

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

FORM 10-K

(Mark One)

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

For the fiscal year ended December 31, 2018

OR

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

Commission File Number 001-35932

ARCTURUS THERAPEUTICS LTD.

(Exact name of Registrant as specified in its Charter)

State of Israel
(State or other jurisdiction of
incorporation or organization)
10628 Science Center Drive, Suite 250
San Diego, California
(Address of principal executive offices)

46-1981974
(I.R.S. Employer
Identification No.)

92121
(Zip Code)

Registrant's telephone number, including area code: (858) 900-2660

Securities registered pursuant to Section 12(b) of the Act: Ordinary Shares, Par Value NIS 0.07 Per Share; Ordinary Shares traded on the NASDAQ stock market

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

Indicate by check mark if the Registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. YES NO

Indicate by check mark if the Registrant is not required to file reports pursuant to Section 13 or 15(d) of the Act. YES NO

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

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

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405) is not contained herein, and will not be contained, to the best of Registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

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

Large accelerated filer	<input type="checkbox"/>	Accelerated filer	<input type="checkbox"/>
Non-accelerated filer	<input checked="" type="checkbox"/>	Smaller reporting company	<input checked="" type="checkbox"/>
Emerging growth company	<input type="checkbox"/>		

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

Indicate by check mark whether the Registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). YES NO

The aggregate market value of the voting and non-voting common equity held by non-affiliates of the Registrant, based on the closing price of the Ordinary Shares on The NASDAQ Stock Market on March 1, 2019 was \$41.3 million.

The number of Registrant's Ordinary Shares outstanding as of March 1, 2019 was 10,761,523.

Table of Contents

	<u>Page</u>
PART I	
Item 1. Business	3
Item 1A. Risk Factors	28
Item 1B. Unresolved Staff Comments	59
Item 2. Properties	59
Item 3. Legal Proceedings	60
Item 4. Mine Safety Disclosures	60
PART II	
Item 5. Market for Registrant’s Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities	61
Item 6. Selected Financial Data	65
Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations	66
Item 7A. Quantitative and Qualitative Disclosures About Market Risk	73
Item 8. Financial Statements and Supplementary Data	73
Item 9. Changes in and Disagreements With Accountants on Accounting and Financial Disclosure	73
Item 9A. Controls and Procedures	73
Item 9B. Other Information	74
PART III	
Item 10. Directors, Executive Officers and Corporate Governance	75
Item 11. Executive Compensation	84
Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters	88
Item 13. Certain Relationships and Related Transactions, and Director Independence	90
Item 14. Principal Accounting Fees and Services	92
PART IV	
Item 15. Exhibits, Financial Statement Schedules	93
Item 16. Form 10-K Summary	93

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K, or this annual report, and the documents incorporated by reference herein may contain “forward-looking statements” within the meaning of the federal securities laws made pursuant to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. Our actual results could differ materially from those anticipated in these forward-looking statements as a result of various factors, including those set forth below under Part I, Item 3.D, “Risk Factors” in this annual report. Except as required by law, we assume no obligation to update these forward-looking statements, whether as a result of new information, future events or otherwise. These statements, which represent our current expectations or beliefs concerning various future events, may contain words such as “may,” “will,” “expect,” “anticipate,” “intend,” “plan,” “believe,” “estimate” or other words indicating future results, though not all forward-looking statements necessarily contain these identifying words. Such statements may include, but are not limited to, statements concerning the following:

- the initiation, cost, timing, progress and results of, and our expected ability to undertake certain activities and accomplish certain goals with respect to, our research and development activities, preclinical studies and clinical trials;
- our ability to obtain and maintain regulatory approval of our product candidates, and any related restrictions, limitations, and/or warnings in the label of an approved product candidate;
- our ability to obtain and deploy funding for our operations;
- our ability to continue as a going concern;
- our plans to research, develop and commercialize our product candidates;
- our strategic alliance partners’ election to pursue development and commercialization of any programs or product candidates that are subject to our collaboration and license agreements with such partners;
- our ability to attract collaborators with relevant development, regulatory and commercialization expertise;
- future activities to be undertaken by our strategic alliance partners, collaborators and other third parties;
- our ability to avoid, settle or be victorious at costly litigation with shareholders, former executives or others;
- our ability to obtain and maintain intellectual property protection for our product candidates;
- the size and growth potential of the markets for our product candidates, and our ability to serve those markets;
- our ability to successfully commercialize, and our expectations regarding future therapeutic and commercial potential with respect to, our product candidates;
- the rate and degree of market acceptance of our product candidates;
- our ability to develop sales and marketing capabilities, whether alone or with potential future collaborators;
- regulatory developments in the United States and foreign countries;
- our ability to attract and retain experienced and seasoned scientific and management professionals to lead the Company;
- the performance of our third-party suppliers and manufacturers;
- the success of competing therapies that are or may become available;

- our expectations regarding the time during which we will be a foreign private issuer;
- our expectations regarding the time during which we will be an emerging growth company under the Jumpstart Our Business Startups Act of 2012 (the “JOBS Act”); and
- the accuracy of our estimates regarding future expenses, future revenues, capital requirements and need for additional financing.

Such forward-looking statements involve known and unknown risks, uncertainties and other factors that may cause actual results or performance to differ materially from those projected. These statements are only current predictions and are subject to known and unknown risks, uncertainties, and other factors that may cause our or our industry’s actual results, levels of activity, performance or achievements to be materially different from those anticipated by the forward-looking statements. In addition, historic results of scientific research, preclinical and clinical trials do not guarantee that the conclusions of future research or trials would not suggest different conclusions or that historic results referred to herein would not be interpreted differently in light of additional research, preclinical and clinical trials results. The forward-looking statements contained in this annual report are subject to risks and uncertainties, including those discussed in our other filings with the United States Securities and Exchange Commission, or the SEC. Readers are cautioned not to place undue reliance on these forward-looking statements, which speak only as of the date hereof. Although we believe that the expectations reflected in the forward-looking statements are reasonable, we cannot guarantee future results, levels of activity, performance, or achievements.

Item 1. Business.**Introduction**

Arcturus Therapeutics Ltd. (“we,” “us,” “Arcturus,” or the “Company”) is an RNA medicines company focused on significant opportunities in rare diseases with a current focus on liver and respiratory diseases. In addition to our internal mRNA platform, our proprietary lipid nanoparticle delivery system, LUNAR®, enables multiple nucleic acid medicines. The Company’s internet address is <https://arcturusrx.com/>. The Company was founded in 2013. On November 15, 2017, Alcobra Ltd. acquired Arcturus Therapeutics, Inc. (“Arcturus Inc.”) pursuant to a merger between the companies. Immediately after giving effect to the merger, on November 15, 2017, Alcobra Ltd. changed its name to Arcturus Therapeutics Ltd. On November 16, 2017, the Company commenced trading on the Nasdaq Global Market under the symbol “ARCT.” On February 11, 2019, we disclosed our intention to initiate a process to redomicile from an Israeli limited company to a U.S. corporation, as described more fully under “Redomiciliation,” below.

The Company’s principal executive offices are located in San Diego, California. Our key proprietary technology has the potential to address the major hurdles in RNA development, namely the effective and safe delivery of RNA therapeutics to disease-relevant target tissues. We believe the versatility of our platform to target multiple tissues, its compatibility with various nucleic acid therapeutics, and our expertise in developing scalable manufacturing processes puts us in a good position to deliver on the next generation of nucleic medicines.

- We have deep expertise in the discovery and development of RNA medicines, including key experience in the production of RNA drug substance and nanoparticle-formulated drug product.
- We have a pipeline of seven drugs in late-stage discovery and early-stage development: two wholly-owned and five pharma partnered programs.
- We have developed a novel lipid-mediated delivery technology platform called LUNAR® which draws from a growing library of over 150 proprietary lipids intended to enable safer and more efficient delivery of RNA medicines.
- Our wholly-owned, LUNAR® and nucleic acid technologies are covered by a patent portfolio of 152 patents and patent applications, issued in the United States, China, Europe, Japan and other countries.

We believe that we can use our proprietary technologies to develop RNA medicines in multiple therapeutic approaches: (1) mRNA, DNA, and replicon protein replacement for therapeutics and protein delivery for vaccines; (2) siRNA, microRNA, and antisense oligonucleotides – knockdown of genes overexpressed in disease; and (3) CRISPR, TALEN, zinc finger proteins, megatals and meganucleases – gene editing of errant genes.

Recent Developments**Redomiciliation**

On February 11, 2019, we disclosed our intention to initiate a process to redomicile from an Israeli limited company to a U.S. corporation. The final form and timing of the redomiciliation has not yet been finalized and the redomiciliation is subject to the approval of our shareholders, Israeli court approval and approval by the U.S. Securities and Exchange Commission (the “SEC”) and the NASDAQ Stock Market LLC (“Nasdaq”), among other conditions precedent. On February 11, 2019, we filed an application with the Tel Aviv District Court to approve the convening of a general shareholders meeting of the Company for the approval of the redomiciliation pursuant to Sections 350 and 351 of the Israeli Companies Law (the “Companies Law”).

In connection with the redomiciliation, the Company entered into a share exchange agreement between the Company and a special-purpose company, Arcturus Therapeutics Holdings Inc. (“NewCo”) (the “Share Exchange Agreement”) in connection with the contemplated redomiciling of the Company from Israel to Delaware (the “Redomiciliation”). Pursuant to the Share Exchange Agreement, and in order to effectuate the transactions contemplated by the Share Exchange Agreement, on February 11, 2019, the Company filed an application with the

Tel Aviv District Court to approve the convening of a general shareholders meeting of the Company for the approval of the Redomiciliation pursuant to Sections 350 and 351 of the Companies Law, 1999-5759. The Share Exchange Agreement and the Redomiciliation are subject to shareholder approval as required by the Companies Law, Israeli court approval, effectiveness of filings to be made with the SEC, approval of the listing of shares of NewCo by the NASDAQ Stock Market LLC (“Nasdaq”) and the other conditions precedent set forth in the Share Exchange Agreement (the “Conditions Precedent”).

In furtherance of the Redomiciliation, the holders of Ordinary Shares of the Company as of a future record date and the holders of options to purchase Ordinary Shares of the Company as of the same record date will transfer their Ordinary Shares of the Company and options to purchase Ordinary Shares of the Company, respectively, to NewCo and, in exchange thereof, will receive one share of common stock of NewCo for each ordinary share of the Company and one option to purchase one share of common stock of NewCo in exchange for each option to purchase an ordinary share of the Company, respectively.

The Company intends the common stock of NewCo to be listed on NASDAQ. Upon consummation of the transactions contemplated by the Share Exchange Agreement, it is expected that the Company’s Ordinary Shares will be delisted from trading on NASDAQ, and the Company is expected to become a private company (as defined in the Companies Law) wholly-owned by NewCo.

Pursuant to the Share Exchange Agreement, the Company also agreed, subject to the Conditions Precedent set forth therein, to transfer all of the shares of Arcturus Therapeutics Inc. (“Arcturus Sub”), a wholly-owned subsidiary of the Company, to NewCo through a reduction of the Company’s equity and the distribution of a dividend-in-kind, such that Arcturus Sub and the Company shall each become a wholly-owned and direct subsidiary of NewCo.

Ornithine Transcarbamylase (OTC) Deficiency Development Program

On February 11, 2019, the Company announced the termination of the obligations of CureVac AG for the preclinical development of ARCT-810, effective 180 days from February 5, 2019 and the re-assumption by the Company of the worldwide rights thereto. Arcturus will reassume 100% global rights for its flagship asset, clinical development candidate ARCT-810, a messenger RNA (mRNA) drug to treat OTC deficiency. ARCT-810 was previously subject to a 50/50 collaboration between Arcturus and CureVac AG. CureVac elected not to continue its obligations for the development of ARCT-810 under and pursuant to the terms of the collaboration.

The preclinical development program for ARCT-810, including Investigational New Drug Application (IND) enabling studies, remains on track. Arcturus is planning to file an IND for ARCT-810 with the U.S. Food and Drug Administration (FDA) in the fourth quarter of 2019.

Pursuant to the terms of the Co-Development Agreement, CureVac is obligated to continue to fund its share of the preclinical expenses for the OTC program until August 5, 2019.

Current Technologies and Limitations

Messenger RNA can be immunogenic. The current lipid nanoparticle technology used to deliver mRNA therapeutics are also limited by their propensity to cause immune responses. This decreases the tolerability of the medicine. These delivery systems are not biodegradable, which causes accumulation of these lipids in cells upon repeat dosing. Each of these aspects of current lipid nanoparticle delivery systems is expected to ultimately limit the utility and therapeutic reach of the RNA therapies they deliver.

Arcturus aims to mitigate the immune response and tolerability issues associated with the LNP mRNA delivery with the development of both less immunogenic mRNAs and biodegradable lipids. The Company has developed processes for the scale up of LNP-mRNA therapeutics to support clinical development.

mRNA therapeutics offer an attractive promise that other RNA medicines cannot provide – to *increase* the production of a protein in the body that is either defective or expressed at low levels to improve symptoms of a genetic disease without interacting with the patient’s genetic code. mRNA therapies have yet to be successful in delivering an approved therapy to patients because of the technical hurdles facing this therapeutic approach. These hurdles include:

- delivery of an intact mRNA, which is much larger than other RNA drugs, to the target organ and cell type needed for a therapeutic effect;
- inefficient translation into the therapeutic protein;
- short duration of effect of the mRNA medicine and
- tolerability issues associated with therapeutic RNAs.

Arcturus’ lipid-mediated delivery platform is designed to address many of the technical issues encountered to date for this very promising area of RNA medicines.

RNA Medicines, Markets and Arcturus’ Technology

There is a significant, unmet medical need in the field of rare genetic diseases. The World Health Organization (WHO) estimates that 10,000 diseases are caused by an error, or mutation, in a single gene, and currently no FDA-approved drug exists for over 95% of known, rare genetic diseases. Moreover, these diseases affect one in a hundred people at birth, and 350 million people worldwide live with a rare genetic disease. Many of these diseases cause moderate to severe symptoms, significantly decreasing quality of life and life expectancy.

Nucleic acid medicines have the potential to treat diseases caused by genetic mutations, including diseases that cannot be treated by conventional drugs, such as small molecules and biologics. Some of these medicines function by providing the means for producing a deficient yet vital protein *in vivo*. Within a cell, DNA carries the blueprint, in the form of genes, from which all proteins necessary for life are encoded. Each gene has the code, carried by a nucleic acid molecule called messenger RNA (“mRNA”), informing the cell’s machinery the pattern of building blocks for making one or more proteins needed for normal biological function.

Nucleic acid therapeutics represent a significant advancement in targeted medicines and several of this class of therapeutics are being developed by public and private companies. These therapies have three general objectives:

- to reduce the amount of a target protein in a patient by binding to and destroying the associated target mRNA (antisense and small interfering RNA (“siRNA”));
- to increase the amount of a functioning target protein by introducing a functional gene or mRNA that encodes for a protein that replaces a malfunctioning protein (mRNA therapy, CRISPR, gene therapy, replicon); and
- to introduce proteins from viruses or malfunctioning proteins in certain cancers to train the immune system to recognize and clear these proteins (nucleic acid vaccines).

siRNA therapies, double-stranded RNA compounds that activate machinery in the cell to destroy a target RNA in the body, are useful in treating diseases caused by viral infections, malfunctioning proteins or an excess of certain proteins that contribute to the severity of symptoms of a disease. siRNA compounds are designed to bind perfectly to one mRNA and trigger machinery in the body to cause the cell to destroy the disease-causing mRNA. This mechanism, called RNA interference (“RNAi”), can be used to prevent mutated genes from being translated into defective proteins that cause disease and can stop viruses from replicating inside the body.

Naked RNA and some DNA molecules are quickly degraded by enzymes in the bloodstream and can cause a strong immune response. Therefore, nucleic acid medicines (mRNA, DNA and siRNA) developed for systemic use must use a vector to deliver the nucleic acid medicine to target cells. Viral delivery vectors and lipid-mediated delivery systems are the two main delivery systems used in a large number of nucleic acid-based therapeutics in development.

Viral delivery vectors are very effective at delivering DNA to alter the genetic make-up of the patient's cells. However, they can cause liver damage and activate an immune response in human patients. Viral vectors may also cause accidental mutations in host DNA. Patients treated with viral vectors can also develop antibodies against these vectors that make the treatment less effective over time.

Lipid-mediated delivery systems are the most common non-viral vectors because they are biocompatible and do not cause insertional mutagenesis. They can also be manipulated to target specific cells in the body. In 2018, the first siRNA therapy using a lipid-mediated delivery system was approved by the FDA for the treatment of polyneuropathy associated with hereditary transthyretin (hTTR) amyloidosis, Onpattro® (Patisiran). Despite these advantages, older lipid-mediated delivery systems, like that utilized in Onpattro®, can stimulate adverse immune responses, requiring co-administration of steroids, and cause liver damage in patients due to their inability to be degraded by the body.

Our Platform Technology

LUNAR

Our LUNAR® lipid-mediated delivery technology includes a diverse, growing library of over 150 proprietary lipids that we rationally designed to be versatile, maximizing efficacy and increasing tolerability of a diverse selection of nucleic acids, target cell types and routes of administration. A key feature of our LUNAR lipids is their biodegradability, decreasing the undesired effects caused by lipid accumulation that are associated with tolerability issues present in other lipid-mediated RNA medicine delivery platforms. Our experienced team continues to innovate in the area of producing LUNAR lipid formulated nucleic acid medicines in a scalable and highly-reproducible manner, reducing the costs of goods for the therapies in our pipeline.

In addition to our LUNAR lipid-mediated delivery technology, we believe we have created innovative, proprietary improvements to producing mRNA medicines, including improvements that increase purity, scalability, efficiency in production times, and adaptability to different mRNA modification strategies. We strive to use these proprietary innovations to benefit each mRNA medicine in our pipeline.

We continue to invest in our LUNAR lipid-mediated delivery of mRNA (encoding CRISPR, TALEN, zinc finger proteins, and meganucleases), siRNA, DNA, microRNA, and antisense oligonucleotide technology platforms to improve their efficacy and safety profile, further expanding their applications. This investment had led to key innovations ensuring optimal characteristics of our LUNAR formulated drug product are attained, which we believe sets us apart from other nucleic acid therapeutics and lipid-mediated delivery platforms.

Arcturus Pipeline of mRNA Medicines

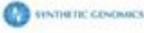


Name	Indication	IND Date	Route of Administration	Target Organ	Target Cells	Prevalence Worldwide
LUNAR-OTC (ARCT-810)	Ornithine Transcarbamylase (OTC) Deficiency	Q4 2019	Intravenous (i.v.)	Liver	Hepatocytes	> 10,000
LUNAR-CF	Cystic Fibrosis	H1 2020	Nebulized Aerosol to Lung	Lung	Bronchial Epithelial Cells	> 70,000
LUNAR-2020	Rare Liver Disease	2021	i.v.	Liver	Hepatocytes	
LUNAR-2020	Rare Lung Disease	2021	Nebulized	Lung	Bronchial Epithelial Cells	

- Arcturus programs focus on messenger RNA (mRNA) drug products for rare diseases
- LUNAR-OTC (ARCT-810, intravenous mRNA medicine): Investigational New Drug (IND) Filing Target Q4 2019
- LUNAR-CF is funded by the Cystic Fibrosis (CF) Foundation – IND Target H1 2020
- If resources are available, we can progress more candidates into the clinic in 2021

We are using our proprietary technology to develop nucleic acid medicines to treat diseases with unmet medical needs, accelerated clinical paths and clear commercial opportunities. Our preclinical pipeline currently has seven active preclinical drug discovery and development programs. This includes wholly-owned programs as well as programs in partnership with Ultragenyx Pharmaceutical, Inc. (“Ultragenyx”), Takeda Pharmaceutical Company Limited (“Takeda”), Janssen Pharmaceuticals, Inc., one of the Janssen Pharmaceutical Companies of Johnson & Johnson (“Janssen”), Synthetic Genomics, Inc. (“Synthetic Genomics” or “SGI”) and CureVac AG (“CureVac”).

- The LUNAR-OTC program is developing mRNA compounds to treat ornithine transcarbamylase (“OTC”) deficiency, a life-threatening genetic disease that affects greater than 10,000 people. We have achieved preclinical proof-of-concept for LUNAR-OTC in a mouse model of the disease. This program was previously co-developed with CureVac, but will become a wholly-owned internal program in August of 2019.
- The LUNAR-CF program is developing mRNA compounds to replace dysfunctional cystic fibrosis transmembrane conductance regulator (“CFTR”) protein in cystic fibrosis (“CF”) patients. CF is a common genetic disease in the United States, and approximately 1,000 patients are newly diagnosed each year. This program is supported by Cystic Fibrosis Foundation Therapeutics, Inc., or CFFT. We have demonstrated activity of an optimized CFTR mRNA in cultured cells and proof of concept for LUNAR delivery to lung epithelial cells *in vivo*.
- LUNAR-RLD is an internal research effort focused on target validation of multiple pipeline LUNAR-mRNA program candidates. A rare liver disease will be selected as a future development program based on these efforts.

Name	Partner	Year of Initiation	Indication	Arcturus Chemistry	Arcturus Delivery	mRNA Process
LUNAR-HBV		2015	Hepatitis B	RNA	LUNAR® Hepatocytes	ARCT
LUNAR-NASH		2017	NASH	RNA	LUNAR® Stellate Cells	ARCT
LUNAR-GSD3		2016	Glycogen Storage Disease Type III	mRNA	LUNAR® Hepatocytes	ARCT
LUNAR-RARE		2016	Rare Disease	mRNA	LUNAR® Hepatocytes	ARCT
LUNAR-RPL		2017	Vaccines	SGI's Replicon RNA	LUNAR® Intramuscular	SGI

- Greater than \$1 Billion in Potential Milestones & Royalties
- Enabling Different Types of RNA – Messenger RNA, Gene Editing RNA, Replicon RNA
- Multiple Cell Types Targeted

- We are partnering with Janssen, a Johnson & Johnson company, to develop nucleic acid-based products for the treatment of hepatitis B virus infection (“HBV”) and potentially other infectious and respiratory diseases.
- We are partnering with Takeda to develop nucleic acid-based therapeutic candidates primarily for the treatment of liver fibrosis. The agreement was entered into on March 8, 2019.
- We are partnering with Ultragenyx to develop up to ten mRNA therapeutic candidates for certain rare disease targets. LUNAR-GSD3 is the first program to be disclosed from the collaboration. Glycogen Storage Disease Type 3 (“GSD”) is caused by genetic mutations in the glycogen debranching enzyme, AGL, which leads to glycogen accumulation in liver and muscle. There are approximately 10,000 patients worldwide with this type of GSD, who experience enlarged liver, increased fats in the blood, low blood sugar, decreased stature and late-onset muscle weakness. There is not currently a cure for GSD3. Treatment typically includes a high-protein diet with cornstarch supplementation to maintain a normal level of glucose in the blood.
- We have a license and collaboration agreement with SGI focused on developing vaccines and therapeutics using their proprietary self-replicating (replicon) nucleic acid technology. We have demonstrated proof-of-concept in preclinical animal models for both vaccines and therapeutics.
- We are partnering with Providence Therapeutics Inc. (“Providence”) to identify and optimize microRNA modulators and/or mimetics for the treatment of neoplastic diseases.

Our Strategy

We aim to leverage our proprietary and licensed intellectual property relating to LUNAR and our nucleic acid technologies to develop a pipeline of mRNA therapeutics for infectious rare diseases and rare genetic disorders with significant unmet medical needs. In addition to our collaborations noted above, we are focused on balancing our portfolio with internally-owned and partnered programs to advance our preclinical candidates in a timely and cost-effective manner.

Our flagship program, LUNAR-OTC, is on track to enter first-in-human studies during 2020.

Our business strategy has three main areas of focus:

- *Drive existing collaborations to achieve first-in-human data for our LUNAR lipid-mediated delivery platform.* The value and promise of our proprietary LUNAR lipid-mediated delivery platform has been recognized by our current partners and continuing partner interest. This value is expected to increase substantially when our pre-clinical data from our LUNAR formulated mRNA medicines is reproduced in our first human clinical studies. We continue to push our first mRNA therapeutic, LUNAR-OTC, toward the clinic and our LUNAR-CF program is supported by our important collaboration with the CF Foundation.
- *Leverage our LUNAR lipid-mediated delivery platform to develop therapeutics for a broad range of additional rare liver and lung diseases.* We have demonstrated in preclinical models the utility of the LUNAR lipid-mediated delivery platform in two important liver cell types, stellate and hepatocyte, as well as bronchial cells in lungs. Our research teams are currently focused internally on discovering our next wave of innovative mRNA medicines, and externally for other nucleic acid modalities, for patients with debilitating rare diseases.
- *Continue to innovate in our core areas of research, including mRNA design and siRNA design, LUNAR lipid formulations and formulation production to increase our competitive advantage over other nucleic acid medicine companies.* Our team has a wealth of research and development experience in the areas of siRNA and mRNA medicine design. We continue to identify new and better ways to design and produce these important nucleic acid medicines, increasing their efficacy and safety profiles. In addition, our team has an advanced understanding of lipid-nanoparticle formulations, continually improving scalability and reproducibility of our LUNAR formulated nucleic acid drug products, translating to better therapies for patients.

Our Competitive Strengths

We believe our proprietary LUNAR lipid-mediated delivery and nucleic acid technologies, extensive intellectual property portfolio and experienced research and development team will enable us to advance our drug candidates and existing partnerships, and further partner our technology platform thereby expanding future development and commercial opportunities.

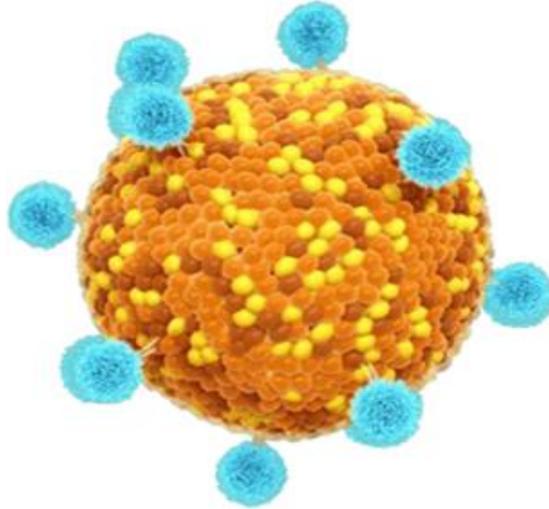
We believe that our competitive strengths include the following, among other areas:

- *LUNAR lipid-mediated delivery technology is applicable to all nucleic acid medicines being developed today that require a formulation:* Preclinical studies have shown that LUNAR delivery technology is compatible with different types of nucleic acids therapeutics, including mRNA, self-amplifying mRNA (or replicon), siRNA, microRNA, antisense oligonucleotides and other oligonucleotide therapeutic approaches. We can combine our LUNAR technology with mRNA therapies that encode for a wide array of therapeutic proteins, including transmembrane proteins (such as transporters, GPCRs, and receptors), secreted proteins (such as hormones and antibodies), engineered nucleases (CRISPR and TALEN), engineered antigen receptors (CAR-T) and intracellular proteins (chaperones, enzymes, intrabodies). We also have pre-clinical data demonstrating proof-of-concept for LUNAR delivery of DNA-based vaccines and therapeutics. The broad applicability of our LUNAR delivery technology is a distinct value driver.
- *LUNAR lipid-mediated delivery technology is applicable to different tissues and cell types via multiple routes of administration.* Most nucleic acid drugs that are marketed or in development are primarily active in liver cells called hepatocytes. Pre-clinical studies have shown that LUNAR can deliver nucleic acid therapies to the liver to hepatocytes and hepatic stellate cells via intravenous injection. Our ability to deliver nucleic acid medicines to both of these cell types provides us a distinct advantage over other technologies that preferentially deliver to hepatocytes only, as stellate cells are key contributors to liver disease progression, including fibrosis and liver cancer. We have also demonstrated functional delivery of LUNAR-formulated mRNA to lung cells through nebulized, inhaled administration. This is the foundation of our LUNAR-CF program and may pave the way for additional therapies to treat rare lung disorders. Additionally, preclinical studies in rodents have shown that LUNAR can deliver nucleic acid compounds to muscle cells via intramuscular injection and retinal cells via subretinal injection intravitreal, an injection to the back of the eye.
- *Ability to repeat dose.* Multiple preclinical studies in rodents and non-human primates have shown no reduction in efficacy upon repeat dosing of LUNAR formulated RNA medicines (siRNA or mRNA). We believe this indicates that LUNAR-delivered nucleic acids may not elicit antibody or cell-mediated immunity that can reduce potency upon repeat dosing.
- *Experienced team.* Our team has extensive experience in the discovery and development of nucleic acid medicines, as well as experience and know-how in lipid-mediated delivery technology. This combination of in-house expertise uniquely positions us to develop innovative, proprietary novel nucleic acid technologies and nucleic acid medicines.
- *Our intellectual property portfolio.* Our LUNAR and nucleic acid technologies are wholly owned by us and covered by our patent portfolio of 152 patents and patent applications, issued in the United States, China, Europe, Japan and other countries. Our intellectual property portfolio serves as a barrier-to-entry for competitors and, since it is wholly-owned and not licensed, does not carry with it down-stream economics which is different than most other pre-clinical stage companies.
- *Ability to develop high barrier-to-entry products with rapid development of subsequent products with lower costs and risks.* The properties of our proprietary technologies, outlined above, allow us to develop high barrier-to-entry nucleic acid medicines. We expect that the versatility of our two development platforms will allow us to develop subsequent products relatively quickly with less risk and lower costs.

Key Attributes of Our LUNAR Lipid-Mediated Delivery Technology

We have designed our LUNAR lipid-mediated delivery platform to address major challenges with nucleic acid medicine delivery, including transfection efficiency, adverse immune reactions and liver damage. See below for a graphic representation of our LUNAR formulation, where blue spheres represent polyethylene glycol (“PEG”) lipids and the orange, darker orange, and yellow spheres represent the proprietary Arcturus (ATX) lipid excipient and other structural components (phospholipid and cholesterol).

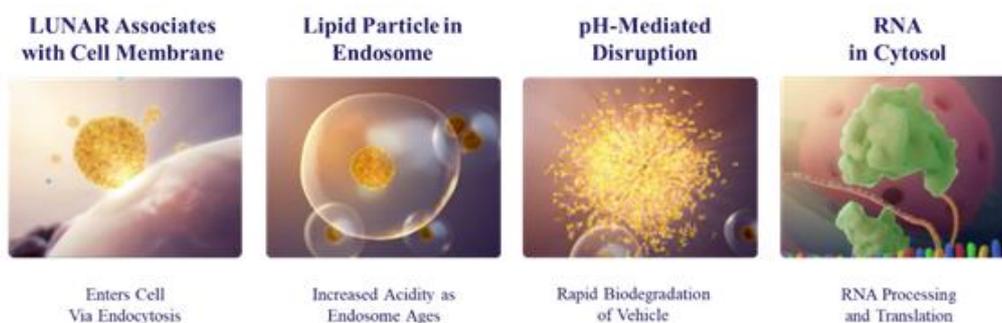
Graphic of LUNAR



LUNAR formulations are a multi-component, lipid-mediated drug delivery system that utilizes our proprietary lipids, called ATX lipids. Each of our ATX lipids contains an amino head group and a biodegradable lipid backbone. The amino head group is a key chemical component of the ATX lipid, making it pH-sensitive and providing it distinct advantages as a component of our LUNAR formulation. At acidic pH, ATX lipids are positively charged, facilitating interaction with the negatively charged nucleic acid, thereby enabling LUNAR particle formation. At physiological pH (e.g., pH 7.4), LUNAR formulations are neutrally charged, avoiding the toxicity often seen with permanently positively-charged lipid-mediated delivery technology, used by other RNA medicine companies. Upon uptake into a cell, by a process called endocytosis that forms a cellular structure called an endosome around the LUNAR formulated nucleic acid therapeutic, the amino head group again becomes positively charged, disrupting the endosome and the LUNAR particle, and releasing the nucleic acid therapeutic into the cell.

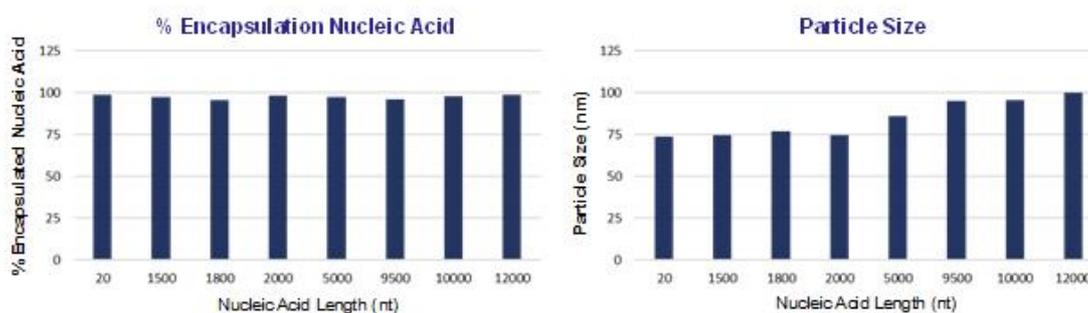
LUNAR-mediated delivery of a nucleic acid therapeutic into cells

The disruption of the LUNAR particle also releases the components of the formulation into the cell, where the ATX lipid is degraded by enzymes in the cell allowing for the lipids to be cleared from the cell. We designed the ATX lipid to be biodegradable by engineering chemical structural components called esters into the ATX backbone that are sensitive to cellular enzymes called esterases. This degradation prevents ATX lipids from accumulating inside the cell and causing toxicity.



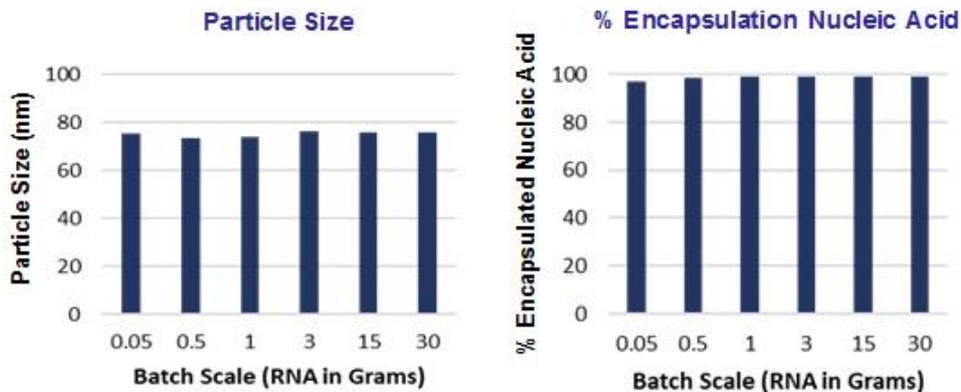
LUNAR compatibility with nucleic acids of various size

We have generated a growing library of over 150 proprietary ATX lipids. ATX lipids are rationally designed to fit the application and vary depending on the target cell type and route of administration. We perform extensive formulation screening for each nucleic acid therapeutic to determine the optimal ATX lipid and LUNAR composition for the particular nucleic acid therapeutic, the desired route of administration and target cell type. We have demonstrated high encapsulating efficiency when formulating a wide range of nucleic acid sizes, 20 to 12,000 nucleotides in length (figure below, left), and particle size was within the acceptable range to maximize targeting and efficacy (figure below, right).

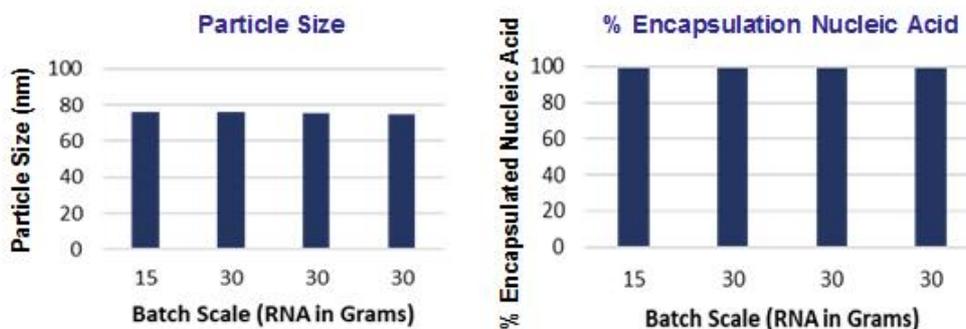


LUNAR Scalability

We have extensively characterized the safety and efficacy profile of first-generation LUNAR 1.0 in rodents and non-human primates and have confirmed its scalability for manufacturing. To test consistency across batch size, we tested batches from 50 milligrams to 30 grams (figure below), and to test reproducibility we tested three different batches of 30 grams each. In both experiments, we demonstrated the LUNAR formulation process is both scalable and reproducible, maintaining both particle size and encapsulation percentage independent of batch size.



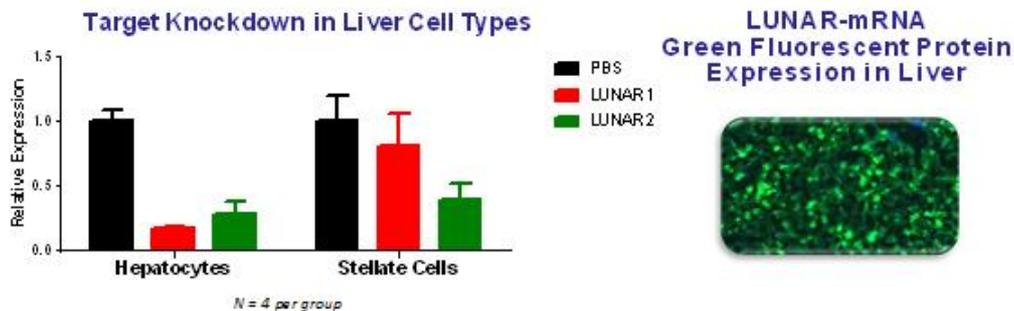
LUNAR Reproducibility



LUNAR In Vivo Proof-of-Concept Data

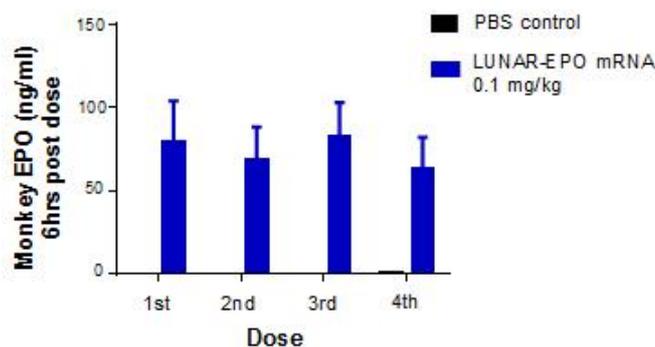
LUNAR formulations can be designed to target different cell types in the liver

We have optimized LUNAR to deliver nucleic acid therapeutics preferentially to different cell types in the liver after intravenous (IV) delivery. When mice were treated with a single intravenous dose of two different LUNAR-siRNA formulations, significant target mRNA knockdown was observed in hepatocytes 72 hours post-treatment (figure below, left). Shown in green, the composition of a different LUNAR-siRNA formulation was modified to also achieve significant target mRNA knockdown in stellate cells, an important cell type for certain liver indications, such as NASH. The hepatocyte-targeting (formulation 1, red bars) was also used to formulate a green fluorescent protein (GFP) mRNA and mice were treated with a single IV dose (figure below, right). 24 hours later, GFP protein was seen throughout the liver, particularly in hepatocytes.

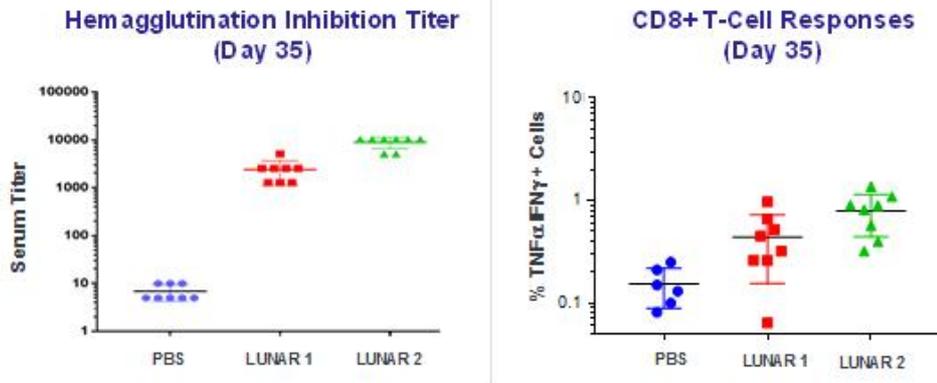


Repeat dose efficacy in non-human primates

To demonstrate efficacy of LUNAR-mRNA in a repeat-dose setting, we treated non-human primates once weekly for four weeks with LUNAR-formulated erythropoietin (EPO) mRNA (figure below). EPO protein expression levels were determined 6 hours following each treatment, and elevated serum EPO levels were maintained following each treatment.



We have demonstrated in proof-of concept studies in mice the utility of LUNAR-formulated mRNA in oncology and infectious disease vaccine applications. Mice were treated at Day 0 (prime) and Day 21 (boost) via intramuscular delivery with 0.5 mg/kg LUNAR-encapsulated hemagglutinin mRNA (2 formulations; LUNAR 1 and LUNAR 2). At Day 35, serum titers were determined in a hemagglutination inhibition assay (figure below, left) and antigen-specific cytokine production was evaluated from CD8+ T-cells (figure below, right). With both formulations tested, titers between 10^3 - 10^4 were achieved and a significant increase in % of TNF α and IFN γ expressing cells was observed.



Our Proprietary mRNA and Protein Design Technology

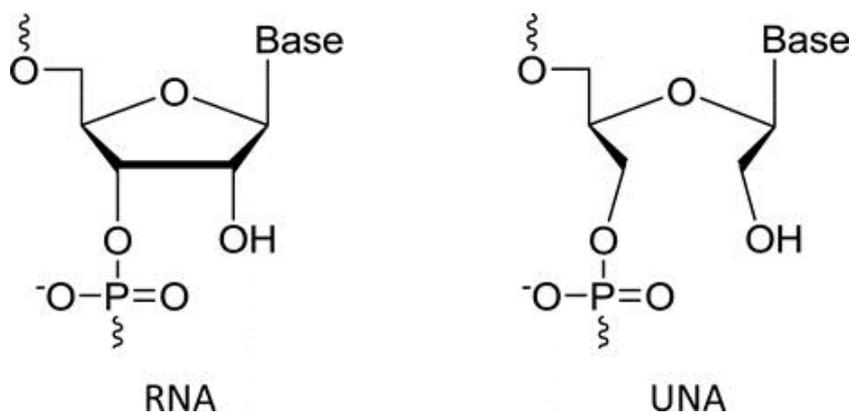
Arcturus has developed in-house expertise in protein and mRNA design to benefit the mRNA programs in its pipeline to address many of the known challenges that face the viability of mRNA therapeutics today. Arcturus has identified several design elements of mRNA compounds that provide improved translation (conversion from mRNA to protein) of our mRNA therapeutics, including untranslated regions derived from species that have not previously been combined with human mRNA sequences. This platform technology is applicable to many different human mRNA sequences that we currently are approaching in our discovery efforts. We have also identified ways to engineer human protein sequences to increase the half-life of the proteins produced by our mRNA therapies as well as directing specific types of proteins more efficiently to certain cellular structures of interest. These innovations are broadly applicable to several programs that are part of our mRNA discovery efforts.

In addition to these platform technologies, Arcturus has developed a proprietary tool to aid our team in the efficient design and development of new mRNA drugs. Arcturus' mRNA Design Suite is a cloud-based software suite with a collection of proprietary bioinformatic algorithms aimed at achieving highly improved potency of a drug substance through optimization of mRNA sequences. The algorithms were developed in house through the integration of experimentally validated optimization processes. Through multi-layered *in silico* QC pipelines, mRNA Design Suite promptly generates error-free sequences in its highest quality accompanied by various statistics. Additionally, mRNA Design Suite seamlessly interacts with Arcturus plasmid/mRNA production database to accelerate the process from mRNA design to gene synthesis, cloning, and mRNA production.

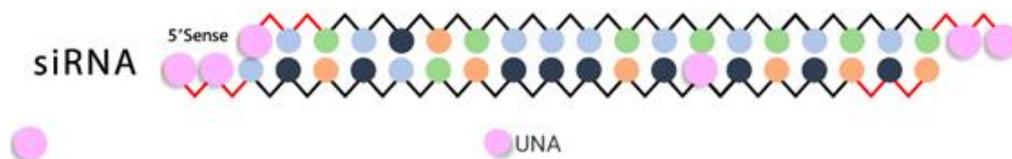
Our Unlocked Nucleic Acid (UNA) Oligomer Chemistry

UNAs are RNA analogues in which the C2'-C3' bond of the ribose ring is absent (figure below). UNA chemistry technology can potentially be applied to multiple types of RNA medicines including mRNA, siRNA, microRNA and guide RNAs for gene editing. One or more UNAs can be positioned strategically along a nucleic acid strand to manipulate the chemical properties of the molecule.

RNA structure compared with UNA structure



UNAs can potentially improve the efficiency and specificity of siRNA-mediated protein suppression. siRNAs are short double-stranded RNA molecules. Once inside the cell, they become part of the RNA-induced silencing complex (“RISC”) and are split into two single siRNA strands. One of these strands stays with RISC and binds to any mRNA with a complementary sequence. If the wrong siRNA strand stays with RISC, it can bind to different mRNAs than the target mRNA and therefore inhibit translation of other proteins. This is an undesired off-target effect and is one of the major barriers to developing effective siRNA medicines. Incorporating a single UNA into siRNA molecules can make one of the strands preferentially bind to RISC improving specificity. Additionally, incorporation of UNA modifications can reduce susceptibility of the siRNA to nuclease degradation, improving the efficiency of siRNA-mediated protein suppression.



We own a comprehensive suite of UNA technology patents for therapeutic and reagent use, enabling us to operate freely and to independently pursue nucleic acid therapeutic candidates incorporating this technology. We are also actively pursuing other novel chemistry technologies with the aim of overcoming the development and therapeutic challenges of nucleic acid medicines. Our goal is to expand our nucleic acid technology portfolio and strengthen our ability to develop safer and more effective nucleic acid therapeutic candidates.

INTERNAL DEVELOPMENT PROGRAMS

We are developing mRNA therapeutic candidates to treat rare diseases with unmet medical needs through the following two internal development programs.

1. LUNAR-OTC (ARCT-810)

On February 11, 2019, Arcturus disclosed that the Company will reassume 100% global rights for its flagship asset, clinical development candidate ARCT-810, a mRNA drug to treat OTC Deficiency. The LUNAR-OTC program addresses ornithine transcarbamylase (OTC) deficiency, a rare, genetic disease caused by mutations in the OTC gene that leads to dysfunctional or deficient OTC levels. OTC deficiency causes the body to accumulate ammonia levels which are neurotoxic and harmful to the liver. Currently, there are only treatments to remove excess ammonia and no disease-modifying treatments of the underlying genetic disorder are available. We use our LUNAR platform to deliver normal OTC mRNA into hepatocytes, where OTC is produced and functions, to produce normal functioning OTC with potentially disease-modifying effects for these patients.

Our LUNAR-OTC approach has the potential to treat the underlying defect that causes the debilitating symptoms that OTC deficiency (dysfunctional or decreased levels of OTC protein), rather than mitigating symptoms by sequestration of ammonia which is at high levels in these patients.

Overview of OTC Deficiency

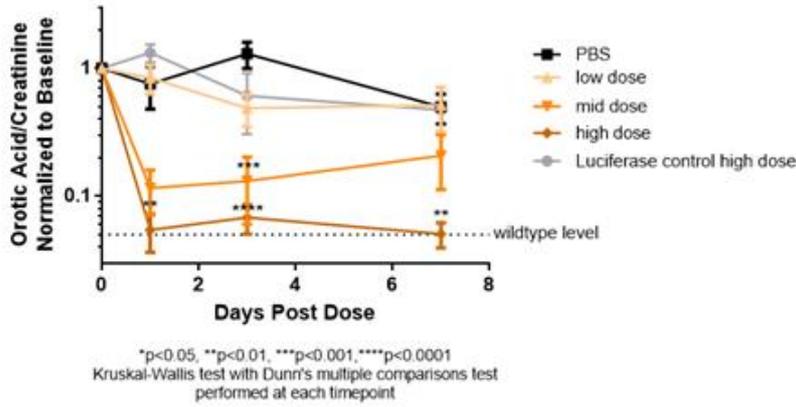
OTC deficiency is caused by mutations in the OTC gene which leads to a non-functional or deficient OTC enzyme. OTCD is the most common urea cycle disorder. Urea cycle disorders are a group of inherited metabolic disorders that make it difficult for afflicted patients to remove toxic waste products as proteins are digested. OTC deficiency is a life-threatening genetic disease. OTC is a critical enzyme in the urea cycle, which takes place in liver cells, and converts ammonia to urea. This conversion does not occur properly in patients with OTC deficiency and ammonia accumulates in their blood, acting as a neurotoxin and liver toxin. This can cause severe symptoms including vomiting, headaches, coma and death. OTC deficiency is an inherited disease that can cause developmental problems, seizures and death in newborn babies. It is an X-linked disorder, so is more common in boys. Patients with less severe symptoms may present later in life, as adults. There is currently no cure for OTC deficiency, apart from liver transplant. However, this treatment comes with significant risk of complications such as organ rejection, and transplant recipients must take immunosuppressant drugs for the rest of their lives. Current standard of care for OTC patients is a low-protein diet and ammonia scavengers to try and prevent patients from accumulating ammonia. These treatments do not address the underlying cause of disease.

The LUNAR-OTC Solution

Our preclinical proof-of-concept studies have shown that LUNAR-delivered human OTC mRNA reduces urinary orotic acid levels in a well-established mouse model of OTC deficiency: *OTC-spf^{ash}* mice. These mice have elevated urinary orotic acid. Because they have a small amount of residual OTC enzyme activity, they are not hyperammonemic unless challenged with a high protein diet through inhibition of the residual OTC enzyme activity.

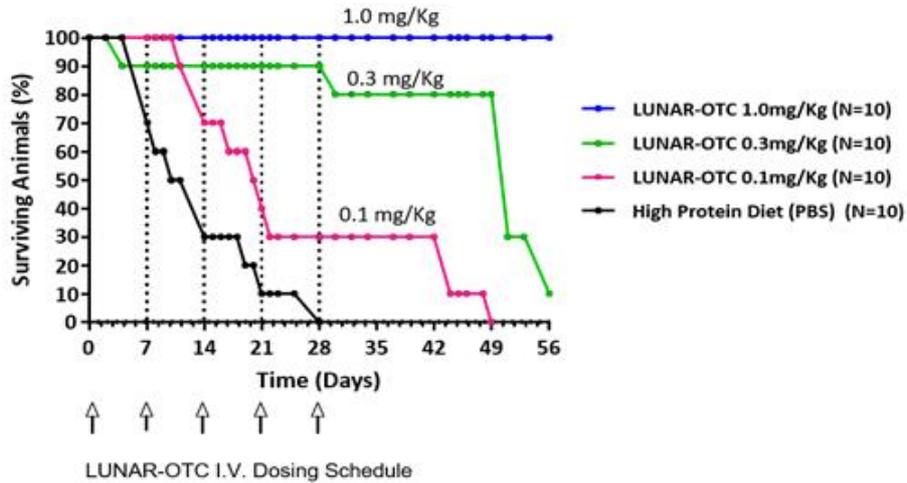
We treated *OTC-spf^{ash}* mice, with induced hyperammonemia resulting from a high protein diet, with one intravenous dose of LUNAR-encapsulated human OTC mRNA (candidate mRNA sequences tested at a low, middle, and high dose levels). A LUNAR-encapsulated Luciferase mRNA was included as a control. As shown in the figure below, this single treatment significantly reduced urinary orotic acid levels for at least seven days post-treatment (n=4-6 animals per group).

Urinary orotic acid levels following single administration



Functional effects following repeat dosing of LUNAR-encapsulated human OTC mRNA in *OTC-spf^{ash}* mice were then determined. *OTC-spf^{ash}* mice were placed on a high-protein diet to induce hyperammonemia and treated with once weekly intravenous doses of LUNAR-encapsulated human OTC mRNA for 5 weeks at 0.3 and 1.0 mg/kg with a 2-week washout period. As shown in the figure below, animals in the 1.0 mg/kg LUNAR-OTC treatment group were completely protected from lethality (n=10 animals per group).

Survival of *OTC*-deficient mice on high protein diet following weekly LUNAR-OTC treatment



Our LUNAR-OTC program utilizes our current innovations in protein sequence optimization, mRNA coding region optimization and our proprietary untranslated regions that increase the efficiency of our mRNA therapeutic to translate into protein, the half-life of the OTC protein and also its localization into the mitochondria (a cellular structure) where the OTC protein resides and functions.

2. LUNAR-CF

The LUNAR-CF program addresses cystic fibrosis, a progressive lung disease caused by mutations in the CFTR gene. We use our LUNAR platform to deliver optimized CFTR mRNA into airway epithelial cells. This allows airway cells to produce functional CFTR protein using their native translational machinery and protein trafficking pathways.

This approach has the potential to treat the underlying defect that causes CF (dysfunctional or absent CFTR protein) in *all* such patients, regardless of mutation type. The potential has been recognized by Cystic Fibrosis Foundation Therapeutics, Inc. (CFFT), with whom we have partnered to develop this important therapy.

Overview of CF

According to the National Institutes of Health, CF is the most common lethal genetic disease in the United States. Currently, Arcturus is focusing on Class 1 patients which make up approximately 10% of the United States CF population. More than 30,000 people are living with CF in the United States, 70,000 people worldwide, and approximately 1,000 people are newly-diagnosed each year. There are 2,000 known mutations in the CFTR gene that affect the function of the CFTR protein, an ion channel that controls chloride and sodium movement in-and-out of cells. When this channel is absent or dysfunctional, thick mucus can accumulate in airways and pancreatic ducts, which can cause coughing, chronic bacterial infections, inflammation, tissue scarring, digestive problems and other serious complications. The median lifespan for a person with CF in the United States is 37 years, and the cause of death is usually lung damage.

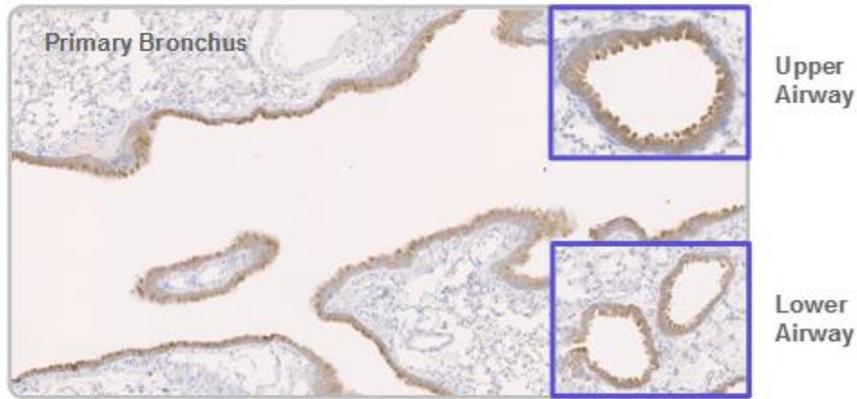
There are currently no FDA-approved drugs that can treat all 2,000 CFTR mutations. The FDA has approved three CFTR modulator therapies (Kalydeco®, Orkambi® and Symdeko®), to treat fewer than 40 CF-causing mutations. These drugs do not treat the underlying genetic cause of CF, but instead assist the mutant CFTR protein to reach the cell membrane and/or increase the functional ion channel activity of the mutant CFTR protein. For patients with other mutations, palliative treatment, including antibiotics and mucolytics, is the primary standard of care. Many of these patients ultimately suffer from decreased lung function and require lung transplant.

Our LUNAR-CF Solution

With the support of CFFT, we are developing an mRNA therapeutic to treat and prevent lung disease in CF patients. Our LUNAR-CF compound comprises normal CFTR mRNA encapsulated by LUNAR delivery technology. This approach is a form of protein replacement therapy as it enables lung cells to produce normal CFTR protein.

We have completed preclinical proof-of-concept studies, demonstrating that LUNAR efficiently delivers a functional reporter mRNA efficiently into mouse lung epithelial cells *in vivo* (figure below). Six hours following intratracheal delivery of 0.1 mg/kg of the LUNAR-encapsulated reporter green fluorescent protein (GFP) mRNA, GFP protein expression (shown in brown) was observed in mouse lung epithelial cells of the primary bronchus and in bronchioles, important lung structures, located in the upper and lower airways.

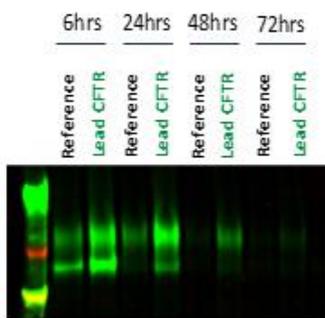
In vivo targeting to lung epithelial cells following treatment with LUNAR-reporter mRNA



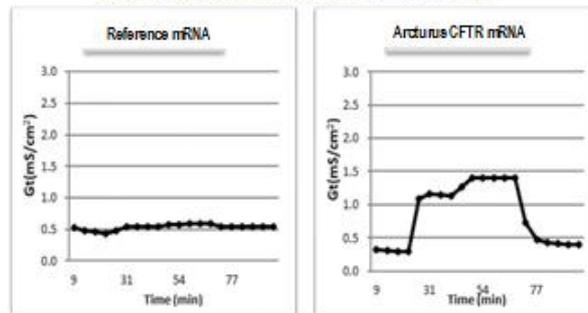
Through optimization of the CFTR mRNA coding sequence and untranslated regions, we were also able to significantly improve CFTR expression and demonstrate enhanced ion channel activity in an in vitro model system. In cystic fibrosis bronchial epithelial (CFBE) cells transfected with a lead candidate CFTR mRNA sequence, protein expression was significantly increased and the duration of expression was prolonged compared to a reference CFTR mRNA which is the natural coding sequence (figure below, left). When the Arcturus lead candidate CFTR mRNA was transfected into FRT epithelial cells (a cell type used to measure conductance in CF research), a significant increase in transepithelial conductance was observed (figure below, right), indicating that the CFTR protein produced from the mRNA is functional. In this study, the same reference CFTR mRNA was included and minimal functional activity was observed, indicating significant improvement of our proprietary mRNA design compared to the natural sequence.

CFTR protein expression (left) and functional activity (right)

Protein Expression in CFBE Cells



Transepithelial Conductance in FRT Cells



COLLABORATION AGREEMENTS

In addition to our internal development programs, we have a number of development partnerships structured such that we work to discover siRNA or mRNA therapeutic candidates formulated in our LUNAR lipid-mediated delivery system. We are collaborating with Janssen to develop nucleic acid-based candidates for hepatitis B virus (HBV) and potentially other infectious or respiratory diseases, with SGI to enable their self-replicating RNA technology for animal and human vaccines and therapeutics, with Takeda to develop nucleic acid therapeutic candidates for NASH and other gastrointestinal disorders, with Ultragenyx to develop mRNA therapeutic candidates for rare disease targets and with CureVac to develop mRNA therapeutic and vaccine candidates for various indications. We have also received funding from Cystic Fibrosis Foundation Therapeutics, Inc., or CFFT, to support our LUNAR-CF development program, which is described above.

Janssen Agreement

On October 18, 2017, we entered into a Research Collaboration and License Agreement (“Janssen Agreement”) with Janssen to address hepatitis B virus (HBV) with an RNA approach. Under this agreement, we are collaborating with Janssen to create therapeutics intended to treat HBV, and at Janssen’s option, other infectious or respiratory disease viruses. Both parties to the Janssen Agreement will carry out their respective research obligations pursuant to agreed upon joint research plans. Janssen may select certain therapeutics in the field for further development by the parties under a joint research plan subject to the terms of the Janssen agreement. Following these joint research efforts, if Janssen selects a development candidate, we will grant to Janssen an exclusive license to the development candidate. As a part of this agreement with Janssen, we will not engage in research independent of this agreement with Janssen for HBV or other disease areas in which Janssen has exercised its option rights to products in the therapeutic area.

The Janssen agreement provides that Janssen will develop the licensed development candidates, obtain certain regulatory approvals and commercialize products containing the development candidates. With respect to rights in infectious and respiratory diseases, Janssen also has an option to have us develop and license therapeutics for infectious and respiratory disease viruses, provided that we may collaborate with third parties and license any rights in the option disease areas to third parties so long as Janssen has not exercised its option rights to products in the therapeutic area. Under the Janssen Agreement, both parties also grant each other certain non-exclusive, royalty-free licenses to conduct the research under the agreement.

Under the Janssen Agreement, Janssen paid us an up-front fee in the mid \$5 million to \$10 million range. On a development candidate-by-development candidate basis, Janssen will pay us certain development milestone payments of up to \$56.5 million for each of the first two products in HBV and in each indication for which Janssen exercises an option. In addition, Janssen will pay us multiple sales milestone payments in the \$20 million to \$40 million range if specified annual net sales milestones are achieved by Janssen, on a research program-by-research program basis for the first calendar year in which such net sales milestones have been achieved. Janssen will also pay option exercise fees within the \$1 to \$5 million range, depending on timing of the election to include either of the option fields. In addition, Janssen will pay royalties on annual net sales of licensed products up to mid-single digits range, subject to reduction on a country-by-country and licensed-product-by-licensed-product basis and subject to certain events, such as expiration of program patents.

The Janssen Agreement will terminate when no further royalty payments on any licensed products are payable. Janssen may terminate the Janssen Agreement at any time on a licensed product-by-licensed product and country-by-country basis, or in its entirety, in each case upon 60 days’ written notice.

Ultragenyx Agreement

On October 26, 2015, we and Ultragenyx Pharmaceutical Inc. entered into a Research Collaboration and License Agreement, as amended on October 17, 2017 and April 20, 2018 (the “Ultragenyx Agreement”). Ultragenyx initially selected two development targets, including Glycogen Storage Disease III, and the parties agreed to a list of eight additional reserved targets related to rare diseases for which Ultragenyx has the exclusive right to evaluate for collaborative development. During the reserved target exclusivity period Ultragenyx may substitute a reserved target for a selected target, and/or exercise an expansion option by payment to us, whereby a reserved target will be deemed an additional target (and will preclude an additional reserved target in place of the converted reserved target). Further, during the reserved target exclusivity period, Ultragenyx may replace a reserved target with a proposed new target, subject to certain conditions including whether we have the ability to partner such new target.

The Ultragenyx Agreement additionally provides for limitations on our activities with third parties utilizing LUNAR lipid-mediated delivery technology with respect to a development target for a specified period of time. During the reserved target exclusivity period, we have agreed to exclusivity with respect to any product containing mRNA, including modified mRNA, or UNA oligomer with respect to such reserved target, and will first offer Ultragenyx a right of first negotiation for any other RNA product or a product utilizing the LUNAR delivery technology with respect to such reserved target. The reserved target restrictions terminate upon expiration of the reserved target exclusivity period for each target, which may be extended on a reserved target-by-reserved target basis upon payment of an exclusivity extension fee.

On a reserved target-by-reserved target basis, following the target exclusivity period, Ultragenyx receives an exclusive right of first negotiation to obtain an exclusive license to exploit RNA products with respect to such reserved target. Following the reserved target right of first negotiation period, if the parties have not entered into an agreement during a specified time period, the rights of Ultragenyx terminate and we may grant a license or enter into a third-party arrangement with respect to such reserved target.

Under the Ultragenyx Agreement, Ultragenyx receives a co-exclusive, royalty-free, sublicenseable license under our technology and collaboration technology to conduct collaborative development of development targets, compounds and products. The license remains in effect for a specified option period based upon development plan milestones being achieved with respect to development targets and reserved targets and compounds and products with respect to such development targets and reserved targets. If Ultragenyx exercises its option with respect to a development target and the parties enter into a license agreement, Ultragenyx receives an exclusive (even as to us), royalty bearing, sublicenseable (subject to certain limitations), license under our technology and collaboration technology to exploit compound and products with respect to such development target.

For development and reserved targets that revert to us, we will pay Ultragenyx royalties on net sales of discontinued targets on a country-by-country basis, until the expiration of the last valid claim or the product-specific patents or patent rights licensed by Ultragenyx to us covering such discontinued targets. Such royalties depend on the state of development of the corresponding discontinued target, set in the low-single digits range.

Ultragenyx paid us an upfront fee of \$10 million. We are entitled to certain additional payments upon exercise of the Ultragenyx expansion option and/or exclusivity extension (if any), and for costs incurred by us in conducting the activities assigned to us under each collaboration development plan. In addition, on a development target-by-development target basis, Ultragenyx will pay us a one-time milestone payment after the first optimized lead designation for the first product with respect of such development target. For each development target for which Ultragenyx exercises its option, Ultragenyx will pay us a one-time option exercise fee based upon on the total number of development targets for which option exercises have been made by Ultragenyx. The option exercise fee is subject to reduction if a development target does not, for example, utilize RNA delivery technology covered by our patent or a nucleic acid chemistry technology covered by our patent. Ultragenyx will also pay us certain milestone payments in the maximum amount of \$49 million per development target with respect to clinical/regulatory development, and a maximum amount of \$90 million per development target with respect to commercialization, in each case subject to reduction if such product does not utilize RNA delivered technology covered by our patent. Ultragenyx will pay royalties as a percentage of net sales on a product-by-product and country-by-country basis during the applicable royalty term up to 10%.

The Ultragenyx Agreement provides that each party owns their respective collaboration know-how and collaboration patents and jointly own all joint collaboration know-how and joint collaboration patents, provided that Ultragenyx owns all right, title and interest in and to all collaboration technology that specifically relates to (a) the composition or formulation of a particular compound or product, or (b) any method of using, making or administering a particular compound or product. Further, we will own all improvements to LUNAR lipid-mediated delivery technology and/or UNA oligomer chemistry.

The Ultragenyx Agreement expires on the last-to-expire royalty term for the last product on a development target-by-development target basis, unless earlier terminated. Upon expiration with respect to a particular development target, the licenses to Arcturus know-how granted to Ultragenyx to exploit products with respect to such development target will be fully paid-up, irrevocable and exclusive. On a target-by-target basis, Ultragenyx has the right to terminate for convenience with respect to such target upon 60 days written notice.

Synthetic Genomics Agreement

On October 24, 2017, we entered into a Research and Exclusive License Agreement with Synthetic Genomics, Inc. (the “Synthetic Genomics Agreement”). Under the Synthetic Genomics Agreement, we will carry out research relating to our LUNAR lipid-mediated delivery for specifically agreed research programs in the area of self-replicating mRNA.

We granted Synthetic Genomics an exclusive, worldwide license, under our intellectual property related to LUNAR lipid-mediated delivery, to research, develop, manufacture and commercialize for vaccine and human therapeutic self-amplifying RNA products but expressly excluding diagnosis, prophylaxis and treatment of respiratory disease viruses other than influenza.

Each party retains ownership rights over intellectual property invented jointly by Synthetic Genomics and us (with inventorship determined by U.S. patent law). Under the Synthetic Genomics Agreement, we own all LUNAR product manufacturing process and process technology within any jointly invented program intellectual property (pursuant to an assignment by Synthetic Genomics of its interest in the joint intellectual property). Synthetic Genomics owns all other intellectual property conceived by or for us or jointly invented in performing any research plan that is not expressly assigned to us. Synthetic Genomics will reimburse us for labor costs and pay us a percentage of all cash payments received from any sublicense for a LUNAR product, in the mid 10% to 20% range, less payments made to third parties to obtain the right to practice intellectual property used to develop or necessary to make, use, or sell all or part of licensed LUNAR product (which reduction may not exceed 50% of the aggregate amount paid to us with respect to a specific LUNAR product for any calendar quarter).

If Synthetic Genomics enters into a LUNAR research agreement with a third party, does not develop a LUNAR product with such third party, but subsequently licenses non-LUNAR products to and develops non-LUNAR products with such third party, then Synthetic Genomics will pay us a percentage of the consideration received for such non-LUNAR product in the 5% to 10% range. In the event that Synthetic Genomics desires to sell LUNAR products for which it obtains marketing approval, the Synthetic Genomics Agreement provides that we and Synthetic Genomics will negotiate in good faith with respect to the economics for that specific product opportunity.

Under the Synthetic Genomics Agreement, in order to maintain exclusive rights, Synthetic Genomics must achieve certain specified milestones or pay us annual exclusivity maintenance fees.

Unless earlier terminated, the agreement with Synthetic Genomics continues in full force and effect until the expiration, abandonment, or termination of the last valid claim of a patent within the licensed intellectual property, provided that, the agreement will terminate on the seventh anniversary of the effective date if the agreement becomes non-exclusive and neither Synthetic Genomics nor its sublicensee have achieved specified preclinical milestones within designated time periods. In addition, Synthetic Genomics has the right to terminate the agreement for convenience on ninety (90) days' written notice.

Takeda Agreement

On December 6, 2016, we entered into a Research Agreement with Millennium Pharmaceuticals, Inc., a wholly-owned subsidiary of Takeda (collectively, “Takeda”), as amended December 21, 2017 (the “Takeda Agreement”). Under the agreement with Takeda, we and Takeda are conducting a research program (“Research Program”) to discover siRNA medicine(s) for the treatment of Nonalcoholic Steatohepatitis (“NASH”). We intend to develop siRNA compounds formulated in LUNAR lipid-mediated delivery technology for *in vivo* studies. The Takeda agreement stated that for the initial research term, which has a stated end date of December 20, 2018 (“Research Term”), Takeda received a non-exclusive and worldwide license, with a right to sublicense, our technology for the purpose of conducting the research program under our agreement. We have further agreed, for the period of two years after the Research Term, not to engage in any research or development activities for which LUNAR and UNA oligomers are used against the same NASH target that is the subject of the Research Program. On March 8, 2019, the Company entered into a Research Collaboration Agreement with Takeda for the purpose of designing, optimizing and manufacturing LUNAR®-formulated mRNA Therapeutics.

Providence Agreement

On March 16, 2016, we entered into a Research Collaboration and License Agreement with a related party, Providence (the “Providence Agreement”), whose CEO and President is also a shareholder of the Company, to identify and optimize microRNA modulators or mimetics for the treatment of neoplastic diseases. In April 2017, the Providence Agreement was amended to include mRNA for the treatment of neoplastic disease. In July 2018, the Providence Agreement was amended and restated to cover brain neoplasms, breast neoplasms and ovarian neoplasms. Each party is responsible for their own research costs under the agreement, and Providence is responsible for all of the development costs through the completion of Phase 2 clinical trials. We are entitled to share in future product revenue of each product provided we share in the product’s post Phase 2 costs. Separately, Providence has agreed to pay a specified rate for the use of our employees.

CureVac Agreements

1. Development and Option Agreement

On January 1, 2018, we entered into a Development and Option Agreement with CureVac AG (“CureVac”), which was amended on May 3, 2018, as restated in the Restated Amendment to the Development and Option Agreement on September 28, 2018 (such agreement, as amended by the restated amendment, the “Development and Option Agreement”). Under the terms of the Development and Option Agreement, CureVac and Arcturus agreed to conduct joint preclinical development programs and we granted CureVac a license on pre-agreed license terms, with respect to targets to be identified during the term of our agreement, to develop and commercialize certain products incorporating our patents and know-how related to delivery systems based on or incorporating lipid-mediated delivery systems (including the LUNAR® platform) (the “Arcturus LMD Technology”), and CureVac patents and know-how related to mRNA technology. Under the terms of the Development and Option Agreement, we granted to CureVac a worldwide, non-exclusive license to use the Arcturus LMD Technology, including the right to grant sublicenses, for the purpose of conducting research and preclinical development activities, subject to certain limitations. In addition, CureVac granted to us a worldwide, non-exclusive license under its mRNA technology, solely to the extent necessary to execute the activities contemplated by the agreement. Subject to certain restrictions, the parties will have an undivided one-half interest in the patents and know-how developed jointly by the parties during the course of the agreement. Pursuant to a May 2018 amendment to the Development and Option Agreement (which as noted above was amended and restated on September 28, 2018), we increased the number of targets available to CureVac under the Development and Option Agreement and agreed upon the license forms to be executed upon selection of the targets by CureVac.

In consideration for the rights granted under the agreement, we received an upfront fee from CureVac. Each development program will be subject to the terms of a work plan under which the parties will use diligent efforts to develop defined products. CureVac may designate certain targets as reserved targets, subject to certain pre-existing restrictions. CureVac has licenses from us for a pre-defined number of targets to use the Arcturus LMD Technology for the development and commercialization of products. To the extent a reserved target is only available on a nonexclusive basis, CureVac may elect to enter into a non-exclusive license agreement. Such licenses shall be obtained under separate, pre-negotiated forms of license agreements to be entered into by the parties upon identification of the targets. If CureVac identifies a target pursuant to the agreement, it will be required to pay us a fee for an exclusive license – or non-exclusive license, as applicable – based on whether the target is a rare disease target or non-rare disease targets. Pursuant to the form of exclusive license agreement, if CureVac achieves all development and commercialization milestones with respect to the licensed product developed for an identified target, CureVac will be required to pay certain development and regulatory approval milestones depending on whether the target is a rare disease target or non-rare disease target. CureVac will also be required to pay us low single-digit royalties on the net sales of each product falling under a license agreement on a country-by-country and product-by-product basis. Such royalties are subject to reduction for third party payments with respect to licensed products or if there is no valid claim under the licensed patents, but may not fall below a specified percentage if the licensed product during the royalty term is not covered by a licensed patent. Further, if within 24 months after the license agreement effective date, CureVac grants a sublicense to a third party under the license agreement for the development and commercialization of licensed products, then CureVac will pay us a single-digit percentage of the total sublicense income actually received by CureVac to the extent the sublicense income exceeds the fee paid by CureVac under the Development and Option Agreement to identify a target for this license agreement and the milestone payments paid by CureVac under this license agreement. The fees, milestones and royalty payments for a non-exclusive license are fifty percent (50%) of the corresponding payments for an exclusive license.

The Development and Option Agreement has an initial term of eight years unless earlier terminated or extended in accordance with its terms. Within 60 days prior to the expiration of the initial term, CureVac has the option to extend the initial term of the agreement on an annual basis for up to a total of three successive years upon payment to us of an annual non-refundable extension fee. CureVac has the right to terminate the agreement in full or on a program-by-program basis (i) in the event of material breach by us that is not cured within the cure period specified in the agreement, (ii) in the event of a change in control of Arcturus or (iii) without cause upon 60 days' notice to us. We have the right to terminate the agreement upon material breach by CureVac that is not cured within the period specified by the agreement. Upon termination, all licenses granted under the agreement will terminate, but any license agreement entered into pursuant upon the identification of a target will remain in effect.

2. Co-Development and Co-Commercialization Agreement

Concurrently with the Development and Option Agreement, we entered into a Co-Development and Co-Commercialization Agreement with CureVac (the "Co-Development Agreement"). Pursuant to the Co-Development Agreement, the overall collaboration will be managed by a joint steering committee. The parties also have the option to co-develop two mRNA programs for CureVac and one mRNA program for us, including targets for such programs selected from the reserved target list established under the Development and Option Agreement.

Unless earlier terminated, the Co-Development Agreement shall continue in full force and effect on a product-by-product and country-by-country basis until the commercialization party no longer sells product in such country, or with respect to opt-out products, the expiration of the royalty term for such product in accordance with the terms of the agreement. A program initiated pursuant to the Co-Development Agreement may be earlier terminated (i) by CureVac with respect to an Arcturus program and by Arcturus with respect to a CureVac program, for convenience upon 180 days written notice, or (ii) by either party in the event of material breach, if the breaching party has not cured such breach within the applicable cure period. The Co-Development Agreement may be earlier terminated by either party in the event the other party commences legal action against the terminating party challenging the scope of the non-challenging party's patents.

On February 11, 2019, the Company announced the termination of the obligations of CureVac for the preclinical development of ARCT-810, effective 180 days from February 5, 2019 and the re-assumption by the Company of the worldwide rights thereto. Arcturus will reassume 100% global rights for its flagship asset, clinical development candidate ARCT-810, a messenger RNA (mRNA) drug to treat ornithine transcarbamylase (OTC) deficiency. ARCT-810 was previously subject to a 50/50 collaboration between Arcturus and CureVac AG under the Co-Development Agreement. CureVac elected not to continue its obligations for the preclinical development of ARCT-810 under and pursuant to the terms of the collaboration, which will be effective in the third quarter of 2019.

Pursuant to the terms of the Co-Development Agreement, CureVac is obligated to continue to fund its share of the preclinical expenses for the OTC program into August of 2019.

OTHER MATERIAL AGREEMENTS

The Company has certain other material agreements, including the Protiva Agreement and CFFT Agreement discussed below.

Protiva Agreement

On August 9, 2013, Marina Biotech, Inc. (“Marina”) assigned certain intellectual property, including patents, inventions and patent-related information related to UNA oligonucleotide therapeutics to us pursuant to a Patent Assignment and License Agreement, as well as Marina’s rights and obligations under a License Agreement with Protiva Biotherapeutics Inc. (“Protiva”), a wholly-owned subsidiary of Arbutus Biopharma Corporation, dated November 28, 2012 (the “Protiva Agreement”). The intellectual property licensed from Marina and Protiva is a significant component of our UNA oligomer chemistry platform. As partial consideration for the assignment from Marina, we granted Marina a royalty-free, fully-paid, irrevocable, worldwide, non-exclusive license to use the inventions, ideas and information embodied in the assigned patents to develop, make, use and sell chemical compounds intended for human and animal therapeutic uses (including certain rights to sublicense in connection with continuing research, development and/or commercialization). We also paid an upfront fee to Marina and agreed to maintain the assigned patents in certain countries.

Under the assigned Protiva Agreement, we granted Protiva a non-exclusive, irrevocable, perpetual, worldwide license with certain rights to sublicense (in connection with continuing research, development and/or commercialization) to exploit our patents, know-how and inventions relating to our technology for purposes of the development of human therapeutics. Protiva will pay us milestone payments with an aggregate value of up to \$3.25 million for each Protiva product directed to a specific gene target, upon achievement of certain development milestones with respect to each such product and target. If, instead, Protiva sublicenses the commercialization rights for a Protiva product, then Protiva will pay us a percentage of sublicense revenues paid to Protiva by such sublicensee, depending on the development stage of such Protiva product at the time of sublicense. In addition, Protiva will pay us royalties on net sales of Protiva products during the royalty term depending on the type of product, on a country-by-country basis. For licensed Protiva products, royalties will be paid in the low single digit range on net sales for such product, subject to reduction on net sales for such product in the event there is no patent coverage or generic products are introduced with respect to such Protiva product. A royalty reduction for a Protiva product will also apply if Protiva is required to license third party intellectual property to commercialize such product, subject to a floor for such reductions.

The Protiva Agreement term, for a particular Protiva product in a particular country, will expire (on a country-by-country basis) upon the earlier of (i) the expiration of the royalty term for such Protiva product in such country or (ii) the end of the calendar quarter in which sales in such country of generic products exceed a certain amount compared to sales of Protiva products in such country. The Protiva Agreement will expire in its entirety upon expiration of the last royalty term for any of our patents with respect to which Protiva has a license under the Protiva Agreement, unless earlier terminated. Protiva may terminate the Protiva Agreement for convenience in its entirety, or for a particular country or countries, upon ninety days’ prior written notice to Arcturus.

Cystic Fibrosis Foundation Therapeutics Agreement

On May 16, 2017, CFFT awarded us with funds for a development program to identify lead CFTR mRNA sequences and LUNAR formulations, demonstrate tolerability of LUNAR CFTR mRNA, and demonstrate translatability of aerosolized LUNAR (the “CFFT Agreement”). The award of approximately \$3.1 million will be received according to a milestone schedule and unused funds will be retained by CFFT. We will use commercially reasonable efforts to conduct the development program, and after the completion of a development program, we will use commercially reasonable efforts to continue to develop the product. The award includes a grant of rights under CFFT know-how to assist us to research, develop, commercialize, make or otherwise exploit a product.

If the award results in a successful product, we will pay CFFT a specified payment amount in installments following commercialization based on a formula that is a single-digit multiple of the total award amount, plus a payment equal to the awarded payments, after aggregate net sales of the product exceed certain thresholds. Further, in the event of a license, sale or other transfer of the product or our development program technology (including a change of control transaction), we will pay CFFT a percentage of such transfer payments actually received by us or our shareholders (subject to a royalty cap).

CFFT has an interruption license right under the CFFT Agreement so that if we fail to use commercially reasonable efforts to develop a product for a certain time period before the first commercial sale of the product, CFFT may, upon written notice of such interruption to us and our failure to effectively deny such interruption or cure such interruption as set forth in the CFFT Agreement, exercise certain rights pursuant to procedures set forth in the CFFT Agreement. CFFT's interruption license rights include, in certain cases, payments from us to CFFT, or the grant of an exclusive (even as to us), worldwide license to CFFT under our development program technology solely to the extent necessary to manufacture, have manufactured, license, use, sell, offer to sell, and support the product in the field of treatment of cystic fibrosis and other pulmonary diseases.

All inventions, data, know-how, information, results, analyses and other intellectual property rights resulting from the development program will be owned by us, and subject to certain exceptions, CFFT assigns and transfers to us all of CFFT's right, title, and interest in and to all inventions and other intellectual property resulting from the development program.

Either party may terminate the CFFT Agreement for cause (e.g., material breach by the other party of its covenants or obligations).

INTELLECTUAL PROPERTY

Our business success depends in part on our ability to obtain and maintain intellectual property protection for our proprietary technologies, inventions and know-how, and on its ability to operate without infringing on the proprietary rights of others. We strive to protect our intellectual property through a combination of patents, trademarks, trade secrets, licensing agreements and confidentiality agreements with employees, advisors, consultants and contractors.

We rely on continuing technological innovation to strengthen our proprietary position in the field of nucleic acid medicines. Therefore, we plan to continue to file patent applications in jurisdictions around the world as we discover and develops novel nucleic acid technology platforms and novel nucleic acid therapeutic candidates. We cannot guarantee that future applications will be issued.

Our Patent Portfolio

As of March 1, 2019, we are the sole owner of 152 patents and pending patent applications including 18 U.S. patents, 24 pending U.S. patent applications, 7 pending international applications under Patent Cooperation Treaty ("PCT"), 44 foreign patents and 59 pending foreign patent applications. The claims of these patents and pending applications include compositions of matter, methods of use, manufacturing process and drug product formulations. These claims cover the use of our core platform technologies including the use of LUNAR and lipid components to deliver nucleic acid, the use of UNA oligomers for therapeutics and reagents, and the use of LNA oligomers for therapeutics. Claims also cover the composition of matter and use of our therapeutic candidates to treat target diseases including HBV and NASH. Our issued patents are expected to expire between 2028 and 2038, without taking into account any possible patent term extensions.

Our patent portfolio includes the following patents and pending patent applications for LUNAR, UNA and the use of LNA in certain RNA medicines:

- LUNAR – As of March 1, 2019, we own 10 U.S. patents, 8 U.S. pending patent applications, 3 international applications (PTC), and 29 foreign pending patent applications covering the composition of matter and use of our LUNAR technology for nucleic acid delivery and drug delivery.
- UNA, mRNA and LNA – As of March 1, 2019, we own 8 U.S. patents, 16 U.S. pending patent applications, 4 PCT applications, 44 foreign patents and 30 foreign pending patent applications covering methods and uses of LNA, UNA oligomer and mRNA therapeutics, and compositions of UNA oligomers or mRNA to treat specific target diseases.

Our patent portfolio includes a filing covering our LUNAR-OTC program, specifically our engineered OTC protein and our optimized mRNA sequence that encodes for the engineered OTC protein. This patent application will have a term until 2040 without extension.

Patent Terms

The term of individual patents depends on the countries in which they are obtained. The patent term is 20 years from the earliest effective date of filing a non-provisional patent application in most of the countries in which we file.

Under the Drug Price Competition and Patent Term Restoration Act (also known as the Hatch-Waxman Act), U.S. patent holders can apply for a patent term extension to compensate for the patent term lost during the FDA regulatory review process. Patent extension is only available for patents covering FDA-approved drugs. The extension can be up to five years beyond the original expiration date of the patent and cannot extend a patent term for longer than 14 years from the date of product approval. Only one patent extension is granted per approved drug. Similar provisions may be available in foreign jurisdictions including Europe. Arcturus intends to apply for patent term extensions where possible.

We also rely on trade secrets to protect our product candidates. Our commercial success also depends in part on our non-infringement of the patents or proprietary rights of third parties. For a more comprehensive discussion of the risks related to our intellectual property, please see Item 1A “Risk Factors” – “Risks Related to Our Intellectual Property.”

The laws of some foreign countries do not protect intellectual property rights to the same extent as the laws of the United States. Many companies have encountered significant problems in protecting and defending intellectual property rights in certain foreign jurisdictions.

Our success depends in part on our ability to:

- preserve trade secrets;
- prevent third parties from infringing upon our proprietary rights; and
- operate our business without infringing the patents and proprietary rights of third parties, both in the United States and internationally.

We also protect our proprietary technology and processes, in part, by confidentiality and invention assignment agreements with our employees, consultants, scientific advisors and other contractors. These agreements may be breached, and we may not have adequate remedies for any breach. In addition, our trade secrets may otherwise become known or be independently discovered by competitors. To the extent that our employees, consultants, scientific advisors or other contractors use intellectual property owned by others in their work for us, disputes may arise as to the rights in related or resulting know-how and inventions.

Item 1A. Risk Factors.

In conducting our business, we face many risks that may interfere with our business objectives. Some of these risks could materially and adversely affect our business, financial condition and results of operations. In particular, we are subject to various risks resulting from inherent unknowns and uncertainties in the drug development process, as well as changing economic, political, industry, regulatory, business and financial conditions. The risks and uncertainties described below are not the only ones we face.

You should carefully consider the following factors and other information in this annual report before you decide to invest in our Ordinary Shares. If any of the negative events referred to below occur, our business, financial condition and results of operations could suffer. In any such case, the trading price of our Ordinary Shares could decline, and you may lose all or part of your investment.

RISKS RELATED TO OUR FINANCIAL CONDITION AND NEED FOR ADDITIONAL CAPITAL

Our auditor's report includes a going concern paragraph.

Our auditor's report on our financial statements for the year ended December 31, 2018 includes a going concern paragraph. The Company's products that are being developed have not generated significant revenue. As a result, the Company has suffered recurring losses and requires significant cash resources to execute its business plans. These losses are expected to continue for an extended period of time. The aforementioned factors raise substantial doubt about the Company's ability to continue as a going concern within one year from the date of filing. The accompanying financial statements have been prepared on a going concern basis, which contemplates the realization of assets and the satisfaction of liabilities in the normal course of business. The financial statements do not include any adjustments relating to the recoverability and classification of asset amounts or the classification of liabilities that might be necessary should the Company be unable to continue as a going concern within one year after the date the financial statements are issued.

Historically, the major source of our cash has been from proceeds from various public and private offerings of Ordinary Shares, debt issuances and through collaboration agreements. Management's plans to mitigate an expected shortfall of capital and to support future operations, include raising additional funds. The actual amount of cash that it will need to operate is subject to many factors.

The Company also recognizes it will need to raise additional capital in order to continue to execute its business plan in the future. There is no assurance that additional financing will be available when needed or that management will be able to obtain financing on terms acceptable to the Company or that the Company will become profitable and generate positive operating cash flow. If the Company is unable to raise sufficient additional funds, it will have to scale back its operations.

We have a limited operating history, have incurred significant losses since our inception and anticipate that we will continue to incur significant losses for the foreseeable future.

We are a preclinical nucleic acid medicines company with a limited operating history. Since inception, our operations have been primarily limited to acquiring and licensing intellectual property rights, developing our nucleic acid product platform, undertaking basic research around nucleic acid targets and conducting preclinical studies for our initial programs. We have not yet obtained regulatory approval for any product candidates. Consequently, any predictions about our future success or viability, or any evaluation of our business and prospects, may not be accurate.

We have incurred losses in each year since our inception. Our net losses were \$21.8 million and \$10.9 million for the years ended December 31, 2018 and 2017, respectively. As of December 31, 2018, we had an accumulated deficit of \$44.9 million.

We have devoted most of our financial resources to research and development, including our preclinical development activities. To date, we have funded our operations primarily through upfront payments, research funding and milestones from strategic alliances and collaborations, and through the sale of equity and convertible securities. We expect to continue to incur substantial and increased expenses, losses and negative cash flows as we expand our development activities and advance our preclinical programs. If our product candidates are not successfully developed or commercialized, including because of a lack of capital, or if we do not generate enough revenue following marketing approval, we will not achieve profitability and our business may fail. Even if we or our strategic alliance partners successfully obtain regulatory approval to market a product candidate, our revenues will also depend upon the size of any markets in which our product candidates have received market approval and our ability to achieve sufficient market acceptance and adequate market share for our products.

We expect to continue to incur significant expenses and increasing operating losses for the foreseeable future. The net losses we incur may fluctuate significantly from quarter to quarter. We anticipate that our expenses will increase substantially if and as we:

- continue our research and preclinical development of our product candidates, both independently and under our strategic alliance agreements;
- seek to identify additional targets and product candidates;
- acquire or in-license other products and technologies;
- advance product candidates into clinical trials;
- seek marketing approvals for our product candidates that successfully complete clinical trials;
- ultimately establish a sales, marketing and distribution infrastructure to commercialize any products for which we may obtain marketing approval;
- maintain, expand and protect our intellectual property portfolio;
- hire additional clinical, regulatory, research, executive and administrative personnel;
- create additional infrastructure to support our operations and our product development and planned future commercialization efforts; and
- incur legal and other expenses in connection with legal proceedings.

We have never generated any revenue from product sales, have generated only limited revenue since inception, and may never be profitable.

Our ability to generate revenue and achieve profitability depends on our ability, alone or with strategic alliance partners, to successfully complete the development of, obtain the necessary regulatory approvals for and commercialize our product candidates. We do not anticipate generating revenues from sales of our products for the foreseeable future, if ever. Our ability to generate future revenues from product sales depends heavily on our success in:

- completing our research and preclinical development of product candidates;
- initiating and completing clinical trials for product candidates;
- seeking and obtaining marketing approvals for product candidates that successfully complete clinical trials;
- establishing and maintaining supply and manufacturing relationships with third parties;
- launching and commercializing product candidates for which we obtain marketing approval, with an alliance partner or, if launched independently, successfully establishing a sales force, marketing and distribution infrastructure;
- maintaining, protecting and expanding our intellectual property portfolio; and
- attracting, hiring and retaining qualified personnel.

Because of the numerous risks and uncertainties associated with pharmaceutical product development, we are unable to predict the timing or amount of increased expenses and when we will be able to achieve or maintain profitability, if ever. In addition, our expenses could increase beyond expectations if we are required by the United States Food and Drug Administration, or FDA, or other foreign regulatory agencies to perform studies and trials in addition to those that we currently anticipate.

Even if one or more of the product candidates that we independently develop is approved for commercial sale, we anticipate incurring significant costs associated with commercializing any approved product. Even if we are able to generate revenues from the sale of any approved products, we may not become profitable and may need to obtain additional funding to continue operations.

We may need to raise additional capital, which may not be available on acceptable terms, or at all.

Developing pharmaceutical products, including conducting preclinical studies and clinical trials, is expensive. We expect our research and development expenses to substantially increase in connection with our ongoing activities, particularly as we advance our product candidates towards or through clinical trials. We may need to raise additional capital to support our operations and such funding may not be available to us on acceptable terms, or at all. As of December 31, 2018, we had unrestricted cash and cash equivalents of \$36.7 million. We cannot provide assurances that our plans will not change or that changed circumstances will not result in the depletion of our capital resources more rapidly than we currently anticipate. For example, our preclinical trials may encounter technical or other difficulties. Additionally, our strategic alliance partners may not elect to pursue the development and commercialization of any of our product candidates that are subject to their respective strategic alliance agreements with us. Any of these events may increase our development costs more than we expect. In order to support our long-term plans, we may need to raise additional capital or otherwise obtain funding through additional strategic alliances if we choose to initiate preclinical or clinical trials for new product candidates other than programs currently partnered. In any event, we will require additional capital to obtain regulatory approval for, and to commercialize, future product candidates.

Any additional fundraising efforts may divert our management from our day-to-day activities, which may adversely affect our ability to develop and commercialize future product candidates. In addition, we cannot guarantee that future financing will be available in sufficient amounts or on terms acceptable to us, if at all. If we are unable to raise additional capital when required or on acceptable terms, we may be required to:

- significantly delay, scale back or discontinue the development or commercialization of any future product candidates;
- seek strategic alliances for research and development programs at an earlier stage than otherwise would be desirable or on terms that are less favorable than might otherwise be available; or
- relinquish or license on unfavorable terms, our rights to technologies or any future product candidates that we otherwise would seek to develop or commercialize ourselves.

If we are unable to raise additional capital in sufficient amounts or on terms acceptable to us, we will be prevented from pursuing development and commercialization efforts, which will have a material adverse effect on our business, operating results and prospects.

We are exposed to interest rate risk, including under our existing loan agreements with our lender.

We are exposed to market risk from changes in interest rates. Exposure to interest rate risk results from our debt obligations, including the Loan Agreement entered into on October 12, 2018 by our wholly-owned subsidiary, Arcturus Therapeutics, Inc., with Western Alliance Bank (the “Western Loan Agreement”). The Western Loan Agreement bears a variable interest rate of 1.25% above the prime rate published by the Western Edition of the Wall Street Journal. As of December 31, 2018, we had \$10.0 million outstanding under the Western Loan Agreement. If we were to experience a 10% adverse change in the prime rate referenced above, the annual effect such change would have on our statement of operations, based on the amount we had outstanding as of December 31, 2018, under the Western Loan Agreement, would be approximately \$70,000.

Our indebtedness could materially and adversely affect our business, financial condition and results of operations.

Agreements with our lenders, including with Western Alliance Bank, create several limitations on us, including but not limited to:

- limiting our flexibility in planning for, or reacting to, changes in our business and our industry;
- placing us at a competitive disadvantage compared to our competitors who may have less debt or comparable debt at more favorable interest rates;

- limiting our ability to incur specified types of additional indebtedness which may be desired for working capital, capital expenditures, research and development efforts, acquisitions, debt service requirements, execution of our business strategy or other purposes; and
- resulting in an acceleration of our obligations upon the occurrence of an event of default.

Our ability to comply with these covenants in future periods will depend on our financial and operating performance, which in turn will be subject to economic conditions and to financial, market and competitive factors, many of which are beyond our control. Any of these factors or others described in the Western Loan Agreement could materially and adversely affect our business, financial condition and results of operations.

Our debt contains customary default clauses, a breach of which may result in acceleration of the repayment of some or all of this debt.

The Western Loan Agreement contains customary default clauses as well as covenants which include the Company's (1) nomination of a clinical candidate, which the Company was in compliance with, and (2) submission of a clinical candidate for Investigational New Drug application ("IND"), made to the U.S. Food and Drug Administration. In the event we were to default on our obligations under our debt and were unable to cure or obtain a waiver of such default, the repayment of our debt may be accelerated. If such acceleration were to occur, we would be required to secure alternative sources of equity or debt financing to be able to repay the debt. Alternative financing may not be available on terms satisfactory to us, or at all. New debt financing may require the cooperation and agreement of our existing lenders. If acceptable alternative financing were unavailable, we would have to consider alternatives to fund the repayment of the debt, which could materially and adversely affect our business, financial condition and results of operations.

RISKS RELATED TO THE DISCOVERY AND DEVELOPMENT OF PRODUCT CANDIDATES

Preclinical and clinical studies of our product candidates may not be successful. If we are unable to generate successful results from preclinical and clinical studies of our product candidates, or experience significant delays in doing so, our business may be materially harmed.

We have no products on the market and all of our product candidates are in preclinical development. In particular, none of our product candidates have ever been tested in a human subject. Our ability to achieve and sustain profitability depends on obtaining regulatory approvals for and, if approved, successfully commercializing our product candidates, either alone or with third parties. Before obtaining regulatory approval for the commercial distribution of our product candidates, we or an existing or future collaborator must conduct extensive preclinical tests and clinical trials to demonstrate the safety, purity and potency of our product candidates.

The success of our product candidates will depend on several factors, including the following:

- successfully designing preclinical studies which may be predictive of clinical outcomes;
- successful results from preclinical and clinical studies;
- receipt of marketing approvals from applicable regulatory authorities;
- obtaining and maintaining patent and trade secret protection for future product candidates;
- establishing and maintaining manufacturing relationships with third parties or establishing our own manufacturing capability; and
- successfully commercializing our products, if and when approved, whether alone or in collaboration with others.

If we do not achieve one or more of these factors in a timely manner or at all, we could experience significant delays or an inability to successfully complete the development or commercialization of our product candidates, which would materially harm our business.

The approach we are taking to discover and develop drugs is novel and may never lead to marketable products.

We have concentrated our therapeutic product research and development efforts on nucleic acid technology, and our future success depends on the successful development of this technology and products based on our nucleic acid product platform. Except for Onpattro (patisiran, which is marketed by Alnylam, Kynamro (mipomersen), which was marketed by Kastle Therapeutics, Vitravene (fomivirsen), which Novartis withdrew from the US market in 2006 and Spinraza (nusinersen), which is marketed by Biogen Inc., neither we, nor any other company, has to our knowledge received regulatory approval to market nucleic acid therapeutics. The scientific discoveries that form the basis for our efforts to discover and develop product candidates are relatively new. The scientific evidence to support the feasibility of developing product candidates based on these discoveries is both preliminary and limited. If we do not successfully develop and commercialize product candidates based upon our technological approach, we may not become profitable and the value of our Ordinary Shares may decline.

Further, our focus solely on nucleic acid technology for developing drugs as opposed to multiple, more proven technologies for drug development increases the risks associated with the ownership of our Ordinary Shares. If we are not successful in developing any product candidates using nucleic acid technology, we may be required to change the scope and direction of our product development activities. In that case, we may not be able to identify and implement successfully an alternative product development strategy.

We may not be successful in our efforts to identify or discover potential product candidates.

The success of our business depends primarily upon our ability to identify, develop and commercialize nucleic acid medicines. Our research programs may initially show promise in identifying potential product candidates, yet fail to yield product candidates for clinical development for a number of reasons, including:

- our research methodology or that of our strategic alliance partners may be unsuccessful in identifying potential product candidates;
- potential product candidates may be shown to have harmful side effects or may have other characteristics that may make the products unmarketable or unlikely to receive marketing approval; or
- our strategic alliance partners may change their development profiles for potential product candidates or abandon a therapeutic area.

If any of these events occur, we may be forced to abandon our development efforts for a program or programs, which would have a material adverse effect on our business and could potentially cause us to cease operations. Research programs to identify new product candidates require substantial technical, financial and human resources. We may focus our efforts and resources on potential programs or product candidates that ultimately prove to be unsuccessful.

If future clinical trials of our product candidates fail to demonstrate safety and efficacy to the satisfaction of regulatory authorities or do not otherwise produce positive results, we may incur additional costs or experience delays in completing, or ultimately be unable to complete, the development and commercialization of our product candidates.

Before obtaining marketing approval from regulatory authorities for the sale of product candidates, we or our strategic alliance partners must conduct extensive clinical trials to demonstrate the safety and efficacy of the product candidates in humans. Clinical trials are expensive, difficult to design and implement, can take many years to complete and are uncertain as to the outcome. A failure of one or more clinical trials can occur at any stage of testing. The outcome of preclinical studies and early clinical trials may not be predictive of the success of later clinical trials, and interim results of a clinical trial do not necessarily predict final results. Moreover, preclinical and clinical data are often susceptible to varying interpretations and analyses, and many companies that have believed their product candidates performed satisfactorily in preclinical studies and clinical trials have nonetheless failed to obtain marketing approval for their products.

Events which may result in a delay or unsuccessful completion of clinical development include:

- delays in reaching an agreement with the FDA or other regulatory authorities on final trial design;
- imposition of a clinical hold of our clinical trial operations or trial sites by the FDA or other regulatory authorities;
- delays in reaching agreement on acceptable terms with prospective contract research organizations, or CROs, and clinical trial sites;
- our inability to adhere to clinical trial requirements directly or with third parties such as CROs;
- delays in obtaining required institutional review board approval at each clinical trial site;
- delays in recruiting suitable patients to participate in a trial;
- delays in the testing, validation, manufacturing and delivery of the product candidates to the clinical sites;
- delays in having patients complete participation in a trial or return for post-treatment follow-up;
- delays caused by patients dropping out of a trial due to protocol procedures or requirements, product side effects or disease progression;
- clinical sites dropping out of a trial to the detriment of enrollment;
- time required to add new clinical sites; or
- delays by our contract manufacturers to produce and deliver sufficient supply of clinical trial materials.

If we or our strategic alliance partners are required to conduct additional clinical trials or other testing of any product candidates beyond those that are currently contemplated, are unable to successfully complete clinical trials of any such product candidates or other testing, or if the results of these trials or tests are not positive, are only modestly positive or if there are safety concerns, we or our strategic alliance partners may:

- be delayed in obtaining marketing approval for our future product candidates;
- not obtain marketing approval at all;
- obtain approval for indications or patient populations that are not as broad as originally intended or desired;
- obtain approval with labeling that includes significant use or distribution restrictions or safety warnings;
- be subject to additional post-marketing testing requirements; or
- have the product removed from the market after obtaining marketing approval.

Our product development costs will also increase if we experience delays in testing or marketing approvals. We do not know whether any clinical trials will begin as planned, will need to be restructured or will be completed on schedule, or at all. Significant clinical trial delays also could shorten any periods during which we may have the exclusive right to commercialize our product candidates or allow our competitors to bring products to market before we do, which would impair our ability to successfully commercialize our product candidates and may harm our business and results of operations. Any inability to successfully complete preclinical and clinical development, whether independently or with our strategic alliance partners, could result in additional costs to us or impair our ability to generate revenues from product sales, regulatory and commercialization milestones and royalties.

Any of our product candidates may cause undesirable side effects or have other properties impacting safety that could delay or prevent their regulatory approval or limit the scope of any approved label or market acceptance.

Undesirable side effects caused by our product candidates could cause us or regulatory authorities to interrupt, delay or halt clinical trials and could result in a more restrictive label or the delay or denial of regulatory approval by the FDA or other regulatory authorities. While we have not yet initiated clinical trials for any of our product candidates, it is likely that there may be side effects associated with their use. Results of our trials could reveal a high and unacceptable severity and prevalence of these or other side effects. In such an event, our trials could be suspended or terminated and the FDA or comparable foreign regulatory authorities could order us to cease further development of or deny approval of our product candidates for any or all targeted indications. Such side effects could also affect patient recruitment, the ability of enrolled patients to complete the trial or result in potential product liability claims. Any of these occurrences may materially and adversely affect our business, financial condition, results of operations and prospects.

Further, clinical trials by their nature test product candidates in only samples of the potential patient populations. With a limited number of patients and limited duration of exposure in such trials, rare and severe side effects of our product candidates may not be uncovered until a significantly larger number of patients are exposed to the product candidate.

If any of our future products, if and when approved for commercial sale, cause serious or unexpected side effects, a number of potentially significant negative consequences could result, including:

- regulatory authorities may withdraw their approval of the product or impose restrictions on its distribution in the form of a modified risk evaluation and mitigation strategy;
- regulatory authorities may require the addition of labeling statements, such as warnings or contraindications;
- we may be required to change the way the product is administered or conduct additional clinical trials;
- we could be sued and held liable for harm caused to patients; or
- our reputation may suffer.

Any of these events could prevent us or our partners from achieving or maintaining market acceptance of the affected product and could substantially increase the costs of commercializing our future products and impair our ability to generate revenues from the commercialization of these products either by us or by our strategic alliance partners.

Even if we complete the necessary preclinical studies and clinical trials, we cannot predict whether or when we will obtain regulatory approval to commercialize a product candidate and we cannot, therefore, predict the timing of any revenue from a future product.

Neither we nor our strategic alliance partners can commercialize a product until the appropriate regulatory authorities, such as the FDA, have reviewed and approved the product candidate. The regulatory agencies may not complete their review processes in a timely manner, or we may not be able to obtain regulatory approval. Additional delays may result if an FDA Advisory Committee recommends restrictions on approval or recommends non-approval. In addition, we or our strategic alliance partners may experience delays or rejections based upon additional government regulation from future legislation or administrative action, or changes in regulatory agency policy during the period of product development, clinical trials and the review process.

Even if we obtain regulatory approval for a product candidate, we will still face extensive regulatory requirements and our products may face future development and regulatory difficulties.

Even if we obtain regulatory approval in the United States, the FDA may still impose significant restrictions on the indicated uses or marketing of our product candidates, or impose ongoing requirements for potentially costly post-approval studies or post-market surveillance. The holder of an approved new drug application (“NDA”) is obligated to monitor and report adverse events, or AEs, and any failure of a product to meet the specifications in the NDA. The holder of an approved NDA must also submit new or supplemental applications and obtain FDA approval for certain changes to the approved product, product labeling or manufacturing process. Advertising and promotional materials must comply with FDA rules and are subject to FDA review, in addition to other potentially applicable federal and state laws.

In addition, drug product manufacturers and their facilities are subject to payment of user fees and continual review and periodic inspections by the FDA and other regulatory authorities for compliance with current good manufacturing practices, or cGMP, and adherence to commitments made in the NDA. If we or a regulatory agency discovers previously unknown problems with a product such as AEs of unanticipated severity or frequency, or problems with the facility where the product is manufactured, a regulatory agency may impose restrictions relative to that product or the manufacturing facility, including requiring recall or withdrawal of the product from the market or suspension of manufacturing.

If we or our partners fail to comply with applicable regulatory requirements following approval of any of our product candidates, a regulatory agency may:

- issue a warning letter asserting that we are in violation of the law;
- seek an injunction or impose civil or criminal penalties or monetary fines;
- suspend or withdraw regulatory approval;
- suspend any ongoing clinical trials;
- refuse to approve a pending NDA or supplements to an NDA submitted by us;
- seize product or require a product recall; or
- refuse to allow us to enter into supply contracts, including government contracts.

Any government investigation of alleged violations of law could require us to expend significant time and resources in response and could generate negative publicity. The occurrence of any event or penalty described above may inhibit our ability to commercialize our future products and generate revenues.

We may use our financial and human resources to pursue a particular research program or product candidate and fail to capitalize on programs or product candidates that may be more profitable or for which there is a greater likelihood of success.

As a result of our limited financial and human resources, we will have to make strategic decisions as to which targets and product candidates to pursue and may forego or delay pursuit of opportunities with other product candidates or for other indications that later prove to have greater commercial potential. Our resource allocation decisions may cause us to fail to capitalize on viable commercial products or profitable market opportunities. Our spending on research and development programs and product candidates for specific indications may not yield any commercially viable products. If we do not accurately evaluate the commercial potential or target market for a particular product candidate, we may relinquish valuable rights to that product candidate through strategic alliance, licensing or other royalty arrangements in cases in which it would have been more advantageous for us to retain sole development and commercialization rights to such product candidate, or we may allocate internal resources to a product candidate in a therapeutic area in which it would have been more advantageous to enter into a partnering arrangement.

If we fail to comply with environmental, health and safety laws and regulations, we could become subject to fines or penalties or incur costs that could have a material adverse effect on the success of our business.

We are subject to numerous environmental, health and safety laws and regulations, including those governing laboratory procedures and the handling, use, storage, treatment and disposal of hazardous materials and wastes. Our operations involve the use of hazardous and flammable materials, including chemicals and biological materials. Our operations also produce hazardous waste products. We generally contract with third parties for the disposal of these materials and wastes. We cannot eliminate the risk of contamination or injury from these materials. In the event of contamination or injury resulting from our use of hazardous materials, we could be held liable for any resulting damages, and any liability could exceed our resources. We also could incur significant costs associated with civil or criminal fines and penalties.

Although we maintain workers' compensation insurance to cover us for costs and expenses we may incur due to injuries to our employees resulting from the use of hazardous materials or other work-related injuries, this insurance may not provide adequate coverage against potential liabilities. In addition, we may incur substantial costs in order to comply with current or future environmental, health and safety laws and regulations. These current or future laws and regulations may impair our research, development or production efforts. Failure to comply with these laws and regulations also may result in substantial fines, penalties or other sanctions.

RISKS RELATED TO OUR RELIANCE ON THIRD PARTIES

We depend upon our third-party alliances with partners and contract organizations for the development, manufacture and eventual commercialization of certain nucleic acid product candidates. If these third-party alliances are unsuccessful or are terminated, we may be unable to commercialize certain product candidates and we may be unable to generate revenues from our development programs.

We depend upon third party alliance partners for financial and scientific resources for the clinical development, manufacture and commercialization of certain of our nucleic acid product candidates. These alliances will likely provide us with limited control over the course of development of a nucleic acid product candidate, especially once a candidate has reached the stage of clinical development. For example, in our alliance with Ultragenyx, Ultragenyx has the option to obtain an exclusive worldwide license to develop, manufacture and commercialize product candidates upon the achievement of relevant endpoints in preclinical studies and clinical trials. However, Ultragenyx is not under any obligation to exercise these options to progress any of our nucleic acid product candidates. While Ultragenyx has development obligations with respect to programs that it may elect to pursue under our agreement, our ability to ultimately recognize revenue from this and future relationships will depend upon the ability and willingness of our alliance partners to successfully meet their respective responsibilities under our agreements with them. Our ability to recognize revenues from successful strategic alliances may be impaired by several factors including:

- an alliance partner may shift its priorities and resources away from our programs due to a change in business strategies, or a merger, acquisition, sale or downsizing of its company or business unit;
- an alliance partner may cease development in therapeutic areas which are the subject of our strategic alliances;
- an alliance partner may change the success criteria for a particular program or potential product candidate thereby delaying or ceasing development of such program or candidate;
- a significant delay in initiation of certain development activities by an alliance partner will also delay payment of milestones tied to such activities, thereby impacting our ability to fund our own activities;
- an alliance partner could develop a product that competes, either directly or indirectly, with an alliance product;
- an alliance partner with commercialization obligations may not commit sufficient financial or human resources to the marketing, distribution or sale of a product;
- an alliance partner with manufacturing responsibilities may encounter regulatory, resource or quality issues and be unable to meet demand requirements;
- an alliance partner may exercise its rights under the agreement to terminate a strategic alliance;
- a dispute may arise between us and an alliance partner concerning the research, development or commercialization of a program or product candidate resulting in a delay in milestones, royalty payments or termination of a program and possibly resulting in costly litigation or arbitration which may divert management attention and resources; and
- an alliance partner may use our proprietary information or intellectual property in such a way as to invite litigation from a third party or fail to maintain or prosecute intellectual property rights such that our rights in such property are jeopardized.

If any of our alliance partners do not elect to pursue the development and commercialization of our nucleic acid development candidates or if they terminate the strategic alliance, then, depending on the event:

- product candidates subject to our alliances may be terminated or significantly delayed;
- our cash expenditures could increase significantly if it is necessary for us to hire additional employees and allocate scarce resources to the development and commercialization of product candidates that were previously funded, or expected to be funded, by our alliance partners;
- we would bear all of the risks and costs related to the further development and commercialization of product candidates that were previously the subject of our strategic alliance, including the reimbursement of third parties; and
- in order to fund further development and commercialization, we may need to seek out and establish alternative strategic alliances with third-party partners; this may not be possible, or we may not be able to do so on terms which are acceptable to us, in which case it may be necessary for us to limit the size or scope of one or more of our programs, increase our expenditures, or seek additional funding by other means.

Any of these events would have a material adverse effect on our results of operations and financial condition.

On February 11, 2019, the Company announced the termination of the obligations of CureVac AG (“CureVac”) for the preclinical development of ARCT-810, effective 180 days from February 5, 2019 and the re-assumption by the Company of the worldwide rights thereto. Arcturus will reassume 100% global rights for its flagship asset, clinical development candidate ARCT-810, a messenger RNA (mRNA) drug to treat ornithine transcarbamylase (OTC) deficiency. ARCT-810 was previously subject to a 50/50 collaboration between Arcturus and CureVac AG. CureVac elected not to continue its obligations for the preclinical development of ARCT-810 under and pursuant to the terms of the collaboration.

The preclinical development program for ARCT-810, including Investigational New Drug Application (IND) enabling studies, remains on track. Arcturus is planning to file an IND for ARCT-810 with the U.S. Food and Drug Administration (FDA) in the fourth quarter of 2019.

Pursuant to the terms of the Co-Development Agreement, CureVac is obligated to continue to fund its share of the preclinical expenses for the OTC program until August of 2019. We expect that Curevac’s share of these preclinical expenses for 2019 will be between \$6 and \$7.5 million. However, CureVac’s decision to terminate its participation in our OTC deficiency program will require that we finance additional preclinical and clinical activities to develop and commercialize OTC products. We will be materially harmed if we are unable to obtain such additional funds.

Certain agreements with our alliance partners may impair or prevent entirely our ability to generate revenues from the development, manufacture and commercialization of certain product candidates.

Under the Development and Option Agreement with CureVac, as amended (the “CureVac Agreement”), CureVac may be entitled to trigger an option to license certain of our product candidates. CureVac may identify certain of our development candidates as targets under the CureVac Agreement and exercise an option to enter into an exclusive or non-exclusive license agreement with us with respect to these identified targets, subject to the limitations given in the CureVac Agreement. The exercise of this option by CureVac may impair or prevent entirely our ability to generate revenues from the commercialization of these development candidates, as the licensing agreement may give CureVac the right to receive some or all of the revenues from the development, manufacture and/or commercialization of these development candidates. Our inability to realize the benefits from developing, manufacturing or marketing our development candidates with our alliance partners, including with CureVac, may have a material adverse impact on our business, financial condition and prospects.

We rely on third parties to conduct some aspects of our compound formulation, research and preclinical studies, and those third parties may not perform satisfactorily, including failing to meet deadlines for the completion of such formulation, research or testing.

We do not expect to independently conduct all aspects of our drug discovery activities, compound formulation research or preclinical studies of product candidates. We currently rely and expect to continue to rely on third parties to conduct some aspects of our preclinical studies and formulation development.

Any of these third parties may terminate their engagements with us at any time. If we need to enter into alternative arrangements, it would delay our product development activities. Our reliance on these third parties for research and development activities will reduce our control over these activities but will not relieve us of our responsibilities. For example, for product candidates that we develop and commercialize on our own, we will remain responsible for ensuring that each of our IND-enabling studies and clinical trials are conducted in accordance with the study plan and protocols for the trial.

If these third parties do not successfully carry out their contractual duties, meet expected deadlines or conduct our studies in accordance with regulatory requirements or our stated study plans and protocols, we will not be able to complete, or may be delayed in completing, the necessary preclinical studies to enable us or our strategic alliance partners to select viable product candidates for IND submissions and will not be able to, or may be delayed in our efforts to, successfully develop and commercialize such product candidates.

We rely on third-party manufacturers to produce the supply of our preclinical product candidates, and we intend to rely on third parties to produce future clinical supplies of product candidates that we advance into clinical trials and commercial supplies of any approved product candidates.

Reliance on third-party manufacturers entails risks, including risks that we would not be subject to if we manufactured the product candidates ourselves, including:

- the inability to meet any product specifications and quality requirements consistently;
- a delay or inability to procure or expand sufficient manufacturing capacity;
- manufacturing and product quality issues related to scale-up of manufacturing;
- costs and validation of new equipment and facilities required for scale-up;
- a failure to comply with cGMP and similar foreign standards;
- the inability to negotiate manufacturing or supply agreements with third parties under commercially reasonable terms;
- termination or nonrenewal of manufacturing agreements with third parties in a manner or at a time that is costly or damaging to us;
- the reliance on a limited number of sources, and in some cases, single sources for raw materials, such that if we are unable to secure a sufficient supply of these product components, we will be unable to manufacture and sell future product candidates in a timely fashion, in sufficient quantities or under acceptable terms;
- the lack of qualified backup suppliers for any raw materials that are currently purchased from a single source supplier;
- operations of our third-party manufacturers or suppliers could be disrupted by conditions unrelated to our business or operations, including the bankruptcy of the manufacturer or supplier;
- carrier disruptions or increased costs that are beyond our control; and
- the failure to deliver products under specified storage conditions and in a timely manner.

Any of these events could lead to clinical study delays or failure to obtain regulatory approval, or impact our ability to successfully commercialize future products. Some of these events could be the basis for FDA action, including injunction, recall, seizure or total or partial suspension of production.

We rely on limited sources of supply for the drug substance of product candidates and any disruption in the chain of supply may cause a delay in developing and commercializing these product candidates.

We have established manufacturing relationships with a limited number of suppliers to manufacture raw materials and the drug substance used to create our product candidates. The availability of such suppliers to manufacture raw materials for our product candidates may be limited. Further, each supplier may require licenses to manufacture such components if such processes are not owned by the supplier or in the public domain. As part of any marketing approval, a manufacturer and its processes are required to be qualified by the FDA prior to commercialization. If supply from the approved vendor is interrupted, there could be a significant disruption in commercial supply. An alternative vendor would need to be qualified through an NDA supplement which could result in further delay. The FDA or other regulatory agencies outside of the United States may also require additional studies if a new supplier is relied upon for commercial production. Switching vendors may involve substantial costs and is likely to result in a delay in our desired clinical and commercial timelines.

In addition, if our alliance partners elect to pursue the development and commercialization of certain programs, we will lose control over the manufacturing of the product candidate subject to the agreement. Also, we will not be able to ensure that the product candidates will be manufactured under the correct conditions to permit the product candidates to be used in such clinical trials.

These factors could cause the delay of clinical trials, regulatory submissions, required approvals or commercialization of our product candidates, cause us to incur higher costs and prevent us from commercializing our products successfully. Furthermore, if our suppliers fail to deliver the required commercial quantities of active pharmaceutical ingredients on a timely basis and at commercially reasonable prices, and we are unable to secure one or more replacement suppliers capable of production in a timely manner at a substantially equivalent cost, our clinical trials may be delayed or we could lose potential revenue.

Manufacturing issues may arise that could increase product and regulatory approval costs or delay commercialization.

As we scale-up manufacturing of product candidates and conduct required stability testing, product, packaging, equipment and process-related issues may require refinement or resolution in order to proceed with any clinical trials and obtain regulatory approval for commercial marketing. We may identify significant impurities, which could result in increased scrutiny by the regulatory agencies, delays in clinical programs and regulatory approval, increases in our operating expenses, or failure to obtain or maintain approval for product candidates or any approved products.

We intend to rely on third parties to conduct, supervise and monitor our clinical trials, and if those third parties perform in an unsatisfactory manner, it may harm our business.

We or our strategic alliance partners intend to rely on contract research organizations (“CROs”) and clinical trial sites to ensure the proper and timely conduct of our clinical trials. While we will have agreements governing their activities, we and our strategic alliance partners have limited influence over their actual performance. We will control only certain aspects of our CROs’ activities. Nevertheless, we or our strategic alliance partners will be responsible for ensuring that each of our clinical trials are conducted in accordance with the applicable protocol, legal, regulatory and scientific standards and our reliance on the CROs will not relieve us of our regulatory responsibilities.

We, our alliance partners and our CROs will be required to comply with the FDA’s or other regulatory agency’s good clinical practices, or GCPs, for conducting, recording and reporting the results of IND-enabling studies and clinical trials to assure that data and reported results are credible and accurate and that the rights, integrity and confidentiality of future clinical trial participants are protected. The FDA and non-U.S. regulatory

agencies enforce these GCPs through periodic inspections of trial sponsors, principal investigators and clinical trial sites. If we or our future CROs fail to comply with applicable GCPs, the clinical data generated in our clinical trials may be deemed unreliable and the FDA or applicable non-U.S. regulatory agency may require us to perform additional clinical trials before approving any marketing applications for the relevant jurisdiction. Upon inspection, the FDA or applicable non-U.S. regulatory agency may determine that our future clinical trials did not comply with GCPs. In addition, our future clinical trials will require a sufficiently large number of test subjects to evaluate the safety and effectiveness of a potential drug product. Accordingly, if our future CROs fail to comply with these regulations or fail to recruit a sufficient number of patients, we may be required to repeat such clinical trials, which would delay the regulatory approval process.

Our future CROs will not be our employees, and we will not be able to control whether or not they devote sufficient time and resources to our future clinical and nonclinical programs. These CROs may also have relationships with other commercial entities, including our competitors, for whom they may also be conducting clinical trials, or other drug development activities which could harm our competitive position. If our future CROs do not successfully carry out their contractual duties or obligations, fail to meet expected deadlines, or if the quality or accuracy of the clinical data they obtain is compromised due to the failure to adhere to our clinical protocols or regulatory requirements, or for any other reasons, our clinical trials may be extended, delayed or terminated, and we may not be able to obtain regulatory approval for, or successfully commercialize our product candidates. As a result, our financial results and the commercial prospects for such products and any product candidates that we develop would be harmed, our costs could increase, and our ability to generate revenues could be delayed.

We intend to rely on other third parties to store and distribute drug products for any clinical trials that we may conduct. Any performance failure on the part of our distributors could delay clinical development or marketing approval of our product candidates or commercialization of our products, if approved, producing additional losses and depriving us of potential product revenue.

RISKS RELATED TO OUR INTELLECTUAL PROPERTY

If we are unable to obtain or protect intellectual property rights related to our future products and product candidates, we may not be able to compete effectively in our markets.

Our success depends in part on our ability to obtain and maintain patents and other forms of intellectual property rights, including in-licenses of intellectual property rights of others, for our product candidates, methods used to develop and manufacture our product candidates and methods for treating patients using our product candidates, as well as our ability to preserve our trade secrets, to prevent third parties from infringing upon our proprietary rights and to operate without infringing upon the proprietary rights of others. As of March 1, 2019, we are the sole owner of 152 patents and pending patent applications including 18 U.S. patents, 24 pending U.S. patent applications, 7 pending international under the Patent Cooperation Treaty (“PCT”), 44 foreign patents and 59 pending foreign patent applications. The strength of patents in the biotechnology and pharmaceutical field involves complex legal and scientific questions and can be uncertain. The patent applications that we own or in-license may fail to result in patents with claims that cover the products in the United States or in other countries. There is no assurance that all of the potentially relevant prior art relating to our patents and patent applications has been found; such prior art can invalidate a patent or prevent a patent from issuing based on a pending patent application. Even if patents do successfully issue, third parties may challenge their validity, enforceability or scope, which may result in such patents being narrowed or invalidated. Furthermore, even if they are unchallenged, our patents and patent applications may not adequately protect our intellectual property or prevent others from designing around our claims.

If the patent applications we hold or have in-licensed with respect to our programs or product candidates fail to issue or if their breadth or strength of protection is threatened, it could dissuade companies from collaborating with us to develop product candidates, and threaten our ability to commercialize, future products. We cannot offer any assurances about which, if any, patents will issue or whether any issued patents will be found invalid and unenforceable or will be threatened by third parties. A patent may be challenged through one or more of several administrative proceedings including post-grant challenges, re-examination or opposition before the U.S. PTO or foreign patent offices. For example, re-examination of, or oppositions to, patents owned by or licensed to us have previously been initiated, and while we believe these concluded proceedings did not result in a commercially relevant impact on the individual patents, any successful challenge of patents or any other patents owned by or licensed to us could deprive us of rights necessary for the successful commercialization of any product candidates that we or our strategic alliance partners may develop.

Since patent applications in the United States and most other countries are confidential for a period of time after filing, and some remain so until issued, we cannot be certain that we were the first to file any patent application related to a product candidate. Furthermore, in certain situations, if we and one or more third parties have filed patent applications in the United States and claiming the same subject matter, an administrative proceeding, known as an interference, can be initiated to determine which applicant is entitled to the patent on that subject matter. Such an interference proceeding provoked by third parties or brought by us may be necessary to determine the priority of inventions with respect to our patents or patent applications, or those of our alliance partners or licensors. An unfavorable outcome could require us to cease using the related technology or to require us to license rights to it from the prevailing party. Our business could be harmed if the prevailing party does not offer us a license at all, or on commercially reasonable terms. Our defense of a patent or patent application in such a proceeding may not be successful and, even if successful, may result in substantial costs and distract our management and other employees.

In addition, patents have a limited lifespan. In the United States, the natural expiration of a patent is generally 20 years after it is filed. Various extensions may be available however the life of a patent, and the protection it affords is limited. Once the patent life has expired for a product, we may be open to competition from generic medications. Further, if we encounter delays in regulatory approvals, the period of time during which we could market a product candidate under patent protection could be reduced.

In addition to the protection afforded by patents, we rely on trade secret protection and confidentiality agreements to protect proprietary know-how that is not patentable, including processes for which patents are difficult to enforce and any other elements of our drug discovery and development processes that involve proprietary know-how, information or technology that is not covered by patents. Although each of our employees agrees to assign their inventions to us through an employee inventions agreement, and all of our employees, consultants, advisors and any third parties who have access to our proprietary know-how, information or technology are required to enter into confidentiality agreements, we cannot provide any assurances that all such agreements have been duly executed, that our trade secrets and other confidential proprietary information will not be disclosed or that competitors will not otherwise gain access to our trade secrets or independently develop substantially equivalent information and techniques. In addition, others may independently discover our trade secrets and proprietary information. For example, the FDA, as part of its Transparency Initiative, is currently considering whether to make additional information publicly available on a routine basis, including information that we may consider to be trade secrets or other proprietary information, and it is not clear at the present time how the FDA's disclosure policies may change in the future, if at all.

Further, the laws of some foreign countries do not protect proprietary rights to the same extent or in the same manner as the laws of the United States. As a result, we may encounter significant problems in protecting and defending our intellectual property both in the United States and abroad. If we are unable to prevent material disclosure of the non-patented intellectual property related to our technologies to third parties, and there is no guarantee that we will have any such enforceable trade secret protection, we may not be able to establish or maintain a competitive advantage in our market, which could materially adversely affect our business, results of operations and financial condition.

Third-party claims of intellectual property infringement may prevent or delay our development and commercialization efforts.

Our commercial success depends in part on our avoiding infringement of the patents and proprietary rights of third parties. There is a substantial amount of litigation, both within and outside the United States, involving patent and other intellectual property rights in the biotechnology and pharmaceutical industries, including patent infringement lawsuits. Numerous U.S. and foreign issued patents and pending patent applications, which are owned by third parties, exist in the fields in which we and our strategic alliance partners are pursuing development candidates. As the biotechnology and pharmaceutical industries expand and more patents are issued, the risk increases that our product candidates may be subject to claims of infringement of the patent rights of third parties.

Third parties may assert that we are employing their proprietary technology without authorization. There may be third-party patents or patent applications with claims to materials, formulations, methods of manufacture or methods for treatment related to the use or manufacture of our product candidates. Because patent applications can take many years to issue, there may be currently pending patent applications which may later result in patents that our product

candidates may infringe. In addition, third parties may obtain patents in the future and claim that use of our technologies infringes upon these patents. If any third-party patents were held by a court of competent jurisdiction to cover the manufacturing process of any of our product candidates, any molecules formed during the manufacturing process or any final product itself, the holders of any such patents may be able to block our ability to commercialize such product candidate unless we obtained a license under the applicable patents, or until such patents expire. Similarly, if any third-party patents were held by a court of competent jurisdiction to cover aspects of our formulations, processes for manufacture or methods of use, including combination therapy, the holders of any such patents may be able to block our ability to develop and commercialize the applicable product candidate unless we obtained a license or until such patent expires. In either case, such a license may not be available on commercially reasonable terms or at all.

Parties making claims against us may obtain injunctive or other equitable relief, which could effectively block our ability to further develop and commercialize one or more of our product candidates. Defense of these claims, regardless of their merit, would involve substantial litigation expense and would be a substantial diversion of employee resources from our business. In the event of a successful claim of infringement against us, we may have to pay substantial damages, including treble damages and attorneys' fees for willful infringement, pay royalties, redesign our infringing products or obtain one or more licenses from third parties, which may be impossible or require substantial time and monetary expenditure.

If we fail to obtain licenses or comply with our obligations in these agreements under which we license intellectual property rights from third parties or otherwise experience disruptions to our business relationships with our licensors, we could lose license rights that are important to our business.

We are a party to intellectual property license agreements that are important to our business and expect to enter into additional license agreements in the future. Our existing license agreements impose, and we expect that future license agreements will impose, various obligations on us, as described in "Other Material Agreements" and "Collaboration Agreements" under Part I, Item 1 and elsewhere in this annual report.

We may need to obtain licenses from third parties to advance our research or allow commercialization of our product candidates, and we have done so from time to time. We may fail to obtain any of these licenses at a reasonable cost or on reasonable terms, if at all. In that event, we would be unable to further develop and commercialize one or more of our product candidates, which could harm our business significantly. We cannot provide any assurances that third-party patents do not exist which might be enforced against our future products, resulting in either an injunction prohibiting our sales, or, with respect to our sales, an obligation on our part to pay royalties and/or other forms of compensation to third parties.

We may be involved in lawsuits to protect or enforce our patents or the patents of our licensees, which could be expensive, time consuming and unsuccessful.

Competitors may infringe our patents or the patents of our licensees. To counter infringement or unauthorized use, we may be required to file infringement claims, which can be expensive and time-consuming. In addition, in an infringement proceeding, a court may decide that a patent of ours or of our licensees is not valid or is unenforceable, or may refuse to stop the other party from using the technology at issue on the grounds that our patents do not cover the technology in question. An adverse result in any litigation or defense proceedings could put one or more of our patents at risk of being invalidated or interpreted narrowly and could put our patent applications at risk of not issuing.

Our defense in a lawsuit may fail and, even if successful, may result in substantial costs and distract our management and other employees. We may not be able to prevent, alone or with our licensees, misappropriation of our intellectual property rights, particularly in countries where the laws may not protect those rights as fully as in the United States.

Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation. There could also be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be negative, it could have a material adverse effect on the price of our Ordinary Shares.

We may be subject to claims that our employees, consultants or independent contractors have wrongfully used or disclosed confidential information of third parties.

We employ individuals who were previously employed at other biotechnology or pharmaceutical companies. We may be subject to claims that we or our employees, consultants or independent contractors have inadvertently or otherwise used or disclosed confidential information of our employees' former employers or other third parties. We may also be subject to claims that former employers or other third parties have an ownership interest in our patents. Litigation may be necessary to defend against these claims. There is no guarantee of success in defending these claims, and if we are successful, litigation could result in substantial cost and be a distraction to our management and other employees.

RISKS RELATED TO COMMERCIALIZATION OF PRODUCT CANDIDATES

The commercial success of our programs that are part of our strategic alliance agreements will depend in large part on the development and marketing efforts of our alliance partners. If our alliance partners are unable or unwilling to perform in accordance with the terms of our agreements, our potential to generate future revenue from these programs would be significantly reduced and our business would be materially and adversely harmed.

If or when our strategic alliance partners elect to further pursue the development and commercialization of any of the product candidates that are subject to its strategic alliance agreement with us, we will have limited influence and/or control over their approaches to development and commercialization. If strategic alliance partners do not perform in the manner that we expect or fail to fulfill their responsibilities in a timely manner, or at all, the clinical development, regulatory approval and commercialization efforts related to product candidates we have licensed to such strategic alliance partners could be delayed or terminated. If we terminate any of our strategic alliances or any program thereunder, we may have the right to assume the responsibility at our own expense for the development of the applicable product candidates. Assuming sole responsibility for further development will increase our expenditures, and may mean we will need to limit the size and scope of one or more of our programs, seek additional funding and/or choose to stop work altogether on one or more of the affected product candidates. This could result in a limited potential to generate future revenue from such product candidates and our business could be materially and adversely affected.

We face significant competition from other biotechnology and pharmaceutical companies and our operating results will suffer if we fail to compete effectively.

The biotechnology and pharmaceutical industries are intensely competitive. We have competitors both in the United States and internationally, including major multinational pharmaceutical companies, biotechnology companies and universities and other research institutions. Our competitors may have substantially greater financial, technical and other resources, such as larger research and development staff and experienced marketing and manufacturing organizations. Additional mergers and acquisitions in the biotechnology and pharmaceutical industries may result in even more resources being concentrated in our competitors. Competition may increase further as a result of advances in the commercial applicability of technologies and greater availability of capital for investment in these industries. Our competitors may succeed in developing, acquiring or licensing on an exclusive basis, drug products that are more effective or less costly than any product candidate that we may develop.

All of our programs are preclinical and targeted toward indications for which there are product candidates in clinical development. We will face competition from other drugs currently approved or that may be approved in the future for the same therapeutic indications. For example, both Synlogic and Ultragenyx are currently conducting clinical trials with therapies to treat ornithine transcarbamylase, or OTC, deficiency. Currently approved therapies for these patients include the small molecule nitrogen scavengers sodium benzoate, sodium phenylacetate, and sodium phenylbutyrate, and glycerol phenylbutyrate (brand name Ravicti®). Our ability to compete successfully will depend largely on our ability to leverage our experience in drug discovery and development to:

- discover and develop therapeutics that are superior to other products in the market;
- attract qualified scientific, product development and commercial personnel;
- obtain patent and/or other proprietary protection for our nucleic acid product platform and future product candidates;

- obtain required regulatory approvals; and
- successfully collaborate with pharmaceutical companies in the discovery, development and commercialization of new therapeutics.

The availability of our competitors' products could limit the demand, and the price we are able to charge, for any products that we may develop and commercialize. We will not achieve our business plan if the acceptance of any of these products is inhibited by price competition or the reluctance of physicians to switch from existing drug products to our products, or if physicians switch to other new drug products or choose to reserve our future products for use in limited circumstances. The inability to compete with existing or subsequently introduced drug products would have a material adverse impact on our business, financial condition and prospects.

Established pharmaceutical companies may invest heavily to accelerate discovery and development of novel compounds or to in-license novel compounds that could make our product candidates less competitive. In addition, any new product that competes with an approved product must demonstrate compelling advantages in efficacy, convenience, tolerability and safety in order to overcome price competition and to be commercially successful. Accordingly, our competitors may succeed in obtaining patent protection, receiving FDA approval or discovering, developing and commercializing product candidates before we do, which would have a material adverse impact on our business.

The commercial success of our product candidates will depend upon the acceptance of these product candidates by the medical community, including physicians, patients and healthcare payors.

The degree of market acceptance of any product candidates will depend on a number of factors, including:

- demonstration of clinical safety and efficacy compared to other products;
- the relative convenience, ease of administration and acceptance by physicians, patients and healthcare payors;
- the prevalence and severity of any AEs;
- limitations or warnings contained in the FDA-approved label for such products;
- availability of alternative treatments;
- pricing and cost-effectiveness;
- the effectiveness of our, or any of our collaborators', sales and marketing strategies;
- our ability to obtain hospital formulary approval;
- our ability to obtain and maintain sufficient third-party coverage and adequate reimbursement; and
- the willingness of patients to pay out-of-pocket in the absence of third-party coverage.

Unless other formulations are developed in the future, we expect our compounds to be formulated in an injectable form. Injectable medications may be disfavored by patients or their physicians in the event drugs which are easy to administer, such as oral medications, are available. If a product is approved, but does not achieve an adequate level of acceptance by physicians, patients and healthcare payors, we may not generate sufficient revenues from such product and we may not become or remain profitable. Such increased competition may decrease any future potential revenue for future product candidates due to increasing pressure for lower pricing and higher discounts in the commercialization of our product.

If we are unable to establish sales and marketing capabilities or enter into agreements with third parties to market and sell our product candidates, we may be unable to generate any revenues.

We currently do not have an organization for the sales, marketing and distribution of pharmaceutical products and the cost of establishing and maintaining such an organization may exceed the cost-effectiveness of doing so. In order to market any products that may be approved, we must build our sales, marketing, managerial and other non-technical capabilities or make arrangements with third parties to perform these services. With respect to certain of our current programs as well as future programs, we may rely completely on an alliance partner for sales and marketing. In addition, we intend to enter into strategic alliances with third parties to commercialize other product candidates, including in markets outside of the United States or for other large markets that are beyond our resources. Although we intend to establish a sales organization if we are able to obtain approval to market any product candidates for niche markets in the United States, we will also consider the option to enter into strategic alliances for future product candidates in the United States if commercialization requirements exceed our available resources. This will reduce the revenue generated from the sales of these products.

Our current and any future strategic alliance partners may not dedicate sufficient resources to the commercialization of our product candidates or may otherwise fail in their commercialization due to factors beyond our control. If we are unable to establish effective alliances to enable the sale of our product candidates to healthcare professionals and in geographical regions, including the United States, that will not be covered by our own marketing and sales force, or if our potential future strategic alliance partners do not successfully commercialize the product candidates, our ability to generate revenues from product sales will be adversely affected.

If we are unable to establish adequate sales, marketing and distribution capabilities, whether independently or with third parties, we may not be able to generate sufficient product revenue and may not become profitable. We will be competing with many companies that currently have extensive and well-funded marketing and sales operations. Without an internal team or the support of a third party to perform marketing and sales functions, we may be unable to compete successfully against these more established companies.

If we obtain approval to commercialize any approved products outside of the United States, a variety of risks associated with international operations could materially adversely affect our business.

If we obtain approval to commercialize any approved products outside of the United States, we expect that we will be subject to additional risks related to entering into international business relationships, including:

- different regulatory requirements for drug approvals in foreign countries;
- differing payor reimbursement regimes, governmental payors or patient self-pay systems and price controls;
- reduced protection for intellectual property rights;
- unexpected changes in tariffs, trade barriers and regulatory requirements;
- economic weakness, including inflation, or political instability in particular foreign economies and markets;
- compliance with tax, employment, immigration and labor laws for employees living or traveling abroad;
- foreign taxes, including withholding of payroll taxes;
- foreign currency fluctuations, which could result in increased operating expenses and reduced revenues, and other obligations incident to doing business in another country;
- workforce uncertainty in countries where labor unrest is more common than in the United States;
- production shortages resulting from any events affecting raw material supply or manufacturing capabilities abroad; and
- business interruptions resulting from geopolitical actions, including war and terrorism, or natural disasters including earthquakes, typhoons, floods and fires.

Coverage and adequate reimbursement may not be available for our product candidates, which could make it difficult for us to sell products profitably.

Market acceptance and sales of any product candidates that we develop will depend on coverage and reimbursement policies and may be affected by future healthcare reform measures. Government authorities and third-party payors, such as private health insurers, government payors and health maintenance organizations, decide which drugs they will pay for and establish reimbursement levels. We cannot be sure that coverage and adequate reimbursement will be available for any future product candidates. Also, inadequate reimbursement amounts may reduce the demand for, or the price of, our future products. Further, one payor's determination to provide coverage for a product does not assure that other payors will also provide coverage for the product. If reimbursement is not available, or is available only at limited levels, we may not be able to successfully commercialize product candidates that we develop.

In addition, we cannot be certain if and when we will obtain formulary approval to allow us to sell any products that we may develop and commercialize into our target markets. Obtaining formulary approval from hospitals and from payors can be an expensive and time-consuming process. Failure to obtain timely formulary approval will limit our commercial success.

There have been a number of legislative and regulatory proposals to change the healthcare system in the United States and in some foreign jurisdictions that could affect our ability to sell products profitably. These legislative and/or regulatory changes may negatively impact the reimbursement for drug products, following approval. The availability of numerous generic treatments may also substantially reduce the likelihood of reimbursement for our future products. The potential application of user fees to generic drug products may expedite the approval of additional generic drug treatments. We expect to experience pricing pressures in connection with the sale of any products that we develop, due to the trend toward managed healthcare, the increasing influence of health maintenance organizations and additional legislative changes. If we fail to successfully secure and maintain reimbursement coverage for our future products or are significantly delayed in doing so, we will have difficulty achieving market acceptance of our future products and our business will be harmed.

In addition, in some non-U.S. jurisdictions, the proposed pricing for a drug must be approved before it may be lawfully marketed. The requirements governing drug pricing vary widely from country to country. For example, the EU provides options for its member states to restrict the range of medicinal products for which their national health insurance systems provide reimbursement and to control the prices of medicinal products for human use. A member state may approve a specific price for the medicinal product or it may instead adopt a system of direct or indirect controls on the profitability of the company placing the medicinal product on the market. There can be no assurance that any country that has price controls or reimbursement limitations for pharmaceutical products will allow favorable reimbursement and pricing arrangements for any of our products. Historically, products launched in the EU do not follow price structures of the U.S. and generally tend to be priced significantly lower.

RISKS RELATED TO OUR BUSINESS OPERATIONS AND INDUSTRY

Our future success depends on our ability to attract and retain key executives and to attract, retain and motivate qualified personnel.

We are highly dependent on principal members of our executive team, and any reduction or loss of their services may adversely impact the achievement of our objectives. While we have entered into employment agreements with each of our executive officers, any of them could leave our employment at any time, as all of our employees are "at will" employees. Recruiting and retaining other qualified employees for our business, including scientific and technical personnel, will also be critical to our success. There is currently a shortage of skilled executives in our industry, which is likely to continue. As a result, competition for skilled personnel is intense and the turnover rate can be high. We may not be able to attract and retain personnel on acceptable terms given the competition among numerous pharmaceutical companies for individuals with similar skill sets. In addition, failure to succeed in preclinical studies and clinical trials may make it more challenging to recruit and retain qualified personnel. The inability to recruit any executive or key employee or the loss of the services of any executive or key employee might impede the progress of our research, development and commercialization objectives.

We may need to expand our organization and may experience difficulties in managing this growth, which could disrupt our operations.

As of December 31, 2018, we had 72 employees. In the future we may expand our employee base to increase our managerial, scientific, operational, commercial, financial and other resources and we may hire more consultants and contractors. Future growth would impose significant additional responsibilities on our management, including the need to identify, recruit, maintain, motivate and integrate additional employees, consultants and contractors. Also, our management may need to divert a disproportionate amount of its attention away from our day-to-day activities and devote a substantial amount of time to managing these growth activities. We may not be able to effectively manage the expansion of our operations, which may result in weaknesses in our infrastructure or give rise to operational mistakes, loss of business opportunities, loss of employees or reduced productivity among remaining employees. Our expected growth could require significant capital expenditures and may divert financial resources from other projects, such as the development of additional product candidates. Moreover, if our management is unable to effectively manage our growth, our expenses may increase more than expected, our ability to generate and/or grow revenues could be reduced, and we may not be able to implement our business strategy. Our future financial performance and our ability to commercialize product candidates and compete effectively will depend, in part, on our ability to effectively manage any future growth.

Our employees may engage in misconduct or other improper activities, including noncompliance with regulatory standards and requirements and insider trading.

We are exposed to the risk of employee fraud or other misconduct. Misconduct by employees could include intentional or nonintentional failures to comply with the regulations of the FDA and non-U.S. regulators, to provide accurate information to the FDA and non-U.S. regulators, to comply with healthcare fraud and abuse laws and regulations in the United States and abroad, to report financial information or data accurately or to disclose unauthorized activities to us. In particular, sales, marketing and business arrangements in the healthcare industry are subject to extensive laws and regulations intended to prevent fraud, misconduct, kickbacks, self-dealing and other abusive practices. These laws and regulations may restrict or prohibit a wide range of pricing, discounting, marketing and promotion, sales commission, customer incentive programs and other business arrangements. Employee misconduct could also involve the improper use of information obtained in the course of clinical trials, which could result in regulatory sanctions and cause serious harm to our reputation. We have adopted a code of conduct, but it is not always possible to identify and deter employee misconduct, and the precautions we take to detect and prevent this activity may not be effective in controlling unknown or unmanaged risks or losses or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to comply with these laws or regulations. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, those actions could have a significant impact on our business, including the imposition of civil, criminal and administrative penalties, damages, fines, possible exclusion from Medicare, Medicaid and other government healthcare programs, additional reporting requirements and/or oversight, particularly if we become subject to a corporate integrity agreement or similar agreement to resolve allegations of non-compliance, disgorgement, imprisonment, and contractual damages.

We intend to redomicile to the U.S. and such redomiciliation may result in disruptions to our business or otherwise materially harm our results of operations or financial condition.

We are incorporated in Israel, while all of our offices, assets, management, board members and most of our business partners are located in the United States. We have begun proceedings in Israel to reincorporate in the State of Delaware, in the United States, while maintaining our Nasdaq listing. Such reincorporation may require a significant amount of time, cost and focus from management and other employees, which may divert attention from our research and commercial activities. If any reincorporation activities we undertake in the future fail to achieve some or all of the expected benefits therefrom, our business, results of operations and financial condition could be materially and adversely affected.

In addition, a redomiciliation of the company will be subject to all corporate approvals, which will include an approval of our shareholders, and such redomiciliation may result in certain shareholders recognizing taxable income in the jurisdiction in which such shareholders are tax residents or in, in certain cases, in which their members or partners are resident. Shareholders may be subject to withholding taxes or other taxes with respect to their ownership of the company after the reincorporation. If a plan to redomicile the company is adopted and executed, we do not intend to make any cash distributions to shareholders to pay such taxes.

Certain current and future relationships with customers and third-party payors as well as certain of our business operations may be subject, directly or indirectly, to federal and state healthcare fraud and abuse laws, false claims laws and health information privacy and security laws. If we are unable to comply, or have not fully complied, with such laws, we could face criminal sanctions, civil penalties, contractual damages, reputational harm and diminished profits and future earnings.

If we obtain FDA approval for any of our product candidates and begin commercializing those products in the United States, our operations may be directly, or indirectly through our customers, further subject to various federal and state fraud and abuse laws, including, without limitation, the federal Anti-Kickback Statute and the federal False Claims Act. These laws may impact, among other things, our proposed sales, marketing and education programs. In addition, we may be subject to patient privacy regulation by the federal government and by the U.S. states and foreign jurisdictions in which we conduct our business. The healthcare laws and regulations that may affect our ability to operate include:

- the federal Anti-Kickback Statute, which prohibits, among other things, persons and entities from knowingly and willfully soliciting, receiving, offering or paying remuneration, directly or indirectly, to induce, or in return for, either the referral of an individual, or the purchase or recommendation of an item or service for which payment may be made under a federal healthcare program, such as the Medicare and Medicaid programs;
- federal civil and criminal false claims laws and civil monetary penalty laws, including the federal False Claims Act, which prohibit, among other things, individuals or entities from knowingly presenting, or causing to be presented, claims for payment to the federal government, including Medicare or Medicaid, that are false or fraudulent;
- the federal Health Insurance Portability and Accountability Act of 1996, or HIPAA, which created additional federal criminal statutes that prohibit, among other things, executing a scheme to defraud any healthcare benefit program and making false statements relating to healthcare matters;
- HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009, or HITECH, and their implementing regulations, which imposes certain requirements on certain types of individuals and entities, such as healthcare providers, health plans and healthcare clearing houses, known as “covered entities,” as well as their “business associates”, independent contractors or agents of covered entities that receive or obtain individually identifiable health information in connection with providing a service on behalf of a covered entity, relating to the privacy, security and transmission of individually identifiable health information;
- the federal Physician Payments Sunshine Act, which requires certain manufacturers of drugs, devices, biologics and medical supplies for which payment is available under Medicare, Medicaid or the Children’s Health Insurance Program, with specific exceptions, to report annually to the Centers for Medicare & Medicaid Services, or CMS, information related to payments or other transfers of value made to physicians, and further requires applicable manufacturers and applicable group purchasing organizations to report annually to CMS ownership and investment interests held by physicians and their immediate family members; and
- state and foreign law equivalents of each of the above federal laws, such as: anti-kickback and false claims laws which may apply to items or services reimbursed by any third party payor, including commercial insurers; state laws that require pharmaceutical companies to comply with the pharmaceutical industry’s voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government; state laws that require drug manufacturers to report information related to payments and other transfers of value to physicians and other healthcare providers or marketing expenditures; state and local laws that require the registration of pharmaceutical sales representatives; and state and foreign laws governing the privacy and security of health information in certain circumstances, many of which differ from each other in significant ways and may not have the same effect, thus complicating compliance efforts.

In addition, the European Union, or EU, has established its own data security and privacy legal framework, including but not limited to Directive 95/46/EC, or the Data Protection Directive. The European General Data Protection Regulation, or GDPR, took effect on May 25, 2018, which contains new provisions specifically directed at the processing of health information, higher sanctions and extra-territoriality measures intended to bring non-EU companies under the regulation. We anticipate that over time we may expand our business operations to include additional operations in the EU, including potentially conducting preclinical and clinical trials. With such expansion, we would be subject to increased governmental regulation in the EU countries in which we might operate, including regulation due to the GDPR.

If our operations are found to be in violation of any of the laws described above or any other governmental regulations that apply to us, we may be subject to penalties, including, without limitation, civil, criminal and administrative penalties, damages, fines, possible exclusion from Medicare, Medicaid and other government healthcare programs, additional reporting requirements and/or oversight, particularly if we become subject to a corporate integrity agreement or similar agreement to resolve allegations of non-compliance, disgorgement, imprisonment, contractual damages, reputational harm, diminished profits and future earnings, and curtailment or restructuring of our operations, any of which could adversely affect our ability to operate our business and our results of operations.

Recent and future healthcare legislation may further impact our business operations.

The United States and some foreign jurisdictions are considering or have enacted a number of legislative and regulatory proposals to change the healthcare system in ways that could affect our ability to sell our products profitably. Among policy makers and payors in the United States and elsewhere, there is significant interest in promoting changes in healthcare systems with the stated goals of containing healthcare costs, improving quality or expanding access. In the United States, the pharmaceutical industry has been a particular focus of these efforts and has been significantly affected by major legislative initiatives. For example, in March 2010, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act of 2010, or collectively the ACA, was enacted, which made a number of substantial changes in the way healthcare is financed by both governmental and private insurers. Since its passage, there have been judicial and Congressional challenges to certain aspects of the ACA, as well as recent efforts by the Trump administration to repeal or replace certain aspects of the ACA. Since January 2017, President Trump has signed two Executive Orders and other directives designed to delay the implementation of certain provisions of the ACA or otherwise circumvent some of the requirements for health insurance mandated by the ACA. Concurrently, Congress has considered legislation that would repeal or repeal and replace all or part of the ACA. While Congress has not passed comprehensive repeal legislation, two bills affecting the implementation of certain taxes under the ACA have been signed into law. On December 22, 2017, President Trump signed into law H.R. 1, “An Act to provide for reconciliation pursuant to titles II and V of the concurrent resolution on the budget for fiscal year 2018,” informally titled the Tax Cuts and Jobs Act, which significantly revises the U.S. Internal Revenue Code of 1986, as amended (the Code). The Tax Cuts and Jobs Act of 2017 includes a provision repealing, effective January 1, 2019, the tax-based shared responsibility payment imposed by the ACA on certain individuals who fail to maintain qualifying health coverage for all or part of a year that is commonly referred to as the “individual mandate.” Additionally, on January 22, 2018, President Trump signed a continuing resolution on appropriations for fiscal year 2018 that delayed the implementation of certain ACA-mandated fees, including the so-called “Cadillac” tax on certain high cost employer-sponsored insurance plans, the annual fee imposed on certain health insurance providers based on market share, and the medical device excise tax on non-exempt medical devices. Further, the Bipartisan Budget Act of 2018, or the BBA, among other things, amends the ACA, effective January 1, 2019, to increase from 50 percent to 70 percent the point-of-sale discount that is owed by pharmaceutical manufacturers who participate in Medicare Part D and to close the coverage gap in most Medicare drug plans, commonly referred to as the “donut hole.” As a result, there is significant uncertainty regarding future healthcare reform and its impact on our operations.

Further, there has been heightened governmental scrutiny in the United States of pharmaceutical pricing practices in light of the rising cost of prescription drugs and biologics. Such scrutiny has resulted in several recent Congressional inquiries and proposed and enacted federal and state legislation 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 products. At the federal level, the Trump administration’s budget proposal for fiscal year 2019 contains further drug price control measures that could be enacted during the 2019 budget process or in other future legislation, including, for example, measures to permit Medicare Part D plans to negotiate the price of certain drugs under Medicare Part B, to allow some states to

negotiate drug prices under Medicaid, and to eliminate cost sharing for generic drugs for low-income patients. While any proposed measures will require authorization through additional legislation to become effective, Congress and the Trump administration have each indicated that it will continue to seek new legislative and/or administrative measures to control drug costs. At the state level, legislatures have increasingly passed legislation and implemented regulations designed to control pharmaceutical and biological product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, and, in some cases, to encourage importation from other countries and bulk purchasing.

We expect that healthcare reform measures that may be adopted in the future may result in more rigorous coverage criteria and lower reimbursement, and in additional downward pressure on the price that we receive for any approved product. Any reduction in reimbursement from Medicare or other government-funded programs may result in a similar reduction in payments from private payors.

We cannot predict what healthcare reform initiatives may be adopted in the future. Further federal, state and foreign legislative and regulatory developments are likely, and we expect ongoing initiatives to increase pressure on drug pricing. Such reforms could have an adverse effect on anticipated revenues from product candidates that we may successfully develop and for which we may obtain regulatory approval and may affect our overall financial condition and ability to develop product candidates.

We face potential product liability, and, if successful claims are brought against us, we may incur substantial liability and costs.

The use of our product candidates in future clinical trials and the sale of any products for which we obtain marketing approval exposes us to the risk of product liability claims. Product liability claims might be brought against us by consumers, healthcare providers, pharmaceutical companies or others selling or otherwise coming into contact with our products. For example, unanticipated adverse effects could result from the use of our future products or product candidates which may result in a potential product liability claim. If we cannot successfully defend against product liability claims, we could incur substantial liability and costs. In addition, regardless of merit or eventual outcome, product liability claims may result in:

- impairment of our business reputation;
- withdrawal of clinical trial participants;
- costs due to related litigation;
- distraction of management's attention from our primary business;
- substantial monetary awards to patients or other claimants;
- the inability to commercialize our product candidates; and
- decreased demand for our product candidates, if approved for commercial sale.

We plan to obtain product liability insurance relating to the use of our therapeutics in future clinical trials. However, such insurance coverage may not be sufficient to reimburse us for any expenses or losses we may suffer. Moreover, insurance coverage is becoming increasingly expensive and in the future we may not be able to obtain or maintain insurance coverage at a reasonable cost or in sufficient amounts to protect us against losses due to liability. If and when we obtain marketing approval for product candidates, we intend to expand our insurance coverage to include the sale of commercial products; however, we may be unable to obtain product liability insurance on commercially reasonable terms or in adequate amounts. On occasion, large judgments have been awarded in class action lawsuits based on drugs that had unanticipated adverse effects. A successful product liability claim or series of claims brought against us could cause our share price to decline and, if judgments exceed our insurance coverage, could adversely affect our results of operations and business.

Cyber security risks and the failure to maintain the confidentiality, integrity, and availability of our computer hardware, software, and Internet applications and related tools and functions could result in damage to our reputation and/or subject us to costs, fines or lawsuits.

Our business requires manipulating, analyzing and storing large amounts of data. In addition, we rely on a global enterprise software system to operate and manage our business. We also maintain personally identifiable information about our employees. Our business therefore depends on the continuous, effective, reliable, and secure operation of our computer hardware, software, networks, Internet servers, and related infrastructure. To the extent that our hardware or software malfunctions or access to our data by internal research personnel is interrupted, our business could suffer. The integrity and protection of our employee and company data is critical to our business and employees have a high expectation that we will adequately protect their personal information. The regulatory environment governing information, security and privacy laws is increasingly demanding and continues to evolve. Maintaining compliance with applicable security and privacy regulations may increase our operating costs. Although our computer and communications hardware is protected through physical and software safeguards, it is still vulnerable to fire, storm, flood, power loss, earthquakes, telecommunications failures, physical or software break-ins, software viruses, and similar events. These events could lead to the unauthorized access, disclosure and use of non-public information. The techniques used by criminal elements to attack computer systems are sophisticated, change frequently and may originate from less regulated and remote areas of the world. As a result, we may not be able to address these techniques proactively or implement adequate preventative measures. If our computer systems are compromised, we could be subject to fines, damages, litigation and enforcement actions, and we could lose trade secrets, the occurrence of which could harm our business. In addition, any sustained disruption in internet access provided by other companies could harm our business.

Business interruptions could delay us in the process of developing our future products.

Our headquarters are located in San Diego, California. We are vulnerable to natural disasters such as earthquakes and wild fires, as well as other events that could disrupt our operations. We do not carry insurance for earthquakes or other natural disasters and we may not carry sufficient business interruption insurance to compensate us for losses that may occur. Any losses or damages we incur could have a material adverse effect on our business operations.

RISKS RELATED TO OUR ORDINARY SHARES

The market price of our Ordinary Shares may be highly volatile and investors may not be able to resell shares at or above the price at which they purchase the shares.

Since our merger on November 15, 2017 through March 1, 2019, our closing share price as reported on The Nasdaq Global Market (“Nasdaq”), has ranged from \$4.11 to \$10.22. The trading price of our Ordinary Shares is likely to continue to be volatile.

Our share price could be subject to wide fluctuations in response to a variety of factors, including but not limited to the following factors:

- adverse results or delays in preclinical studies or clinical trials;
- inability to obtain additional funding;
- any delay in filing an IND or BLA for any of our product candidates and any adverse development or perceived adverse development with respect to the FDA’s review of that IND or BLA;
- failure to maintain our existing strategic alliances or enter into new alliances;
- failure of our strategic alliance partners to elect to develop and commercialize product candidates under our alliance agreements or the termination of any programs under our alliance agreements;
- failure by us or our licensors and strategic alliance partners to prosecute, maintain or enforce our intellectual property rights;
- failure to successfully develop and commercialize our product candidates;

- changes in laws or regulations applicable to our preclinical and clinical development activities, product candidates or future products;
- inability to obtain adequate product supply for our product candidates or the inability to do so at acceptable prices;
- adverse regulatory decisions;
- introduction of new products, services or technologies by our competitors;
- failure to meet or exceed financial projections we may provide to the public;
- failure to meet or exceed the estimates and projections of the investment community;
- the perception of the pharmaceutical industry by the public, legislatures, regulators and the investment community;
- announcements of significant acquisitions, strategic partnerships, joint ventures or capital commitments by us, our strategic alliance partners or our competitors;
- disputes or other developments relating to proprietary rights, including patents, litigation matters and our ability to obtain patent protection for our technologies;
- additions or departures of key scientific or management personnel;
- significant lawsuits, including patent or licensing matters;
- changes in the market valuations of similar companies;
- sales of our Ordinary Shares by us or our shareholders in the future; and
- trading volume of our Ordinary Shares.

In addition, companies trading in the stock market in general, and Nasdaq in particular, have experienced extreme price and volume fluctuations that have often been unrelated or disproportionate to the operating performance of these companies. Broad market and industry factors may negatively affect the market price of our Ordinary Shares, regardless of our actual operating performance.

The requirements of being a publicly traded company may strain our resources and divert management's attention.

As a publicly traded company, we have incurred, and will continue to incur, significant legal, accounting and other expenses that we did not incur as a private company. In addition, the Sarbanes-Oxley Act, as well as rules subsequently implemented by the SEC and Nasdaq have imposed various requirements on public companies. In July 2010, the Dodd-Frank Wall Street Reform and Consumer Protection Act, or the Dodd-Frank Act, was enacted. There are significant corporate governance and executive compensation related provisions in the Dodd-Frank Act that require the SEC to adopt additional rules and regulations in these areas such as “say on pay” and proxy access. Shareholder activism, the current political environment and the current high level of government intervention and regulatory reform may lead to substantial new regulations and disclosure obligations, which may lead to additional compliance costs and impact the manner in which we operate our business in ways we cannot currently anticipate. Our management and other personnel will need to devote a substantial amount of time to these compliance initiatives. Moreover, these rules and regulations will increase our legal and financial compliance costs and will make some activities more time-consuming and costly. For example, we expect these rules and regulations to make it more difficult and more expensive for us to obtain director and officer liability insurance and we may be required to incur substantial costs to maintain our current levels of such coverage. In addition, most of our personnel consists of the Arcturus Therapeutics, Inc. employees prior to the merger, some of whom may not have previously managed and operated a public company. These employees will need to devote substantial time to gaining expertise regarding operations as a public company and compliance with applicable laws and regulations including the costs associated with the filing requirements under Section 16 of the Exchange Act.

We are no longer an “emerging growth company” and are therefore subject to the auditor attestation requirement in the assessment of our internal controls over financial reporting and certain other increased disclosure and governance requirements.

At the end of fiscal year 2018, we lost our status as an “emerging growth company” as defined in the Jumpstart Our Business Startups Act of 2012 (the “JOBS Act”). As a result, we are no longer able to take advantage of certain exemptions from various reporting requirements. Therefore, we are now subject to certain requirements that apply to other public companies that did not previously apply to us, due to our previous status as an emerging growth company. These requirements include:

- compliance with the auditor attestation requirement in the assessment of our internal controls over financial reporting pursuant to Section 404 of the Sarbanes-Oxley Act;
- compliance with any new rules that may be adopted by the Public Company Accounting Oversight Board;
- compliance with any new or revised financial accounting standards applicable to public companies without an extended transition period;
- full disclosure regarding executive compensation required of larger public companies; and
- compliance with the requirement of holding a nonbinding advisory vote on executive compensation and obtaining shareholder approval of any golden parachute payments not previously approved.

Failure to comply with these requirements could subject us to enforcement actions by the SEC, divert management’s attention, damage our reputation, and adversely affect our business, results of operations, or financial condition. In particular, if our independent registered public accounting firm is not able to render the required attestation, it could result in a loss of investor confidence in the accuracy, reliability, and completeness of our financial reports. We expect that the loss of “emerging growth company” status and compliance with these additional requirements will require management to expend additional time while also condensing the time frame available to comply with certain requirements, which may further increase our legal and financial compliance costs.

We may be at risk of securities class action litigation.

We may be at risk of securities class action litigation. This risk is especially relevant for us due to our dependence on positive clinical trial outcomes and regulatory approvals of each of our product candidates. In the past, medicines, biotechnology and pharmaceutical companies have experienced significant stock price volatility, particularly when associated with binary events such as clinical trials and product approvals. If we face such litigation, it could result in substantial costs, divert management’s attention and resources, or have a material adverse effect on our business, operating results and prospects.

Sales of a substantial number of our Ordinary Shares in the public market by our existing shareholders could cause our share price to fall.

If our existing shareholders sell, or indicate an intention to sell, substantial amounts of those Ordinary Shares in the public market, the trading price of our Ordinary Shares could decline. In particular, the former shareholders, warrant holders and noteholders of Arcturus Therapeutics, Inc. received an aggregate of 6,631,712 of our Ordinary Shares pursuant to the merger in an unregistered transaction, which shares may be sold pursuant to Rule 144 under the Securities Act. Those shareholders are eligible to sell those shares in the public market without restriction, except for shareholders who are deemed “affiliates” of the Company under Rule 144 under the Securities Act. In addition, Ordinary Shares that are either subject to outstanding options or reserved for future issuance under our employee benefit plans are or may become eligible for sale in the public market to the extent permitted by the provisions of various vesting schedules and Rule 144 under the Securities Act. If these Ordinary Shares are sold, or if it is perceived that they will be sold, in the public market, that could create downward pressure on the trading price of our Ordinary Shares and cause the trading price to decline.

Future sales and issuances of our Ordinary Shares or rights to purchase Ordinary Shares, including pursuant to our equity incentive plans, could result in additional dilution of the percentage ownership of our shareholders and could cause our share price to fall.

We expect that significant additional capital will be needed in the future to continue our planned operations. To the extent we raise additional capital by issuing equity securities, our shareholders may experience substantial dilution. Pursuant to our 2018 Omnibus Equity Incentive Plan, or the 2018 Plan, our management is authorized to grant options and other equity-based awards to our employees, directors and consultants. We may sell Ordinary Shares, convertible securities or other equity securities in one or more transactions at prices and in a manner we determine from time to time, any of which may result in material dilution to investors and/or our existing shareholders. New investors could also be issued securities with rights superior to those of our existing shareholders.

We may be unable to comply with the applicable continued listing requirements of Nasdaq.

Our Ordinary Shares are currently listed on Nasdaq. In order to maintain this listing, we must satisfy minimum financial and other continued listing requirements and standards, including a minimum closing bid price requirement for our Ordinary Shares of \$1.00 per share. There can be no assurance that we will be able to comply with the applicable listing standards. For example, if we were to fail to meet the minimum bid price requirement for 30 consecutive business days, we could become subject to delisting. Although Nasdaq may provide us with a compliance period in which to regain compliance with the minimum bid price requirement, we cannot assure you that we would be able to regain compliance within the period provided by Nasdaq. In order to regain compliance with such requirement, the closing bid price of our Ordinary Shares would need to meet or exceed \$1.00 per share for at least 10 consecutive business days during the compliance period. If we were not able to regain compliance within the allotted compliance period for this requirement or any other applicable listing standard, including any extensions that may be granted by Nasdaq, our Ordinary Shares would be subject to delisting. In the event that our Ordinary Shares are delisted from Nasdaq and are not eligible for quotation or listing on another market or exchange, trading of our Ordinary Shares could be conducted only in the over-the-counter market or on an electronic bulletin board established for unlisted securities such as the Pink Sheets or the OTC Bulletin Board. In such event, it could become more difficult to dispose of, or obtain accurate price quotations for our Ordinary Shares and there would likely also be a reduction in our coverage by securities analysts and the news media, which could cause the price of our Ordinary Shares to decline further.

We are treated as a U.S. corporation for U.S. federal tax purposes.

Pursuant to Section 7874 of the Code, we are treated as a U.S. corporation for U.S. federal income tax purposes. As a result, we are subject to U.S. federal corporate income tax as if we were incorporated in the United States. Shareholders should consult their tax advisers regarding the tax consequences of holding our Ordinary Shares based on their particular circumstances.

The recently enacted U.S. federal income tax reform bill could adversely affect our business and financial condition.

As noted above, on December 22, 2017, President Trump signed into law the Tax Cuts and Jobs Act, which significantly revises the Code. The Tax Cuts and Jobs Act, among other things, contains significant changes to U.S. federal corporate taxation, including reduction of the corporate tax rate from a top marginal rate of 35% to a flat rate of 21%, limitation of the tax deduction for interest expense to 30% of adjusted earnings (except for certain small businesses), limitation of the deduction for net operating losses to 80% of current year taxable income and elimination of net operating loss carrybacks, one time taxation of offshore earnings at reduced rates regardless of whether they are repatriated, elimination of U.S. tax on foreign earnings (subject to certain important exceptions), immediate deductions for certain new investments instead of deductions for depreciation expense over time, and modifying or repealing many business deductions and credits. Notwithstanding the reduction in the corporate income tax rate, the overall impact of the Tax Cuts and Jobs Act is uncertain and our business and financial condition could be adversely affected. In addition, it is uncertain if and to what extent various states will conform to the newly enacted federal tax law. The impact of the Tax Cuts and Jobs Act on holders of our Ordinary Shares is also uncertain and could be adverse. We urge our shareholders to consult with their legal and tax advisors with respect to this legislation and the potential tax consequences of investing in or holding our Ordinary Shares.

Unlike in prior years, as of January 1, 2019, we are required to comply with the domestic reporting regime under the Exchange Act and will incur significant legal, accounting and other expenses, and our management will be required to devote substantial additional time to new compliance initiatives and corporate governance matters.

We determined that, effective as of January 1, 2019, we no longer qualified as a “foreign private issuer” under the rules and regulations of the SEC. While we were a foreign private issuer, we were exempt from compliance with certain laws and regulations of the SEC, including the proxy rules, the short-swing profits recapture rules and certain governance requirements, such as independent director oversight of the nomination of directors and executive compensation. In addition, we were not required to file annual, quarterly and current reports and financial statements with the SEC as frequently or as promptly as U.S. companies registered under the Exchange Act. As a result of this determination, beginning on January 1, 2019, we were no longer entitled to “foreign private issuer” exemptions and we plan to report as a domestic U.S. filer, including filing quarterly reports on Form 10-Q, current reports on Form 8-K and proxy statements under Section 14 of the Exchange Act. In addition, commencing January 1, 2019, our “insiders” are subject to the reporting and short-swing profit recovery provisions contained in Section 16 of the Exchange Act and will be no longer exempt from the requirements of Regulation FD promulgated by the SEC under the Exchange Act. Moreover, beginning January 1, 2019, we were no longer permitted to follow our home country rules in lieu of the corporate governance obligations imposed by Nasdaq, and will be required to comply with the governance practices required of U.S. domestic issuers.

The regulatory and compliance costs associated with the reporting and governance requirements applicable to U.S. domestic issuers may be significantly higher than the costs we previously incurred as a foreign private issuer. As a result, we expect that the loss of foreign private issuer status will increase our legal and financial compliance costs and will make some activities highly time consuming and costly. In addition, we need to develop our reporting and compliance infrastructure and may face challenges in complying with the new requirements applicable to us.

Our ability to use our net operating loss carryforwards and certain other tax attributes may be limited.

Under the Tax Cuts and Jobs Act, U.S. federal net operating losses, or NOLs, incurred in 2018 and in future years may be carried forward indefinitely, but the deductibility of such federal NOLs is limited. It is uncertain if and to what extent various states will conform to the Tax Cuts and Jobs Act. To the extent that we continue to generate taxable losses for United States federal income tax purposes, unused NOLs will carry forward to offset future taxable income (subject to any applicable limitations), if any. Under Sections 382 and 383 of the Code, as amended, if a corporation undergoes an “ownership change,” generally defined as a greater than 50% change (by value) in its equity ownership over a three-year period, the corporation’s ability to use its pre-change NOLs and other pre-change tax attributes (such as research tax credits) to offset its post-change income may be limited. We believe we may have triggered an “ownership change” limitation at the completion of our merger with Arcturus Therapeutics, Inc. in November 2017, however we have not completed a study in accordance with Sections 382 and 383 of the Code to determine whether this ownership change has occurred. We may also experience ownership changes in the future as a result of subsequent shifts in our share ownership. As a result, if we earn net taxable income, our ability to use our pre-change NOL carryforwards to offset U.S. federal taxable income may be subject to limitations, which could potentially result in increased future tax liability to us. Similar provisions of U.S. state tax law may also apply to limit our use of accumulated state tax attributes, including our state NOLs. In addition, at the state level, there may be periods during which the use of NOLs is suspended or otherwise limited, which could accelerate or permanently increase state taxes owed. As a result, even if we attain profitability, we may be unable to use a material portion of our NOLs and other tax attributes, which could negatively impact our future cash flows.

We do not intend to pay dividends on our Ordinary Shares so any returns will be limited to the value of our shares.

We have never declared or paid any cash dividends on our Ordinary Shares. We currently anticipate that we will retain future earnings for the development, operation and expansion of our business and do not anticipate declaring or paying any cash dividends for the foreseeable future. Moreover, the Companies Law, imposes certain restrictions on our ability to declare and pay dividends. See Item 10.B. “Memorandum and Articles of Association – Rights, Preferences and Restrictions of Shares – Dividend and Liquidation Rights” of our Annual Report on Form 20-F for the fiscal year ended December 31, 2017 for additional information. Any return to shareholders will therefore be limited to the appreciation of their shares.

RISKS RELATED TO ISRAELI LAW AND OUR OPERATIONS IN ISRAEL

Provisions of Israeli law may make it easy for our shareholders to demand that we convene a shareholders meeting, and/or allow shareholders to convene a shareholder meeting without the consent of our management, which may disrupt our management's ability to run our company.

Section 63(b) of the Companies Law may allow any one or more of our shareholders holding at least 5% of our voting rights to demand that we convene an extraordinary shareholders meeting. Also, in the event that we deny to convene an extraordinary shareholders meeting pursuant to such a request, Section 64 of the Companies Law provides that such shareholders may independently convene an extraordinary shareholders meeting and require us to cover the costs. If our shareholders decide to exercise these rights in a way inconsistent with our management's strategic plans, our management's ability to run our company may be disrupted, and this process may entail significant costs to us.

Provisions of Israeli law and our amended and restated articles of association may delay, prevent or otherwise impede a merger with, or an acquisition of, our company, which could prevent a change of control, even when the terms of such a transaction are favorable to us and our shareholders.

Israeli corporate law regulates mergers, requires tender offers for acquisitions of shares above specified thresholds, requires special approvals for transactions involving directors, officers or significant shareholders and regulates other matters that may be relevant to such types of transactions. For example, a merger may not be consummated unless at least 50 days have passed from the date on which a merger proposal is filed by each merging company with the Israel Registrar of Companies and at least 30 days have passed from the date on which the shareholders of both merging companies have approved the merger. In addition, a majority of each class of securities of the target company must approve a merger. Moreover, a tender offer for all of a company's issued and outstanding shares can only be completed if the acquirer receives positive responses from the holders of at least 95% of the issued share capital. Completion of the tender offer also requires approval of a majority of the offerees that do not have a personal interest in the tender offer, unless, following consummation of the tender offer, the acquirer would hold at least 98% of our outstanding shares. Furthermore, the shareholders, including those who indicated their acceptance of the tender offer, may, at any time within six months following the completion of the tender offer, petition an Israeli court to alter the consideration for the acquisition, unless the acquirer stipulated in its tender offer that a shareholder that accepts the offer may not seek such appraisal rights.

Furthermore, Israeli tax considerations may make potential transactions unappealing to us or to our shareholders whose country of residence does not have a tax treaty with Israel exempting such shareholders from Israeli tax. See Item 10.E. "Taxation – Israeli Taxation Considerations" of our Annual Report on Form 20-F for the fiscal year ended December 31, 2017 for additional information.

Our amended and restated articles of association also contain provisions that could delay or prevent changes in control or changes in our management without the consent of our Board of Directors. These provisions include the following:

- no cumulative voting in the election of directors, which limits the ability of minority shareholders to elect director candidates; and
- the right of our Board of Directors to appoint a director to fill a vacancy created by the expansion of the Board of Directors or the resignation, death or removal of a director, which may prevent shareholders from being able to fill vacancies on our Board of Directors.

As a domiciliary of Israel, our results may be adversely affected by political, economic and military instability in Israel.

As an Israeli company, political, economic and military conditions in Israel may directly affect our business. Since the establishment of the State of Israel in 1948, a number of armed conflicts have taken place between Israel and its neighboring countries, the Hamas militant group and the Hezbollah. Any hostilities involving Israel or the interruption or curtailment of trade between Israel and its trading partners could adversely affect our operations and results of operations.

In addition, since 2010 political uprisings and conflicts have arisen in various countries in the Middle East. Such instability may lead to deterioration in the political and trade relationships that exist between the State of Israel and certain other countries. Several countries, principally in the Middle East, still restrict doing business with Israel and Israeli companies, and additional countries may impose restrictions on doing business with Israel and Israeli companies if hostilities in Israel or political instability in the region continues or increases. Similarly, Israeli companies are limited in conducting business with entities from countries that are considered to be in a state of war with Israel.

Further, in the past, the State of Israel and Israeli companies have been subjected to economic boycotts. Several countries still restrict business with the State of Israel and with Israeli companies. These restrictive laws and policies may have an adverse impact on our operating results, financial conditions or the expansion of our business.

It may be difficult to enforce a judgment of a U.S. court against us and the Israeli experts named herein in Israel or the United States, to assert U.S. securities laws claims in Israel or to serve process on certain of our officers and directors and these experts.

We were incorporated in Israel. Therefore, a judgment obtained against us, or any directors that reside outside of the United States, including a judgment based on the civil liability provisions of the U.S. federal securities laws, may not be collectible in the United States and may not necessarily be enforced by an Israeli court. It also may be difficult for you to effect service of process on these persons in the United States or to assert U.S. securities law claims in original actions instituted in Israel. Additionally, it may be difficult for an investor, or any other person or entity, to initiate an action with respect to U.S. securities laws in Israel. Israeli courts may refuse to hear a claim based on an alleged violation of U.S. securities laws reasoning that Israel is not the most appropriate forum in which to bring such a claim. In addition, even if an Israeli court agrees to hear a claim, it may determine that Israeli law and not U.S. law is applicable to the claim. If U.S. law is found to be applicable, the content of applicable U.S. law must be proven as a fact by expert witnesses, which can be a time consuming and costly process. Certain matters of procedure will also be governed by Israeli law. There is little binding case law in Israel that addresses the matters described above. As a result of the difficulty associated with enforcing a judgment against us in Israel, you may not be able to collect any damages awarded by either a U.S. or foreign court.

Your rights and responsibilities as a shareholder will be governed by Israeli law, which differs in some material respects from the rights and responsibilities of shareholders of U.S. companies.

The rights and responsibilities of the holders of our Ordinary Shares are governed by our amended and restated articles of association and by Israeli law. These rights and responsibilities differ in some material respects from the rights and responsibilities of shareholders in typical U.S.-based corporations. In particular, a shareholder of an Israeli company has certain duties to act in good faith and fairness towards the Company and other shareholders, and to refrain from abusing its power in the Company. See Item 10.B. “Memorandum and Articles of Association – Shareholder Duties” of our Annual Report on Form 20-F for the fiscal year ended December 31, 2017 for additional information. There is limited case law available to assist us in understanding the nature of this duty or the implications of these provisions. These provisions may be interpreted to impose additional obligations and liabilities on holders of our Ordinary Shares that are not typically imposed on stockholders of U.S. corporations.

We are subject to anti-takeover provisions that could delay or prevent our acquisition by another entity.

Provisions of Israeli corporate and tax law and of our amended and restated articles of association may have the effect of delaying, preventing or making more difficult any merger or acquisition of us. In addition, any merger or acquisition of us may require the prior consent of the Israel Innovation Authority (formerly known as the Office of the Chief Scientist), as well as the Investment Center of the Israeli Ministry of Industry, Trade and Employment, or the Investment Center. Israeli law regulates mergers, votes required to approve a merger, acquisition of shares through tender offers and transactions involving significant shareholders. Any of these provisions may make it more difficult to acquire us. Accordingly, our acquisition by another entity could be delayed or prevented even if it would be beneficial to our shareholders.

RISKS RELATED TO OUR REDOMICILIATION

Your rights as a shareholder will change as a result of the Redomiciliation.

Due to the differences between Delaware law and Israel law and differences between the governing documents of our newly formed Delaware corporation and our existing Israeli governed entity we are unable to adopt governing documents for Delaware that are identical to the governing documents for our existing Israeli governed entity. We have sought to preserve in the certificate of incorporation and bylaws of our newly formed Delaware corporation a similar allocation of rights and powers between the shareholders and our board of directors that exists under our existing Israeli governed entity's constitution. Nevertheless, our newly formed Delaware corporation's proposed certificate of incorporation and bylaws differ from our existing Israeli governed entity's constitution, both in form and substance, and your rights as a shareholder will change.

The expected benefits of the Redomiciliation may not be realized.

There can be no assurance that all of the anticipated benefits of the Redomiciliation will be achievable, particularly as the achievement of the benefits are in many important respects subject to factors that we do not and cannot control, including the reaction of third parties with whom we enter into contracts and do business and the reactions of investors.

The Redomiciliation will result in additional direct and indirect costs, even if it is not completed.

We will incur additional costs as a result of the Redomiciliation. We expect to incur attorneys' fees, accountants' fees, filing and other regulatory fees, mailing expenses, proxy solicitation fees and financial printing expenses in connection with the Redomiciliation, even if the Scheme of Arrangement is not approved or completed. The Redomiciliation also may negatively affect us by diverting attention of our management and employees from our operating business during the period of implementation and by increasing other administrative costs and expenses.

The Redomiciliation may result in taxes imposed on our shareholders.

The Redomiciliation may result in shareholders recognizing taxable income in the jurisdiction in which such shareholders are tax residents or in, in certain cases, in which their members or partners are resident. If the Redomiciliation is executed, we may not make any cash distributions to shareholders to pay such taxes. Our shareholders may be subject to withholding taxes or other taxes with respect to their ownership of our equity after the Redomiciliation.

Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties.

Our principal place of business is located at 10628 Science Center Drive, Suite 250, San Diego, California, and our telephone number is (858) 900-2660. Our agent in the United States is Arcturus Therapeutics, Inc., whose address is that of our San Diego, California headquarters. Our World Wide Web address is www.arcturusrx.com. The information contained on that web site is not a part of this annual report. We believe our facilities are adequate for our current and near-term needs.

Item 3. Legal Proceedings.

On February 8, 2019, the Company entered into a share exchange agreement (the “Share Exchange Agreement”) between the Company and a special-purpose company, Arcturus Therapeutics Holdings Inc. (“NewCo”) in connection with the contemplated redomiciliation of the Company from Israel to Delaware (the “Redomiciliation”). Pursuant to the Share Exchange Agreement, and in order to effectuate the transactions contemplated by the Share Exchange Agreement, on February 11, 2019, the Company filed an application with the Tel Aviv District Court to approve the convening of a general shareholders meeting of the Company for the approval of the Redomiciliation pursuant to Sections 350 and 351 of the Companies Law. The Share Exchange Agreement and the Redomiciliation are subject to shareholder approval as required by the Companies Law, Israeli court approval, effectiveness of filings to be made with the SEC, approval of the listing of shares of NewCo by the NASDAQ Stock Market LLC (“Nasdaq”) and the other conditions precedent set forth in the Share Exchange Agreement (the “Conditions Precedent”).

In furtherance of the Redomiciliation, the holders of Ordinary Shares of the Company as of a future record date and the holders of options to purchase Ordinary Shares of the Company as of the same record date will transfer their Ordinary Shares of the Company and options to purchase Ordinary Shares of the Company, respectively, to NewCo and, in exchange thereof, will receive one share of common stock of NewCo for each ordinary share of the Company and one option to purchase one share of common stock of NewCo in exchange for each option to purchase an ordinary share of the Company, respectively.

Concurrently, the Company intends the common stock of NewCo to be listed on NASDAQ. Upon consummation of the transactions contemplated by the Share Exchange Agreement, it is expected that the Company’s Ordinary Shares will be delisted from trading on NASDAQ, and the Company is expected to become a private company (as defined in the Companies Law) wholly-owned by NewCo.

Pursuant to the Share Exchange Agreement, the Company also agreed, subject to the Conditions Precedent, to transfer all of the shares of Arcturus Therapeutics Inc. (“Arcturus Sub”), a wholly-owned subsidiary of the Company, to NewCo through a reduction of the Company’s equity and the distribution of a dividend-in-kind, such that Arcturus Sub and the Company shall each become a wholly-owned and direct subsidiary of NewCo.

Item 4. Mine Safety Disclosures.

Not applicable.

Item 5. Market for Registrant’s Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities.

Our Ordinary Shares are listed on Nasdaq under the trading symbol “ARCT” upon the effective date of the reverse merger with Alcobra Ltd. on November 15, 2017. The following table sets forth the range of high and low sales prices for our Ordinary Shares for the periods indicated. The quotations reflect inter-dealer prices, without retail markup, markdown or commission, and may not represent actual transactions. Consequently, the information provided below may not be indicative of our ordinary share price under different conditions.

Year ended December 31, 2018	High	Low
Fourth Quarter	\$ 8.75	\$ 4.11
Third Quarter	\$ 9.80	\$ 7.45
Second Quarter	\$ 9.40	\$ 4.91
First Quarter	\$ 9.60	\$ 5.30
Year ended December 31, 2017	High	Low
Fourth quarter (from November 15, 2017)	\$ 10.22	\$ 7.95

Holders of Ordinary Shares

As of March 1, 2019, there were 53 holders of record of our Ordinary Shares. As of such date, there were 10,761,523 shares of our Ordinary Shares outstanding.

Dividends

We have never declared or paid any cash dividends on our Ordinary Shares. We currently intend to retain all available funds and any future earnings to support our operations and finance the growth and development of our business. Any future determination related to our dividend policy will be made at the discretion of our board of directors and will depend upon, among other factors, our results of operations, financial condition, capital requirements, contractual restrictions, business prospects and other factors our board of directors may deem relevant.

Our Board of Directors may determine that a dividend may be paid, wholly or partially, by the distribution of certain of our assets or by a distribution of paid up shares, debentures or debenture share or any of our securities or of any other companies or in any one or more of such ways in the manner and to the extent permitted by the Companies Law. Under Israeli law, dividends may only be paid out of our profits and other surplus funds, as defined in the Companies Law, as of the end of the most recent year or as accrued over a period of the most recent two years, whichever amount is greater, provided that there is no reasonable concern that payment of a dividend will prevent us from satisfying our existing and foreseeable obligations as they become due. No unpaid dividend or interest shall bear interest as against the Company and all dividends unclaimed for one year after having been declared may be invested or otherwise used by the directors until claimed.

There are currently no Israeli currency control restrictions on payments of dividends or other distributions with respect to our Ordinary Shares or the proceeds from the sale of shares, except for the obligation of Israeli residents to file reports with the Bank of Israel regarding certain transactions. However, legislation remains in effect pursuant to which currency controls can be imposed by administrative action at any time.

Non-residents of Israel who purchase our securities with non-Israeli currency will be able to repatriate dividends (if any), liquidation distributions and the proceeds of any sale of such securities, into non-Israeli currencies at the rate of exchange prevailing at the time of repatriation, provided that any applicable Israeli taxes have been paid (or withheld) on such amounts.

Neither our amended and restated articles of association nor the laws of the State of Israel restrict in any way the ownership or voting of Ordinary Shares by non-residents of Israel, except with respect to citizens of countries that are in a state of war with Israel. Our amended and restated articles of association do not impose any conditions governing changes in capital that are more stringent than required by the Companies Law.

Modification of Class Rights

If, at any time, the share capital is divided into different classes of shares, the rights attached to any class (unless otherwise provided by the terms of issuance of the shares of that class) may be varied with the consent in writing of the holders of all the issued shares of that class, or with the approval of a majority vote at a meeting of the shareholders passed at a separate meeting of the holders of the shares of the class. The provisions of our amended and restated articles of association relating to general meetings shall apply, *mutatis mutandis*, to every such separate general meeting. Unless otherwise provided by the conditions of issuance, the enlargement of an existing class of shares, or the issuance of additional shares thereof, shall not be deemed to modify or abrogate the rights attached to the previously issued shares of such class or of any other class. These conditions provide for the minimum shareholder approvals permitted by the Companies Law.

Israeli Taxation Considerations

The following is a summary of the material Israeli income tax laws applicable to us. This section also contains a discussion of material Israeli income tax consequences concerning the ownership and disposition of our Ordinary Shares. This summary does not discuss all the aspects of Israeli income tax law that may be relevant to a particular investor in light of his or her personal investment circumstances or to some types of investors subject to special treatment under Israeli law. Examples of this kind of investor include residents of Israel or traders in securities who are subject to special tax regimes not covered in this discussion. To the extent that the discussion is based on new tax legislation that has not yet been subject to judicial or administrative interpretation, we cannot assure you that the appropriate tax authorities or the courts will accept the views expressed in this discussion. This summary is based on laws and regulations in effect as of the date of this annual report and does not take into account possible future amendments which may be under consideration.

General corporate tax structure in Israel

As of January 1, 2018, Israeli resident companies, such as us, are generally subject to corporate tax at the rate of 23% on their taxable income. For the years ended December 31, 2017 and 2016, the corporate tax rate was 24% and 25%, respectively.

Capital gains derived by an Israeli resident company are generally subject to tax at the same rate as the corporate tax rate. Under Israeli tax legislation, a corporation will be considered as an “Israeli Resident” if it meets one of the following: (a) it was incorporated in Israel; or (b) its business is managed and controlled from Israel.

Taxation of our Israeli shareholders on receipt of dividends

Israeli residents who are individuals are generally subject to Israeli income tax for dividends paid on our Ordinary Shares (other than bonus shares or share dividends) at a rate of 25%, or 30% if the recipient of such dividend is a “substantial shareholder” (as defined below) at the time of distribution or at any time during the preceding 12-month period.

A “substantial shareholder” is generally a person who alone, or together with his relative or another person who collaborates with him on a regular basis, holds, directly or indirectly, at least 10% of any of the “means of control” of the corporation. “Means of control” generally include the right to vote in a general meeting of shareholders, receive profits, nominate a director or an officer, receive assets upon liquidation, or instruct someone who holds any of the aforesaid rights regarding the manner in which he or she is to exercise such right(s), and whether by virtue of shares, rights to shares or other rights, or in any other manner, including by means of voting or trusteeship agreements.

The term “Israeli Resident” for individuals is generally defined under the Israeli Income Tax Ordinance [New Version], 1961, or the Israeli Tax Ordinance, as an individual whose center of life is in Israel. According to the Israeli Tax Ordinance, in order to determine the center of life of an individual, account will be taken of the individual’s family, economic and social connections, including: (a) the place of the individual’s permanent home; (b) the place of residence of the individual and his family; (c) the place of the individual’s regular or permanent place of business or the place of his permanent employment; (d) place of the individual’s active and substantial economic interests; (e) place of the individual’s activities in organizations, associations and other institutions. The center of life of an individual will be presumed to be in Israel if: (a) the individual was present in Israel for 183 days or more in the tax year; or (b) the individual was present in Israel for 30 days or more in the tax year, and the total period of the individual’s presence in Israel in that tax year and the two previous tax years is 425 days or more. The presumption in this paragraph may be rebutted either by the individual or by the assessing officer.

Israeli resident corporations are generally exempt from Israeli corporate income tax with respect to dividends paid on our Ordinary Shares so long as the profits out of which the dividends were paid, were derived and taxed in Israel.

Capital Gains Taxes Applicable to Israeli Resident Shareholders

The income tax rate applicable to Real Capital Gain derived by an Israeli individual from the sale of shares which had been purchased after January 1, 2012, whether listed on a stock exchange or not, is 25%. However, if such shareholder is considered a “substantial shareholder” (as defined above) at the time of sale or at any time during the preceding 12-month period and/or claims a deduction for interest and linkage differences expenses in connection with the purchase and holding of such shares, such gain will be taxed at the rate of 30%.

Moreover, capital gains derived by an individual shareholder who is a dealer or trader in securities, or to whom such income is otherwise taxable as ordinary business income, are taxed in Israel at his/her marginal ordinary income tax rates (up to 50% in 2017, including excess tax as detailed below).

Israeli resident corporations are generally subject to regular corporate tax rate (24% in 2017 and 23% as of 2018) with respect to capital gains generated from the sale of our Ordinary Shares.

Taxation of Non-Israeli Shareholders on Receipt of Dividends

Non-Israeli residents are generally subject to Israeli income tax on the receipt of dividends paid on our Shares at the rate of 25% (or 30% for individuals, if such individual is a “substantial shareholder” at the time receiving the dividend or on any date in the 12 months preceding such date), unless a tax certificate is obtained in advance from the Israeli Tax Authority authorizing withholding-exempt remittances or a reduced rate of tax pursuant to an applicable tax treaty between Israel and the shareholder’s country of residence.

A non-Israeli resident who receives dividends from which tax was fully withheld is generally exempt from the duty to file tax returns in Israel in respect of such income; provided that (i) such income was not derived from a business conducted in Israel by the taxpayer, (ii) the taxpayer has no other taxable sources of income in Israel with respect to which a tax return is required to be filed and (iii) the taxpayer is not obliged to pay excess tax (as further explained below).

For example, under the Convention Between the Government of the United States of America and the Government of Israel with Respect to Taxes on Income, as amended (the “U.S.-Israel Tax Treaty”), Israeli withholding tax on dividends paid to a U.S. resident for treaty purposes may not, in general, exceed 25%, subject to certain conditions. Where the recipient is a U.S. corporation owning 10% or more of the outstanding shares of the voting stock of the paying corporation during the part of the paying corporation’s taxable year which precedes the date of payment of the dividend and during the whole of its prior taxable year (if any) and not more than 25% of the gross income of the paying corporation for such prior taxable year (if any) consists certain interest or dividends, the Israeli tax withheld may not exceed 12.5%, subject to certain conditions.

Payers of dividends on our Ordinary Shares, including the Israeli stockbroker effectuating the transaction, or the financial institution through which the securities are held, are generally required, subject to any of the foregoing exemptions, reduced tax rates and the demonstration of a shareholder regarding his, her or its foreign residency, to withhold tax upon the distribution of dividend at the rate of 25% (whether the recipient is a substantial shareholder or not), so long as the shares are registered with a nominee company.

Capital gains income taxes applicable to non-Israeli shareholders.

Non-Israeli resident shareholders are generally exempt from Israeli capital gains tax on any gains derived from the sale, exchange or disposition of our Ordinary Shares, provided certain conditions, such as the shareholders did not acquire their shares prior to January 1, 2009 or acquired their shares after the Company was listed for trading on a stock exchange and such gains were not derived from a permanent establishment or business activity of such shareholders in Israel. However, non-Israeli corporations' shareholders will not be entitled to the foregoing exemptions if an Israeli resident (i) has a controlling interest of more than 25% in such non-Israeli corporation or (ii) is the beneficiary of or is entitled to 25% or more of the revenues or profits of such non-Israeli corporation, whether directly or indirectly.

In addition, a sale of securities by a non-Israeli resident may be exempt from Israeli capital gains tax under the provisions of an applicable tax treaty. For example, under the U.S.-Israel Tax Treaty, the sale, exchange or disposition of our Ordinary Shares by a shareholder who is a U.S. resident (for purposes of the U.S.-Israel Tax Treaty) holding the Ordinary Shares as a capital asset and is entitled to claim the benefits afforded to such a resident by the U.S.-Israel Tax Treaty (such shareholder is referred to herein as a Treaty U.S. Resident), is generally exempt from Israeli capital gains tax unless the one of the following scenarios : (i) such Treaty U.S. Resident is an individual and was present in Israel for 183 days or more in the aggregate during the relevant taxable year; (ii) such Treaty U.S. Resident holds, directly or indirectly, shares representing 10% or more of our voting power of the Company during any part of the 12 month period preceding such sale, exchange or disposition, subject to certain conditions; (iii) the capital gains arising from such sale, exchange or disposition are attributable to a permanent establishment of the Treaty U.S. Resident located maintained in Israel, subject to certain conditions; (iv) the capital gains arising from such sale, exchange or disposition is attributed to real estate located in Israel; or (v) the capital gains arising from such sale, exchange or disposition is attributed to royalties. In any such case, the sale, exchange or disposition of our Ordinary Shares would be subject to Israeli tax, to the extent applicable. However, under the U.S.-Israel Tax Treaty, such Treaty U.S. Resident would be permitted to claim a credit for such taxes against U.S. federal income tax imposed on any gain from such sale, exchange or disposition, under the circumstances and subject to the limitations specified in the U.S.-Israel Income Tax Treaty.

Regardless of whether shareholders may be liable for Israeli income tax on the sale of our Ordinary Shares, the payment of the consideration may be subject to withholding of Israeli tax at the source. Accordingly, shareholders may be required to demonstrate that they are exempt from tax on their capital gains in order to avoid withholding at source at the time of sale. Specifically, in transactions involving a sale of all of the shares of an Israeli resident company, in the form of a merger or otherwise, the Israel Tax Authority may require from shareholders who are not liable for Israeli tax to sign declarations in forms specified by this authority or obtain a specific exemption from the Israel Tax Authority to confirm their status as non-Israeli resident, and, in the absence of such declarations or exemptions, may require the purchaser of the shares to withhold taxes at source.

Excess Tax and Estate and Gift Tax

Individuals who are subject to tax in Israel are also subject to an additional income tax at a rate of 3% (till the end of 2016 the excess tax rate was 2%) on annual taxable income or gain exceeding a certain threshold (NIS 803,520 for 2016, NIS 640,000 for 2017, NIS 641,880 for 2018 and NIS 649,560 for 2019), which amount is linked to the annual change in the Israeli consumer price index), including, but not limited to, dividends, interest and capital gain. Currently, Israeli law does not impose estate or gift taxes.

Recent Sales of Unregistered Securities

None.

Issuer and Affiliated Purchaser -- Purchases of Equity Securities

We completed the sale of our intangible assets related to the ADAIR technology during fiscal year 2018. Pursuant to the asset purchase agreement for ADAIR, the Company received a 30% ownership interest in the common stock of a privately held company in consideration for the sale of the ADAIR technology.

Item 6. Selected Financial Data.

The following tables set forth a summary of our historical financial data as of, and for the periods ended on, the dates indicated. We have derived the statement of operations data and balance sheet data from our audited financial statements (in thousands). You should read the selected financial data in conjunction with the related notes and "Management's Discussion and Analysis of Financial Condition and Results of Operations," both of which are included elsewhere in this report.

	For the year ended December 31,				
	2018	2017	2016	2015	2014 (Unaudited)
Collaboration revenue	\$ 15,753	\$ 12,998	\$ 20,382	\$ 6,138	\$ 25
Research and development, net	16,982	15,918	17,934	5,476	3,975
General and administrative	20,582	7,572	3,448	2,574	2,027
Net loss from operations	(21,811)	(10,492)	(1,000)	(1,912)	(5,977)
Net loss	(21,785)	(10,902)	(1,571)	(1,902)	(6,018)
Net loss per share, basic and diluted	\$ (2.16)	\$ (3.53)	\$ (0.77)	\$ (0.94)	\$ (2.99)
Weighted-average shares outstanding, basic and diluted	10,069	3,087	2,032	2,016	2,015

	2014 (Unaudited)				
	2018	2017	2016	2015	2014 (Unaudited)
Working capital	\$ 29,251	\$ 39,662	\$ 3,597	\$ 1,208	\$ 1,416
Total assets	\$ 44,198	\$ 52,024	\$ 13,736	\$ 14,947	\$ 2,895
Shareholders' equity (deficit)	\$ 13,642	\$ 33,794	\$ 1,577	\$ (3,631)	\$ (1,845)

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

Overview

We are an emerging RNA medicines company focused on the development and commercialization of therapeutics directed towards rare, infectious, fibrotic, and respiratory diseases with significant unmet medical need. The genetic medicines industry is constantly struggling to identify non-viral delivery solutions for large RNA molecules to different cell types. Arcturus' LUNAR® Delivery technology is lipid mediated – and non-viral. LUNAR is versatile, compatible with various types of RNA -- and has been shown to deliver large RNA to different cell types including Liver hepatocytes, Liver stellate cells, Muscle cells (myocytes), and Lung cells (including bronchial epithelial cells).

Our activities since inception have consisted principally of performing research and development activities, general and administrative activities and raising capital to fund those efforts. Our activities are subject to significant risks and uncertainties, including failing to secure additional funding before we achieve sustainable revenues and profit from operations. As of December 31, 2018, we had an accumulated deficit of \$44.9 million.

Liquidity and Capital Resources

Going Concern and Management's Plans

The Company's products that are being developed have not generated significant revenue. As a result, the Company has suffered recurring losses and requires significant cash resources to execute its business plans. These losses are expected to continue for an extended period of time. Based on our planned operations, we do not expect that our current cash and cash equivalents balances will be sufficient to fund our operations for at least 12 months after the date the consolidated financial statements are filed without raising additional capital through equity or debt financing. These conditions raise substantial doubt about our ability to continue as a going concern for a period of one year from the date of the issuance of our 2018 consolidated financial statements. The accompanying financial statements have been prepared on a going concern basis, which contemplates the realization of assets and the satisfaction of liabilities in the normal course of business. The financial statements do not include any adjustments relating to the recoverability and classification of asset amounts or the classification of liabilities that might be necessary should the Company be unable to continue as a going concern within one year after the date the financial statements are issued.

Historically, our major sources of cash have comprised proceeds from collaboration partners, various public and private offerings of our Ordinary Shares, option and warrant exercises, and interest income. From inception through December 2018, the Company raised approximately \$131.5 million in gross proceeds from various public and private offerings of our Ordinary Shares, debt issuances, collaboration agreements, and the merger with Alcobra.

As of December 31, 2018, the Company had approximately \$36.8 million in cash, restricted cash and cash equivalents. Management's plans to mitigate an expected shortfall of capital, to support future operations, include raising additional funds. The actual amount of cash that it will need to operate is subject to many factors.

The Company also recognizes it will need to raise additional capital in order to continue to execute its business plan in the future. There is no assurance that additional financing will be available when needed or that management will be able to obtain financing on terms acceptable to the Company or whether the Company will become profitable and generate positive operating cash flow. If the Company is unable to raise sufficient additional funds, it will have to scale back its operations.

Overview

Since our inception, we have funded our operations principally with proceeds from the sale of capital stock, convertible notes and revenues earned through collaborative agreements. In November 2017, we obtained \$36.4 million in cash and short-term investments from our merger with Alcobra Ltd. At December 31, 2018, we had \$36.7 million in unrestricted cash and cash equivalents.

On October 12, 2018, the Company entered into a Loan and Security Agreement with Western Alliance Bank whereby the Company received gross proceeds of \$10.0 million under a long-term debt agreement (the “Loan”). The Loan has a maturity date of October 1, 2022 and carries interest at the U.S. prime rate plus 1.25%. The loan has an interest-only period of 19 months, which could be extended by an additional 6 months if certain conditions are met, followed by an amortization period of 30 months, or 24 months if the interest-only period is extended. Upon maturity or prepayment, the Company will be required to pay a 3% fee, or a 2% fee if the U.S. Food and Drug Administration accepts certain Investigational New Drug applications prior to maturity. The Company paid a loan origination fee of \$128,000 which was recorded as a debt discount and will be accreted over the term of the loan. In addition, the Company is required to pay a fee of \$350,000 upon certain change of control events. The Loan is collateralized by all of the assets of the Company, excluding intellectual property, which is subject to a negative pledge. In addition, the Company is required to maintain at least 50% of its deposit and investment accounts, or \$20 million, whichever is lower, with the Western Alliance Bank.

The Loan includes financial covenants which include the Company’s (1) nomination of a clinical candidate by December 31, 2018, which the Company is in compliance with, and (2) submission of a clinical candidate for Investigational New Drug application (“IND”), made to the U.S. Food and Drug Administration by December 31, 2019 and have it approved by January 31, 2020, provided that, if the Company has received net cash proceeds from sale, on or after October 12, 2018, of the Company’s equity securities in an amount of not less than \$15,000,000, then the IND submission date shall be extended to May 31, 2020 and the approval date shall be extended to June 30, 2020.

On October 15, 2018, the Company entered into a Sales Agreement (the “Sales Agreement”) with Leerink Partners LLC (“Leerink”), pursuant to which it may sell from time to time, at its option, up to an aggregate of \$30.0 million of the Company’s Ordinary Shares through Leerink, as sales agent. The Company is required to pay Leerink compensation in cash equal to 3.0% of gross proceeds for the Ordinary Shares sold through the Sales Agreement and the Company has agreed to reimburse Leerink for certain fees and expenses. Under the Sales Agreement, Leerink may sell Ordinary Shares by any method permitted by law deemed to be an “at the market offering” as defined in Rule 415 of the Securities Act of 1933, as amended, and the rules and regulations thereunder, including, without limitation, sales made directly on or through NASDAQ, on or through any other existing trading market for the Ordinary Shares or to or through a market maker. If expressly authorized by the Company, Leerink may also sell Ordinary Shares in negotiated transactions.

If we are unable to maintain sufficient financial resources, our business, financial condition and results of operations will be materially and adversely affected. There can be no assurance that the Company will be able to obtain the needed financing on acceptable terms or at all. Additionally, equity or debt financings may have a dilutive effect on the holdings of the Company’s existing shareholders. Our future capital requirements are difficult to forecast and will depend on many factors.

We expect to continue to incur additional losses for the foreseeable future, and we will need to raise additional debt or equity financing or enter into additional partnerships to fund development. The ability of our Company to transition to profitability is dependent on identifying and developing successful mRNA drug candidates. In the near future, if we are not able to achieve planned milestones, incur costs in excess of our forecasts, or do not meet covenant requirements of our debt, we will need to reduce discretionary spending, discontinue the development of some or all of our products, which will delay part of our development programs, all of which will have a material adverse effect on our ability to achieve our intended business objectives. There can be no assurances that additional financing will be secured or, if secured, will be on favorable terms. These conditions raise substantial doubt about the business, results of operations, financial condition and/or our ability to fund scheduled obligations on a timely basis or at all. The accompanying financial statements have been prepared assuming that we will continue as a going concern, which contemplates the realization of assets and the settlement of liabilities and commitments in the normal course of business. The consolidated financial statements do not reflect any adjustments related to the recoverability and classification of assets or the amounts and classification of liabilities that might be necessary if we are unable to continue as a going concern.

The following table shows a summary of our cash flows for the year ended December 31, 2018 and 2017 (in thousands):

(Dollars in thousands)	Year Ended December 31,	
	2018	2017
Cash provided by (used in):		
Operating activities	\$ (20,760)	\$ (460)
Investing activities	22,134	10,355
Financing activities	10,204	6,998
Net increase in cash and restricted cash	\$ 11,578	\$ 16,893

Operating Activities

Our primary use of cash is to fund operating expenses, which consist mainly of research and development expenditures and general and administrative expenditures. We have incurred significant expenses which have been partially offset by cash collected through our collaboration agreements and acquired through our recent merger. Cash collections under the collaboration agreements can vary from year to year depending on the terms of agreement and work performed. These changes on cash flows primarily relate to the timing of cash receipts for upfront payments, reimbursable expenses and achievement of milestones under these collaborative agreements.

Net cash used in operating activities was \$20.8 million on a net loss of \$21.8 million for the year ended December 31, 2018, compared to net cash used of \$0.5 million on a net loss of \$10.9 million for the year ended December 31, 2017. Adjustments for non-cash charges which includes share-based compensation and depreciation and amortization were \$2.2 million and \$3.1 million for the year ended December 31, 2018 and 2017, respectively. Changes in working capital resulted in adjustments to operating net cash outflows of \$1.2 million for the year ended December 31, 2018, and net cash inflows of \$7.4 million for the year December 31, 2017.

Investing Activities

Net cash provided by investing activities of \$22.1 million for the year ended December 31, 2018 reflected proceeds from the maturities of our short-term investments of \$30.2 million, offset by purchases of short-term investments of \$6.6 million, and cash used to purchase property and equipment of \$1.5 million. Net cash provided by investing activities of \$10.4 million for the year ended December 31, 2017 reflected proceeds from the maturities of our short-term investments of \$10.6 million and negligible proceeds from the sale of equipment, offset by cash used to purchase property and equipment of \$0.3 million.

Financing Activities

Net cash provided by financing activities of \$10.2 million for the year ended December 31, 2018 consisted of net proceeds from the exercise of stock options of \$0.3 million and net proceeds from the long-term debt of \$9.9 million. Net cash provided by financing activities of \$7.0 million for the year ended December 31, 2017 consisted of proceeds from issuance of convertible promissory notes of \$5.7 million, net proceeds from exercise of stock options and warrants of \$0.9 million and net cash received in the issuance of shares for the net assets of Alcobra Ltd. of \$0.5 million.

Funding Requirements

We anticipate that we will continue to generate annual net losses for the foreseeable future, and we expect the losses to increase as we continue the development of, and seek regulatory approvals for, our product candidates, and begin commercialization of our products. As a result, we will require additional capital to fund our operations in order to support our long-term plans. The Company intends to seek additional capital through equity and/or debt financings, collaborative or other funding arrangements with partners or through other sources of financing. Should we seek additional financing from outside sources, we may not be able to raise such financing on terms acceptable to us or at all. If we are unable to raise additional capital when required or on acceptable terms, we may be required to scale back or discontinue the advancement of product candidates, reduce headcount, liquidate our assets, file for bankruptcy, reorganize, merge with another entity, or cease operations.

Our future funding requirements are difficult to forecast and will depend on many factors, including the following:

- the achievement of milestones under our strategic alliance agreements;
- the terms and timing of any other strategic alliance, licensing and other arrangements that we may establish;
- the initiation, progress, timing and completion of preclinical studies and clinical trials for our product candidates;
- the number and characteristics of product candidates that we pursue;
- the outcome, timing and cost of regulatory approvals;
- delays that may be caused by changing regulatory requirements;
- the cost and timing of hiring new employees to support our continued growth;
- the costs involved in filing and prosecuting patent applications and enforcing and defending patent claims;
- the costs and timing of procuring clinical and commercial supplies of our product candidates;
- the costs and timing of establishing sales, marketing and distribution capabilities;
- the costs associated with legal proceedings;
- the costs associated with potential litigation related to collaboration agreements; and
- the extent to which we acquire or invest in businesses, products or technologies.

Results of Operations

The following discussion and analysis of our financial condition and results of operations should be read in conjunction with the consolidated financial statements included in this annual report. Our historical results of operations and the year-to-year comparisons of our results of operations that follow are not necessarily indicative of future results. As noted in the 2017 Annual Report, from an accounting perspective, the merger which closed on November 15, 2017 has been reflected in our financial statements as a recapitalization, whereby Arcturus Therapeutics, Inc. was the deemed accounting acquirer. Accordingly, our results of operations described below reflect Arcturus Therapeutics, Inc.'s results, not Alcobra Ltd.'s results, for all periods presented.

Revenues

We enter into arrangements with pharmaceutical and biotechnology partners that may contain upfront payments, license fees for research and development arrangements, research and development funding, milestone payments, option exercise and exclusivity fees and royalties on future sales. The following table summarizes our total revenues for the periods indicated (in thousands):

(Dollars in thousands)	Year Ended December 31,		2017 to 2018	
	2018	2017	\$ change	% change
Collaboration revenue	\$ 15,753	\$ 12,998	\$ 2,755	21.2%

Collaboration revenue increased by \$2.8 million during the year ended December 31, 2018 as compared to the year ended December 31, 2017. The increase in revenue was due to a new collaboration agreement that was signed during the first quarter of 2018 with CureVac that resulted in \$4.4 million in revenue, an increase in revenue of \$1.2 million related to the collaboration agreement with Ultragenyx as upfront payment amortization increased due to a change to the amortization period as well as revenue recognized from a payment received from Ultragenyx that extended the exclusivity period of reserved targets for one year. Lastly, a \$1.4 million increase in revenue with Synthetic Genomics, Inc. related to a contract signed during the fourth quarter of 2017. These increases were primarily offset by decreased revenue of \$3.6 million associated with Janssen as a result of the previous agreement being completed during the third quarter of 2017. Furthermore, a decrease in revenue of \$0.6 million resulted from lower revenue recognition for research and development funding from two other collaboration partners.

On February 11, 2019, we announced the termination of the obligations of CureVac for preclinical development, effective 180 days from February 5, 2019 and the re-assumption by us of the worldwide rights thereto. We will reassume 100% global rights of our flagship asset and clinical development candidate, a messenger RNA (mRNA) drug to treat ornithine transcarbamylase (OTC) deficiency.

Operating Expenses

Our operating expenses consist of research and development and general and administrative expenses.

(Dollars in thousands)	Year Ended December 31,		2017 to 2018	
	2018	2017	\$ change	% change
Operating expenses:				
Research and development, net	\$ 16,982	\$ 15,918	\$ 1,064	6.7%
General and administrative	20,582	7,572	\$ 13,010	*
Total	\$ 37,564	\$ 23,490	\$ 14,074	59.9%

* Greater than 100%

Research and Development Expenses, net

Our research and development expenses consist primarily of payments for salaries and related personnel expenses, third-party clinical consultants, and laboratory supplies related to conducting research and development activities in conjunction with collaborative agreements and our internal research and development activities.

The increase of \$1.1 million in research and development expenses for the year ended December 31, 2018 as compared to the year ended December 31, 2017 was due to an increase of \$0.6 million in share-based compensation expense, an increase of \$1.0 million in salaries related to new hires and increases in general facility costs of \$0.7 million. The increase in research and development expenses were offset by lower expense of \$0.9 million in research supplies and contract manufacturing costs primarily from the completion of our initial collaboration agreement with Janssen as well as the \$0.3 million increase in grant funding from the Cystic Fibrosis Foundation.

General and Administrative Expenses

General and administrative expenses consist primarily of salaries and related benefits for our executive, administrative and accounting functions and professional service fees for legal and accounting services as well as other general and administrative expenses.

The increase in general and administrative expenses of \$13.0 million for year ended December 31, 2018 as compared to the year ended December 31, 2017 was partly due to proxy and related costs of \$7.3 million, which included legal fees of \$4.4 million, \$1.2 million increase in insurance cost from a director "tail" insurance policy that was purchased pursuant to the terms of the Agreement and Release, additional professional fees of \$0.9 million, and other personnel costs of \$0.8 million. The remaining increase of \$5.7 million was due primarily the increase of \$2.5 million of salaries and related expenses for new hires, \$2.4 million of professional fees, \$0.8 million of public company related expenses, \$0.8 million in general facility and office costs and \$0.6 million of insurance costs, offset by lower expense in share-based compensation of \$1.6 million. The offset in share-based compensation is primarily related to a one-time modification of a restricted ordinary share agreement in 2017. Without the effect of this one-time adjustment, share-based compensation expenses for the year ended December 31, 2018 would have been relatively the same amount as it was during the year ended December 31, 2017.

Finance income (expense), net

(Dollars in thousands)	Year Ended December 31,		2017 to 2018	
	2018	2017	\$ change	% change
Finance income (expense), net:				
Interest income	\$ 514	\$ 89	\$ 425	*
Interest expense	(186)	(150)	\$ (36)	24.0%
Debt conversion expense	—	(348)	\$ 348	-100.0%
Total	<u>\$ 328</u>	<u>\$ (409)</u>	<u>\$ 737</u>	<u>*</u>

* Greater than 100%

Interest income is generated on cash and cash equivalents and our short-term investments. For the year ended December 31, 2018, the increase in interest income over the year ended December 31, 2017 resulted from increased balances including cash and investments obtained in conjunction with our merger.

Interest expense during 2018 was incurred primarily in conjunction with the long-term debt with Western Alliance Bank. Interest expense during 2017 was incurred from our convertible notes which were converted to Ordinary Shares in conjunction with our merger.

Critical Accounting Policies and Estimates

We prepare our consolidated financial statements in conformity with accounting principles generally accepted in the United States, or U.S. GAAP. As such, we make certain estimates, judgements and assumptions that we believe are reasonable, based upon information available to us. These judgements involve making estimates about the effect of matters that are inherently uncertain and may significantly impact our results of operations and financial condition. We describe our significant accounting policies more fully in Note 2 to our consolidated financial statements for the year ended December 31, 2018. In the following paragraphs, we describe the specific risks associated with these critical accounting policies and we caution that future events may not reflect exactly as one may expect, and that best estimates may require adjustment.

The following are our significant accounting policies which we believe are the most critical to aid in fully understanding and evaluating our reported financial results.

Revenue Recognition

We recognize revenue when each of the following four criteria is met: (i) persuasive evidence of an arrangement exists; (ii) products are delivered or as services are rendered; (iii) the sales price is fixed or determinable; and (iv) collectability is reasonably assured.

Multiple-element arrangements may include (i) grants of licenses, or options to obtain licenses, to intellectual property, (ii) research and development services, (iii) participation on joint research or joint development committees, or (iv) manufacturing or supply services. The payments we may receive under these arrangements typically include one or more of the following: non-refundable upfront license fees, option exercise fees, funding of research or development efforts, amounts due upon the achievement of specified objectives, or royalties on future product sales.

Multiple-element arrangements require the separability of deliverables included in an arrangement into different units of accounting and the allocation of arrangement consideration to the units of accounting. The evaluation of multiple-element arrangements requires management to make judgments about (i) the identification of deliverables, (ii) whether such deliverables are separable from the other aspects of the contractual relationship, (iii) the estimated selling price of each deliverable, and (iv) the expected period of performance for each deliverable.

To determine the units of accounting under a multiple-element arrangement, management evaluates certain separation criteria, including whether the deliverables have stand-alone value, based on the relevant facts and circumstances for each arrangement. Management then estimates the selling price for each unit of accounting and allocates the arrangement consideration to each unit using the relative selling price method. The allocated consideration for each unit of accounting is recognized based on the method most appropriate for that unit of account and in accordance with the revenue recognition criteria detailed above.

If there are deliverables in an arrangement that are not separable from other aspects of the contractual relationship, they are treated as a combined unit of accounting, with the allocated revenue for the combined unit recognized in a manner consistent with the revenue recognition applicable to the final deliverable in the combined unit. Payments received prior to satisfying the relevant revenue recognition criteria are recorded as deferred revenue in the accompanying balance sheets and recognized as revenue when the related revenue recognition criteria are met.

Most of our collaboration agreements provide for non-refundable milestone payments. We recognize revenue that is contingent upon the achievement of a substantive milestone in its entirety in the period in which the milestone is achieved. A milestone is considered substantive when the consideration payable to us for such milestone (i) is consistent with our performance necessary to achieve the milestone or the increase in value to the collaboration resulting from our performance, (ii) relates solely to our past performance and (iii) is reasonable relative to all of the other deliverables and payments within the arrangement. In making this assessment, we consider all facts and circumstances relevant to the arrangement, including factors such as the scientific, regulatory, commercial and other risks that must be overcome to achieve the milestone, the level of effort and investment required to achieve the milestone and whether any portion of the milestone consideration is related to future performance or deliverables.

We periodically review the estimated performance periods under the collaboration agreements, which provide for non-refundable upfront payments and fees. We adjusted the periods over which revenue was recognized when appropriate to reflect changes in assumptions relating to the estimated performance periods. In the first quarter of 2019, we will adopt new accounting guidance that will change future patterns of revenue recognition.

We record revenues related to the reimbursement of costs incurred under the collaboration agreements where we act as a principal, control the research or development activities and bear credit risk. Under our collaboration agreements, we are reimbursed for associated out-of-pocket costs and for a certain amount of our full-time equivalent, or FTE, costs based on an agreed-upon FTE rate. The gross amount of these pass-through reimbursed costs is reported as revenue in the accompanying consolidated statements of operations and comprehensive loss, while the actual expenses for which we are reimbursed are reflected as research and development costs.

Emerging Growth Company

The Company will no longer qualify as an emerging growth company after December 31, 2018. Subject to certain conditions set forth in the JOBS Act, as an “emerging growth company” through December 31, 2018, we elected to rely on other exemptions, including without limitation, (i) providing an auditor’s attestation report on our internal control over financial reporting pursuant to Section 404 of the Sarbanes-Oxley Act and (ii) complying with any requirement that may be adopted by the PCAOB regarding mandatory audit firm rotation or a supplement to the auditor’s report providing additional information about the audit and the financial statements (auditor discussion and analysis).

Under the JOBS Act, an emerging growth company can take advantage of an extended transition period for complying with new or revised accounting standards. This provision allows an emerging growth company to delay the adoption of new or revised accounting standards that have different transition dates for public and private companies until those standards would otherwise apply to private companies. We have elected to use this extended transition period specifically for *Revenue from Contracts with Customers* (Topic 606). As a result of this election, our timeline to comply with this standard will in many cases be delayed as compared to other public companies that were not eligible to take advantage of this election or did not make this election. Therefore, our consolidated financial statements may not be comparable to those of companies that complied with the public company effective dates for this standard.

Off-balance sheet arrangements

None.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk.

Our primary exposure to market risk is interest income sensitivity, which is affected by changes in the general level of United States interest rates. Due to the nature of our investments, we believe that we are not subject to any material market risk exposure. We do not have any foreign currency or other derivative financial instruments.

Item 8. Financial Statements and Supplementary Data.

The consolidated financial statements and related financial statement schedules required to be filed are listed in the Index to Consolidated Financial Statements and are incorporated herein and in Item 15 of Part IV of this annual report on Form 10-K.

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

None.

Item 9A. Controls and Procedures.

Evaluation of Disclosure Controls and Procedures

We maintain disclosure controls and procedures that are designed to ensure that information required to be disclosed in our periodic and current reports that we file with the SEC is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms, and that such information is accumulated and communicated to our management, including our principal executive officer and our principal financial officer, as appropriate, to allow timely decisions regarding required disclosure. In designing and evaluating the disclosure controls and procedures, management recognized that any controls and procedures, no matter how well designed and operated, can provide only reasonable and not absolute assurance of achieving the desired control objectives. In reaching a reasonable level of assurance, management necessarily was required to apply its judgment in evaluating the cost-benefit relationship of possible controls and procedures. In addition, 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 December 31, 2018, our management, with the participation of our Chief Executive Officer, Chief Financial Officer and Principal Accounting Officer, has evaluated the effectiveness of the design and operation of our disclosure controls and procedures, as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed in the reports we file or submit under the Exchange Act is accumulated and communicated to management, including our Chief Executive Officer, Chief Financial Officer and Principal Accounting Officer, as appropriate, to allow timely decisions regarding required disclosure. Based on this evaluation, our Chief Executive Officer, Chief Financial Officer and Principal Accounting Officer concluded that our disclosure controls and procedures were effective at the reasonable assurance level as of December 31, 2018.

Management's Report on Internal Control Over Financial Reporting

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

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

As of December 31, 2018, our management assessed the effectiveness of our internal control over financial reporting using the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in Internal Control-Integrated Framework (2013). In adopting the 2013 Framework, management assessed the applicability of the principles within each component of internal control and determined whether or not they have been adequately addressed within the current system of internal control and adequately documented. Based on this assessment, management, under the supervision and with the participation of our Chief Executive Officer, Chief Financial Officer and Principal Accounting Officer, concluded that, as of December 31, 2018, our internal control over financial reporting was effective based on those criteria.

This Annual Report on Form 10-K does not include an attestation report of our independent registered public accounting firm regarding internal control over financial reporting. We were not required to have, nor have we, engaged our independent registered public accounting firm to perform an audit of internal control over financial reporting pursuant to SEC rules that permit us to provide only management's report in this Annual Report on Form 10-K.

Changes in Internal Control Over Financial Reporting.

An evaluation was also performed under the supervision and with the participation of our management, including our Chief Executive Officer, Chief Financial Officer and Principal Accounting Officer of any changes in our internal control over financial reporting that occurred during our last fiscal quarter and that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting. There were no changes in our internal control over financial reporting during the quarter ended December 31, 2018 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information.

None.

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

The following table sets forth information regarding our executive officers and directors as of March 1, 2019:

Name	Age	Position(s)
Executive Officers		
Joseph E. Payne	47	President and Chief Executive Officer and Director
Andrew Sassine (6)	54	Chief Financial Officer and Director
Padmanabh Chivukula	40	Chief Scientific Officer and Chief Operating Officer
Non-Employee Directors		
Dr. Peter Farrell (1)(2)(3)(4)(5)	76	Director and Chairman of the Board
James Barlow (1)(2)(3)(4)(5)	60	Director
Dr. Magda Marquet (1)(2)(3)(4)(5)	60	Director

- (1) Indicates independent director under Nasdaq rules.
- (2) Member of the Audit Committee.
- (3) Member of the Compensation Committee.
- (4) Member of the Executive Committee.
- (5) Member of the Nominating and Corporate Governance Committee.
- (6) Andrew Sassine served as a Director of the Board during the year ended December 31, 2018. Mr. Sassine also served as the Interim Chief Financial Officer from August 24, 2018 to December 31, 2018. Effective January 1, 2019, Mr. Sassine became our Chief Financial Officer on a full-time basis.

Joseph E. Payne is the President and Chief Executive Officer of Arcturus Therapeutics Ltd. He serves on Arcturus's Board since March 2013. He brings with him an exceptional track record of ushering novel therapeutics to the clinic including targeted RNA medicines utilizing lipid-mediated delivery technologies. Joseph's background includes over 20 years of successful drug discovery experience at Merck Research Labs, DuPont Pharmaceuticals, Bristol-Myers Squibb, Kalypsys, and Nitto as evidenced by over 40 publications and patents, and several investigational new drug (IND) clinical candidates. His academic training includes a Bachelor's Degree in Chemistry, magna cum laude from Brigham Young University, a Master of Science in Synthetic Organic Chemistry from the University of Calgary and Executive Training Certification from MIT Sloan School of Management.

Dr. Padmanabh Chivukula is the Chief Scientific Officer and Chief Operating Officer of Arcturus Therapeutics. Dr. Chivukula has an exceptional and technically solid foundation in nanoparticle technology. Prior to Arcturus, from 2008 until February 2013, Dr. Chivukula was employed by Nitto, where his titles included Group Leader and Chief Scientist. Dr. Chivukula brings over 15 years of experience in drug delivery and therapeutic drug development, including leading the polymeric RNAi research department at Nitto. Dr. Chivukula has a Ph.D. in Pharmaceutical Chemistry from the University of Utah where he specialized in nanoparticle technology.

Dr. Peter Farrell is the founder, former long-term CEO and current Chairman of ResMed Inc. (NYSE:RMD). Dr. Farrell has been Chairman and a director of ResMed since 1989, when the company began as a management buyout of sleep technology from Baxter Healthcare. Peter was previously Foundation Director of the University of New South Wales (UNSW) Graduate School for Biomedical Engineering (1978-89) while simultaneously serving as Vice President of Research & Development for Baxter Healthcare in Tokyo (1984-89). Dr. Farrell served on the board of directors of NuVasive, Inc., a company focused on the surgical treatment of spine disorders. Dr. Farrell serves on the board of trustees of The Scripps Research Institute in La Jolla and is Chairman of the Boston-based POC NMR diagnostic company, WaveGuide. Dr. Farrell is a fellow or honorary fellow of several professional bodies, including the US National Academy of Engineering. He was inducted as 1998 San Diego Entrepreneur of the Year for Health Sciences, 2001 Australian Entrepreneur of the Year and 2005 US National Entrepreneur of the

Year for Health Sciences. Peter was appointed to the Executive Council of the division of Sleep Medicine at Harvard Medical School in 1998, was appointed Vice Chairman in 2000 (2000-2010), became Chairman in 2010 and served in that capacity for three years. He is on various academic advisory boards including UCSD's Jacobs School of Engineering, where he was named the 2012 Gordon Fellow, UCSD's Rady Business School and the MIT Dean of Engineering's Advisory Council. Peter holds a B.E. with honors in chemical engineering from the University of Sydney, an SM in chemical engineering from MIT, a PhD in bioengineering from the University of Washington, Seattle, and a DSc from UNSW for research which resulted in improved treatment for both hemodialysis and peritoneal dialysis patients.

Andrew Sassine serves on the Board of Directors of Nasdaq listed ICAD Inc. and Nasdaq listed Gemphire Therapeutics, Inc. (GEMP). ICAD Inc. is a leading provider of advanced image analysis, workflow solutions and radiation therapy for early detection and treatment of cancer. Gemphire Therapeutics, Inc. is a clinical-stage biopharmaceutical company focused on delivering and commercializing therapies for the treatment of cardiovascular disease and Non-alcoholic steatohepatitis. He also is Chairman of the Board of privately held ComHear Inc., a digital audio software and device company. Mr. Sassine previously served on the board of Acorn Energy, Inc., CNS Response, Inc. and FluoroPharma Medical, Inc., (FMPI). Mr. Sassine served in various positions at Fidelity Investments from 1999 to 2012, including, most recently as Portfolio Manager. Between 2004 and 2011, he managed the Fidelity Small Cap Stock Fund, the Fidelity International Small Cap Opportunities Fund and the Fidelity Advisor International Small Cap Opportunities Fund. Mr. Sassine joined Fidelity as a high yield research analyst, covering the Telecommunications, Satellite, Technology, Defense and Aerospace, and Restaurant Industries and in 2001, joined the international group as a research analyst covering small and mid-cap international stocks. Prior to joining Fidelity, he served as a vice president in the Acquisition Finance Group at Fleet National Bank. Mr. Sassine has been a member of the Henry B. Tippie College of Business, University of Iowa Board of Advisors since 2009 and served on the Board of Trustees at the Clarke Schools for Hearing and Speech between 2009 and 2014. Mr. Sassine earned a Bachelor of Arts degree at the University of Iowa in 1987 and an MBA from the Wharton School at the University of Pennsylvania in 1993.

James Barlow is a member of the Board of Directors of NAHS Holding, Inc., an Employee Stock Ownership Plan company, whose affiliates provide post-acute care, subacute care, short and long-term rehabilitation, and skilled nursing in the United States. Mr. Barlow is a C-level financial executive with more than 30 years of experience leading teams in the successful strategic achievement of financial and operational goals, and expertise in domestic and international operations, financial planning, forecasting and reporting, restructurings, business development and integrations, treasury and investor relations. As an Executive Officer (Principal Accounting Officer) at Allergan, Inc. from January 2002 to March 2015, he oversaw financial due diligence, integration and structuring for all significant asset purchases, sales, business combinations and licensing transactions, the spin-off of Advanced Medical Optics, the \$3.3 billion acquisition of Inamed Corporation and more than \$4.5 billion in other transactions. He ensured consistent application of corporate policies and procedures and alignment with global reporting and corporate compliance requirements, made recommendations globally to improve financial operations and participated in robust financial planning/forecasting activities. Prior to joining Allergan, Mr. Barlow served as Chief Financial Officer of Wynn Oil Company, a division of Parker Hannifin Corporation, during 2001, Treasurer and Controller of Wynn's International, Inc. from 1990 to 2000 and Vice President and Controller of Ford Equipment Leasing Company from 1986 to 1990. From 1983 to 1985 Mr. Barlow worked for the accounting firm Deloitte Haskins and Sells. Mr. Barlow received a Bachelor of Science degree in Accounting, graduating magna cum laude, from Brigham Young University and a Master of Accountancy, graduating with honors - high distinction, from Brigham Young University. He is a certified public accountant (inactive).

Dr. Magda Marquet is an experienced and highly-regarded leader in the life sciences industry with a very successful track record in entrepreneurship. She has a true passion for creating a winning corporate culture of innovation and expertise in strategic growth and corporate governance. She co-founded Althea Technologies in 1998, and led the company as co-CEO for ten years. Althea Technologies was successfully acquired by Ajinomoto in 2013. As of today, Dr. Marquet remains as Chairman of the Board of the new entity Aji Bio-Pharma, a leading global contract development and manufacturing organization. She is also the co-Founder of AltheaDx, a commercial stage precision medicine company with the world's leading pharmacogenomics test for anxiety and depression. She is co-Founder and co-CEO of ALMA Life Sciences, an early stage investment firm focusing on the creation and growth of innovative healthcare companies with an overall focus on prevention. In addition, Dr. Marquet serves as a Board member of Senté, Matrisys Bioscience, Arcturus Therapeutics (ARCT), HUYA and

Independa. She is an advisor to Mesa Verde Venture Partners and City National Bank. Dr. Marquet plays a pivotal role in developing San Diego's entrepreneurial ecosystem where she serves on several non-profit boards, including BIOCOM, CONNECT, EDC and Moores Cancer Center at UC San Diego. Dr. Marquet has over three decades of experience in the biotechnology industry in the United States and Europe. Prior to starting Althea Technologies, Dr. Marquet held management positions at Vical, Amylin Pharmaceuticals, Protein Polymer Technologies, Syntro Corporation and Transgene. She holds a Ph.D. in Biochemical Engineering from INSA/University of Toulouse, France. Dr. Marquet has received numerous awards throughout her career including the 2005 Regional Ernst &Young Entrepreneur of the Year award in the Life Sciences category, the Athena Pinnacle award, the Most Admired CEO award from the San Diego Business Journal, and the Director of the Year award (Corporate Governance) from the Corporate Directors Forum. Under her leadership, Althea Technologies received several Best Companies to Work For awards. Dr. Marquet is the first woman to be inducted into the CONNECT Entrepreneur Hall of Fame.

Board of Directors and Executives – Term and Contracts

We have entered into written employment agreements with all of our executive officers. Each of these agreements contains provisions regarding non-competition, confidentiality of information and ownership of inventions. The non-competition provision applies for a period that is generally 12 months following termination of employment. The employment agreements also include severance for certain key employees subject to our compensation policy. The enforceability of covenants not to compete in Israel and the United States is subject to limitations. In addition, we are required to provide notice prior to terminating the employment of our executive officers, other than in the case of a termination for cause.

Other than with respect to our directors that are also executive officers, we do not have written agreements with any director providing for benefits upon the termination of his employment with our company.

Board of Directors – Israeli Law

Under the Companies Law, our Board of Directors is vested with the power to set corporate policy and oversee our business. Our Board of Directors may exercise all powers and may take all actions that are not specifically granted to our shareholders or to management. Our Board of Directors serves as the primary corporate body responsible for risk management for our company, including cybersecurity risks, and periodically consults with the management of our company to obtain updates concerning, and internally discusses, the most material risks currently facing our company, and how those risks are being mitigated. Our executive officers are responsible for our day-to-day management and have individual responsibilities established by our Board of Directors. Our principal executive officer is appointed by, and serves at the discretion of, our Board of Directors, subject to the employment agreement that we have entered into with him. All other executive officers are appointed by our principal executive officer, and are subject to the terms of any applicable employment agreements that we may enter into with them.

Under our amended and restated articles of association, our Board of Directors must consist of at least five and not more than eleven directors. Our Board of Directors currently consists of five directors. We have only one class of directors. In accordance with the Companies Law and our amended and restated articles of association, our Board of Directors is required to appoint one of its members to serve as Chairman of the Board of Directors. Our Board of Directors has appointed Dr. Farrell to serve as Chairman of the Board of Directors.

Each of our directors is elected at an annual or extraordinary general meeting of shareholders. The vote required for the election of each director is a majority of the voting power represented at the meeting and voting on the election proposal.

External Directors – Exemption

In June 2016, we elected to be governed by an exemption under the Companies Law regulations that exempts us from appointing external directors and from complying with the Companies Law requirements related to the composition of the audit committee and compensation committee of our Board of Directors. Our eligibility for that exemption is conditioned upon: (i) the continued listing of our Ordinary Shares on the Nasdaq Stock Market (or one of a few select other non-Israeli stock exchanges); (ii) there not being a controlling shareholder (generally understood to be a 25% or greater shareholder) of our company under the Companies Law; and (iii) our compliance with the Nasdaq Listing Rules requirements as to the composition of (a) our Board of Directors—which requires that we maintain a majority of independent directors (as defined under the Nasdaq Listing Rules) on our Board of Directors (subject to applicable cure periods under the Nasdaq Listing Rules) and (b) the audit and compensation committees of our Board of Directors, which rules require that such committees consist solely of independent directors (at least three and two members, respectively). At the time that it was determined to exempt our company from the external director requirement, our board affirmatively determined that we meet the conditions for exemption from the external director requirement.

Board Nominations and Removal

Our directors are each elected at an annual or extraordinary general meeting of our shareholders and serve until the next annual general meeting. Such election is subject to the nomination, and recommendation for the Board of Directors' nomination, by a majority of independent directors. Directors may nevertheless be removed prior to the end of their term by the majority of our shareholders at a general meeting of our shareholders or upon the occurrence of certain events, all in accordance with the Companies Law and our amended and restated articles of association.

In addition, our amended and restated articles of association allow our Board of Directors to appoint directors, to fill vacancies on our Board of Directors, for a term of office equal to the remaining period of the term of office of the directors whose offices have been vacated or appoint new additions to Board of Directors up to the maximum number of directors.

Under the Companies Law, following the publication of a notice convening the general meeting of shareholders by the Company, nominations for directors may be made by any shareholder holding at least one percent (1%) of our outstanding voting power. However, any such shareholder may make such a nomination only if a written notice of such shareholder's intent to make such nomination has been given to our Board of Directors. Any such notice must include certain information which under the Companies Law requires to be provided to our shareholders, the consent of the proposed director nominee(s) to serve as our director(s) if elected and a declaration signed by the nominee(s) declaring that there is no limitation under the Companies Law preventing their election and that all of the information that is required under the Companies Law to be provided to us in connection with such election has been provided.

Board Member Qualifications

In addition to its role in making director nominations, under the Companies Law, our Board of Directors must determine the minimum number of directors who are required to have accounting and financial expertise. Under applicable regulations, a director with accounting and financial expertise is a director who, by reason of his or her education, professional experience and skill, has a high level of proficiency in and understanding of business accounting matters and financial statements, sufficient to be able to thoroughly comprehend the financial statements of the Company and initiate debate regarding the manner in which financial information is presented. In determining the number of directors required to have such expertise, our Board of Directors must consider, among other things, the type and size of our company and the scope and complexity of its operations. Our Board of Directors has determined that our company requires one director with such expertise. Mr. James Barlow has such accounting and financial expertise.

Audit Committee

Israeli Law Requirements

Under the Companies Law, the board of directors of a public company must appoint an audit committee.

Our Audit Committee assists our Board of Directors in fulfilling its legal and fiduciary obligations in matters involving our accounting, auditing, financial reporting, internal control and legal compliance functions by pre-approving the services performed by our independent accountants and reviewing their reports regarding our accounting practices and systems of internal control over financial reporting. Our Audit Committee also oversees the audit efforts of our independent accountants and takes those actions that it deems necessary to satisfy itself that the accountants are independent of management.

Under the Companies Law, our Audit Committee is responsible for:

- determining whether there are deficiencies in the business management practices of our Company, and making recommendations to our Board of Directors to improve such practices;
- determining whether to approve certain related party transactions (including transactions in which an office holder has a personal interest and whether such transaction is extraordinary or material under the Companies Law) (see Item 16G. – “Corporate Governance – Approval of Related Party Transactions under Israeli Law” of our Annual Report on Form 20-F for the fiscal year ended December 31, 2017);
- examining our internal controls and internal auditor’s performance, including whether the internal auditor has sufficient resources and tools to dispose of its responsibilities;
- examining the scope of our auditor’s work and compensation and submitting a recommendation with respect thereto to our Board of Directors or shareholders, depending on which of them is considering the appointment of our auditor;
- establishing procedures for the handling of employees’ complaints as to the management of our business and the protection to be provided to such employees;
- determining whether certain acts of an office holder not in accordance with his or her fiduciary duty owed to the Company are extraordinary or material and to approve such acts and certain related party transactions (including transactions in which an office holder has a personal interest) and whether such transaction is extraordinary or material under the Companies Law (see Item 16G. – “Corporate Governance – Approval of Related Party Transactions under Israeli Law” of our Annual Report on Form 20-F for the fiscal year ended December 31, 2017);
- deciding whether to approve and to establish the approval process (including by tender or other competitive proceedings) for certain transactions with a controlling shareholder or in which a controlling shareholder has a personal interest; and
- determining the process of approval of transactions that are not negligible, including determining the types of transactions that will be subject to the approval of our Audit Committee.

Nasdaq Requirements

Under the Nasdaq Listing Rules, we are required to maintain an audit committee consisting of at least three independent directors, all of whom are financially literate and one of whom has accounting or related financial management expertise. Under the Nasdaq Listing Rules, the audit committee is responsible for, among other things: the oversight of our independent registered public accounting firm; the receipt, retention, and treatment of complaints received by our company regarding accounting, internal accounting controls, or auditing matters; and the confidential, anonymous submission by our employees of concerns regarding questionable accounting or auditing matters.

Our Audit Committee consists of Mr. Barlow, who serves as the chairperson of the Audit Committee, Mr. Farrell and Dr. Marquet, all of whom are independent under the listing standards of the Nasdaq Listing Rules. The existing Board of Directors has determined that Mr. Barlow is an audit committee financial expert as defined by the SEC rules and has the requisite financial sophistication as defined by the Nasdaq Listing Rules. All of the members of our Audit Committee meet the requirements for financial literacy under the applicable Nasdaq Listing Rules. Each member of the Audit Committee is required to be (and each of the foregoing members of our Audit Committee actually is) “independent” as such term is defined in Rule 10A-3(b)(1) under the Exchange Act.

Charter

Our Board of Directors has adopted an audit committee charter setting forth the responsibilities of our Audit Committee consistent with the rules of the SEC and the Nasdaq Listing Rules, as well as the requirements for such committee under the Companies Law. The audit committee charter is posted on our website.

Compensation Committee and Compensation Policy

Compensation Committee – Israeli Law Requirements

Under the Companies Law, the board of directors of a public company must appoint a compensation committee, which must be responsible for (i) approving, and proposing for approval by the board of directors and shareholders, a compensation policy, (ii) proposing necessary revisions to the compensation policy and examining its implementation, (iii) determining whether to approve transactions with respect to the terms of office and employment of office holders, and (iv) determining, in accordance with the compensation policy, whether to exempt an engagement with an unaffiliated nominee for the position of principal executive officer from requiring shareholders’ approval. The term “office holder,” as defined in the Companies Law, includes directors, executive officers and any manager directly subordinate to the chief executive officer. Under the regulations promulgated under the Companies Law, certain exemptions and reliefs with respect to the compensation committee are granted to companies such as ours whose securities are traded outside of Israel.

Compensation Policy Requirements

The Companies Law provides that a compensation policy must serve as the basis for the decisions concerning the financial terms of employment or engagement of the office holders, including exculpation, insurance, indemnification or any monetary payment or obligation of payment in respect of employment or engagement. The compensation policy must be approved (or reapproved) not less frequently than every three years, and relate to certain factors, including advancement of the company’s objective, business plan and its long-term strategy and creation of appropriate incentives for office holders. It must also consider, among other things, the company’s risk management, size and nature of its operations. The compensation policy must furthermore consider the following additional factors:

- the knowledge, skills, expertise and accomplishments of the relevant office holder;
- the office holder’s roles and responsibilities and prior compensation agreements with him or her;
- the relationship between the terms offered and the average compensation of the other employees of the company, including those employed through manpower companies;
- the impact of disparities in salary upon work relationships in the company;
- the possibility of reducing variable compensation at the discretion of the board of directors or the possibility of setting a limit on the exercise value of non-cash variable equity-based compensation; and
- as to severance compensation, the period of service of the office holder, the terms of his or her compensation during such service period, the company’s performance during that period of service, the person’s contributions towards the company’s achievement of its goals and the maximization of its profits and the circumstances under which the person is leaving the company.

The compensation policy must also include the following principles:

- the link between variable compensation and long-term performance and measurable criteria;
- the relationship between variable and fixed compensation, and the ceiling for the value of variable compensation;
- the conditions under which a director or executive would be required to repay compensation paid to him or her if it was later shown that the data upon which such compensation was based was inaccurate and was required to be restated in the company's financial statements;
- the minimum holding or vesting period for variable, equity-based compensation; and
- maximum limits for severance compensation.

The compensation policy must be approved by the board of directors, after considering the recommendations of the compensation committee. The compensation policy must also be approved by a majority of the company's shareholders, provided that (i) such majority includes at least a majority of the shareholders who are not controlling shareholders and who do not have a personal interest in the matter, present and voting (abstentions are disregarded), or (ii) the non-controlling shareholders and shareholders who do not have a personal interest in the matter who were present and voted against the policy hold two percent or less of the outstanding voting power of the company. Other than for a newly public company, for which the regulations provide for a five-year period, for all other public companies, the compensation policy must be approved by the board of directors and the shareholders every three years. If the compensation policy is not approved by the shareholders, the compensation committee and the board of directors may nonetheless approve the policy, following further discussion of the matter and for specified reasons.

Our amended and restated Compensation policy, that meets the above requirements, was recently restated and approved by our shareholders in August 2018.

Israeli Law Office Holder Compensation Approvals

Under the Companies Law, the terms of office and employment of office holders require the approval of the compensation committee and the board of directors. The terms of office and employment of directors and the Chief Executive Officer must also be approved by shareholders (excluding several exemptions). Changes to existing terms of office and employment of office holders (other than directors) can be made with the approval of the compensation committee only, if the committee determines that the change is not substantially different from the existing terms.

Under certain circumstances, the compensation committee and the board of directors may approve an arrangement that deviates from the compensation policy, provided that such arrangement is approved by the special majority of the company's shareholders mentioned above. Such shareholder approval will also be required with respect to determining the terms of office and employment of a director or the principal executive officer during the transition period until a company adopts a compensation policy (or during any period between the three-year anniversary (or in the case of a newly public company, the initial five-year anniversary) of the last adoption of a compensation policy and the actual adoption of an updated compensation policy). Notwithstanding the foregoing, a company may be exempted from receiving shareholder approval with respect to the terms of office and employment of a candidate for principal executive officer if such candidate meets certain independence criteria, the terms are in line with the compensation policy and the compensation committee has determined for specified reasons that shareholder approval would prevent the engagement.

Compensation Committee – Nasdaq Requirements

Under the Nasdaq Listing Rules, we are required to maintain a compensation committee, consisting entirely of independent directors, which is authorized to determine the compensation of our executive officers (or, the determination of that compensation of our executive officers must be made solely by the independent members of the board of directors).

Our Compensation Committee consists of Dr. Marquet, who serves as the chairperson of the committee, Mr. Farrell and Mr. Barlow, all of whom are independent under the listing standards of the Nasdaq Listing Rules.

Our Board of Directors has adopted a compensation committee charter setting forth the responsibilities of our Compensation Committee consistent with the Nasdaq Listing Rules and the requirements under the Companies Law, as described above. The compensation committee charter requires that our Compensation Committee be comprised of at least three members. The compensation committee charter is posted on our website.

Nominating and Corporate Governance Committee

Our Nominating and Corporate Governance Committee consists of Mr. Farrell, who serves as the chairperson of the committee, and Mr. Barlow and Dr. Marquet, each of whom are independent under the listing standards of the Nasdaq Listing Rules. No committee member may be an employee of the Company and each member must be free from any relationship that would interfere with the exercise of his or her independent judgment, as determined by the Board of Directors, in accordance with the applicable independence requirements under the Nasdaq Listing Rules. The members of the committee and the committee chairperson are appointed by the Board of Directors. To the extent that the Board of Directors is then required to include external directors under the Companies Law, at least one such external director will serve on the Nominating and Corporate Governance Committee.

The purpose of the Nominating and Corporate Governance Committee is to: (i) oversee all aspects of the Company's corporate governance functions on behalf of the Board of Directors; (ii) make recommendations to the Board of Directors regarding corporate governance issues; (iii) identify, review and evaluate candidates to serve as directors of the Company and review and evaluate incumbent directors; (iv) serve as a focal point for communication between such candidates, non-committee directors and the Company's management; (v) recommend for nomination by the Board of Directors and election by the shareholders candidates to serve on the Board of Directors; and (vi) make other recommendations to the Board of Directors regarding affairs relating to the directors of the Company, including director compensation (subject to approval by the compensation committee of the Board of Directors to the extent required under Israeli law).

The Nominating and Corporate Governance Committee has the following primary responsibilities:

- *Director Nominations* – The committee has the responsibility of identifying, reviewing and evaluating candidates to serve on the Company's Board of Directors, including consideration of any potential conflicts of interest as well as applicable independence and experience requirements. The committee will also have the primary responsibility for reviewing, evaluating and considering the recommendation for nomination of incumbent directors for re-election to the Board, as well as monitoring the size of the Board of Directors. The committee will also recommend to the Board of Directors for selection candidates to the Board of Directors. The committee will also have the power and authority to consider recommendations for Board of Directors nominees and proposals submitted by the Company's shareholders and to establish any policies, requirements, criteria and procedures, including policies and procedures to facilitate shareholder communications with the Board of Directors, to recommend to the Board of Directors appropriate action on any such proposal or recommendation and to make any disclosures required by applicable law in the course of exercising its authority.
- *Management and Board Assessment* – The committee will periodically review, discuss and assess the performance of management and the Board of Directors, including Board of Directors committees, seeking input from senior management, the full Board of Directors and others. The assessment will include evaluation of the Board of Director's contribution as a whole and effectiveness in serving the best interests of the Company and its shareholders, specific areas in which the Board of Directors and/or management believe contributions could be improved, and overall Board of Directors composition and makeup, including the reelection of current board members. The factors to be considered will include whether the directors, both individually and collectively, can and do provide the integrity, experience, judgment, commitment, skills and expertise appropriate for the Company. The committee will also consider and assess the independence of directors, including whether a majority of the Board of Directors continue to be independent from management in both fact and appearance, as well as within the meaning prescribed by the Nasdaq Listing Rules. The results of these reviews will be provided to the Board of Directors for further discussion as appropriate.

- *Board Committee Nominations* – The committee, after due consideration of the interests, independence and experience of the individual directors and the independence and experience requirements of the Nasdaq Listing Rules, the rules and regulations of the SEC and applicable law, will recommend to the entire Board of Directors annually the chairmanship and membership of each committee. The committee will conduct an annual self-evaluation.
- *Continuing Education* – The committee will consider instituting a plan or program for the continuing education of directors.
- *Corporate Governance Principles* – The committee has the authority to develop a set of corporate governance principles to be applicable to the Company, may periodically review and assess these principles and their application, and may recommend any changes deemed appropriate to the Board of Directors for its consideration. Further, the committee will periodically review Company policy statements to determine their adherence to the Company’s code of conduct.
- *Procedures for Information Dissemination* – The committee will oversee and review the processes and procedures used by the Company to provide information to the Board of Directors and its committees. The committee should consider, among other factors, the reporting channels through which the Board of Directors and its committees receive information and the level of access to outside advisors where necessary or appropriate, as well as the procedures for providing accurate, relevant and appropriately detailed information to the Board of Directors and its committees on a timely basis.
- *Director Compensation* – The committee will periodically review the compensation paid to non-employee directors for their service on the Board of Directors and its committees and recommend any changes considered appropriate to the compensation committee, which in turn can recommend to the full Board of Directors for its approval.
- *Management Succession* – The committee will periodically review with the Chief Executive Officer the plans for succession to the offices of the Company’s executive officers and make recommendations to the Board of Directors with respect to the selection of appropriate individuals to succeed to these positions.
- *Self-Assessment* – The committee will review, discuss and assess its own performance at least annually. The committee will also periodically review and assess the adequacy of the committee charter, including the committee’s role and responsibilities as outlined in the committee charter, and will recommend any proposed changes to the Board of Directors for its consideration.
- *Reporting to the Board* – The committee, through the committee chairperson, will report all material activities of the committee to the Board of Directors from time to time or whenever so requested by the Board of Directors.

Nominating and Corporate Governance Committee – Nasdaq Requirements

We maintain a Nominating and Corporate Governance Committee, consisting entirely of independent directors, which is authorized to oversee our corporate governance functions on behalf of the Board of Directors and identify, review and evaluate candidates to serve as directors of the company (including coordinating communication between candidates, non-committee directors and the company’s management, making nomination recommendations and other recommendations regarding director-related affairs).

Our Nominating and Corporate Governance Committee consists of Mr. Farrell, who serves as the chairperson of the committee, and Mr. Barlow and Dr. Marquet, who are all independent under the listing standards of the Nasdaq Listing Rules.

Nominating and Corporate Governance Committee – Charter

Our Board of Directors has adopted a Nominating and Corporate Governance Committee Charter setting forth the responsibilities of the Nominating and Corporate Governance Committee consistent with the Nasdaq Listing Rules and the requirements under the Companies Law, as described above. The Nominating and Corporate Governance Committee Charter requires that our Nominating and Corporate Governance Committee be comprised of at least two members. The Nominating and Corporate Governance Committee Charter is posted on our website. The Nominating and Corporate Governance Committee holds at least one regular meeting per year and additional meetings, as the committee deems appropriate.

Item 11. Executive Compensation.

Our named executive officers for the year ended December 31, 2018, which consist of all individuals who served as our principal executive officer during 2018 and our two most highly compensated executive officers other than the principal executive officer who were serving as executive officers at the end of the last completed fiscal year, are:

- Joseph E. Payne, our President, Chief Executive Officer, and Director of the Board;
- Andrew Sassine, our Interim Chief Financial Officer from August 24, 2018 to December 31, 2018. Effective January 1, 2019, Mr. Sassine was appointed the Company's Chief Financial Officer;
- Padmanabh Chivukula, our Chief Science Officer and Chief Operating Officer;
- Mark Herbert, Interim President from February 2, 2018 to May 26, 2018.

Name and Principal Position	Year	Salary (\$)(1)	Bonus (\$)(1)	Option Awards (\$)(2)	Share Awards (\$)	Nonequity Incentive Plan Compensation (\$)	Nonqualified Deferred Compensation Earnings (\$)	All Other Compensation (\$)(3)	Total (\$)
Joseph E. Payne President and Chief Executive Officer, Director of the Board	2018	\$ 425,000	\$ 372,532	\$ 636,888	\$ —	\$ —	\$ —	\$ 1,252,624 (4)	\$ 2,687,044
Joseph E. Payne President and Chief Executive Officer, Director of the Board	2017	\$ 384,000	\$ 40,810	\$ —	\$ —	\$ —	\$ —	\$ 23,955	\$ 448,765
Padmanabh Chivukula Chief Scientific Officer and Chief Operating Officer	2018	\$ 350,000	\$ 83,233	\$ 424,592	\$ —	\$ —	\$ —	\$ 515,080 (5)	\$ 1,372,905
Padmanabh Chivukula Chief Scientific Officer and Chief Operating Officer	2017	\$ 335,000	\$ 40,810	\$ —	\$ —	\$ —	\$ —	\$ 72	\$ 375,882
Andrew Sassine Interim Chief Financial Officer (6)	2018	\$ 120,000	\$ —	\$ 126,340 (7)	\$ —	\$ —	\$ —	\$ —	\$ 246,340
Mark Herbert Interim President (8)	2018	\$ 307,200	\$ —	\$ —	\$ —	\$ —	\$ —	\$ 153,600 (9)	\$ 460,800

- (1) Figures represent Salary and Bonus amounts as of fiscal year-end regardless of increases in Salary during the fiscal year and regardless of whether part or all of such amounts were paid in subsequent fiscal year(s). Bonuses are awarded pursuant to a bonus program. Salary and Bonus amounts owed to Mr. Payne are subject to approval of the shareholders under the Israeli law.
- (2) Represents the grant date fair value of options awarded in accordance with accounting guidance for equity-based compensation. All the following option share numbers and exercise prices per share give effect to the 1-for-7 reverse split implemented in connection with the merger in November 2017.
- (3) Includes the social benefits paid by us on behalf of the employees, including convalescence pay, contributions made by the company to an insurance policy or a pension fund, work disability insurance, life insurance, medical insurance, and payments for social security.
- (4) Includes \$14,625 of fees for services as a member of the board of directors in 2018 and \$1,237,999 of certain expenses incurred by the Company in connection with the previously disclosed dispute between management and former Company directors.
- (5) Represents severance amount given to Dr. Chivukula and certain expenses incurred by the Company in connection with the previously disclosed dispute between management and former Company directors.
- (6) Excludes fees and share based payments made to Mr. Sassine for his services as a member of the Board of Directors, which is presented in the Directors' Compensation table below.
- (7) Mr. Sassine served as the Company's Interim Chief Financial Officer from August 24, 2018 through December 31, 2018 and received options to purchase 20,000 of the Company's Ordinary Shares ("Interim CFO Grant"). On January 1, 2019, Mr. Sassine was appointed the Company's Chief Financial Officer and was granted options to purchase 100,000 shares of the Company's Ordinary Shares. The unvested portion of the Interim CFO Grant was cancelled on January 1, 2019.
- (8) Mr. Herbert served as our interim CEO from February 2018 until his resignation on May 29, 2018. Salary figure represents Mr. Herbert's salary upon resignation.
- (9) Represents severance payments made to Mr. Herbert.

Base Salary

The base salaries of our named executive officers, as applicable, is generally determined and approved by our board of directors, based on the recommendation of the compensation committee.

Mr. Payne's annual base salary for 2018 and 2017 was \$425,000 and \$384,000. In February 2019, our Board approved that Mr. Payne shall receive options to purchase 60,000 shares of the Company's Ordinary Shares and his annual base salary will change to \$450,000, both of which are subject to approval of the shareholders under the Israeli law.

Dr. Chivukula's annual base salary for 2018 and 2017 was \$350,000 and \$335,000. In February 2019, Dr. Chivukula received options to purchase 40,000 shares of the Company's common stock and his annual base salary was changed to \$370,000.

Mr. Sassine's annual base salary for 2018 was \$120,000 as the Interim Chief Financial Officer. In January 2019, our Board approved options for Mr. Sassine to purchase 100,000 shares of the Company's Ordinary Shares as well as an increase in Mr. Sassine's annual base salary to \$375,000. Both are subject to approval of the shareholders under the Israeli law.

Annual Bonus

Under the Company's 2018 Omnibus Equity Incentive Plan, as approved by shareholders under the Companies Law, the compensation terms for Mr. Payne and Dr. Chivukula with respect to an annual bonus are summarized below:

Payne Annual Bonus:

An annual bonus of up to 60% of Mr. Payne's Annual Base Salary. For fiscal year 2018, the "Annual Base Salary" shall be calculated based on a base salary of \$384,000 through July 4, 2018 and a base salary of \$425,000 from July 5 to the end of the bonus period. The bonus shall be subject to the achievement of certain criteria for each 12 month-period (or such shorter or longer period determined by the Compensation Committee and the Board), as determined by the Compensation Committee and Board, in accordance with the Company's Amended and Restated Compensation Policy as previously approved by shareholders in accordance with the Companies Law (the "Company Compensation Policy"). The Board and the Compensation Committee may determine that Mr. Payne shall be entitled to certain portion(s) of the bonus upon partial achievement of the criteria and that the bonus shall be conditioned upon the achievement of a minimum threshold of the criteria. The Board and the Compensation Committee may further determine that in the event that Mr. Payne's employment terminates prior to the end of a full 12-month period, he shall be entitled to the relative portion of the bonus, based on the actual employment term during the 12-month period and the Board's assessment of actual performance at the end of the bonus performance period.

Chivukula Annual Bonus:

An annual bonus of up to 40% of the Annual Base Salary. The bonus shall be subject to the achievement of certain criteria for each 12 month-period (or such shorter or longer period determined by the Compensation Committee and the Board), as shall be determined by the Compensation Committee and the Board, in accordance with the Company's Compensation Policy. The Board and the Compensation Committee may determine that Dr. Chivukula be entitled to certain portion(s) of the bonus upon partial achievement of the criteria and that the bonus shall be conditioned upon the achievement of a minimum threshold of the criteria. The Board and the Compensation Committee may further determine that in the event that Dr. Chivukula employment terminates prior to the end of a full 12-month period, he shall be entitled to the relative portion of the bonus, based on the actual employment term during the 12-month period and the Board's assessment of actual performance at the end of the bonus performance period.

In 2018, Mr. Payne received a 2018 annual bonus equal to 60% of the compensation payable from January 1, 2018 to year end, and Dr. Chivukula received a 2018 annual bonus equal to 40% of the compensation in fact paid from May 29, 2018 to year end.

Under the Company's Compensation Policy, the Company is permitted to grant an annual cash bonus to the CEO and the Company's chief officers and those performing management functions directly subordinate to the Company's Chief Executive Officer ("Senior Staff") as part of their compensation package, according to measurable and qualitative criteria, subject to the parameters set forth in the Company's Compensation Policy, with the specific parameters for the Senior Staff determined by the CEO and the parameters for the CEO determined by the Chairman of the Board and the Company's Compensation Committee.

Equity-Based Awards

Our equity-based incentive awards are designed to align our interests with those of our employees and consultants, including our named executive officers. Our board of directors or our compensation committee approves equity grants. Vesting of equity awards is generally tied to continuous service with us and serves as an additional retention measure. Our executives may be awarded an initial new hire grant upon commencement of service and may receive additional grants, as the board of directors or compensation committee determines appropriate, in order to incentivize and/or reward such executives.

We have traditionally granted stock options to our named executive officers under our equity incentive plans, the terms of which are described below under "—Equity Benefit Plans."

Potential Payments and Benefits upon Termination or Change in Control

Mr. Payne, Dr. Chivukula and Mr. Sassine may be entitled to receive severance grants upon termination or upon a change in control of the Company under the compensation arrangements approved by shareholders at the Company's 2018 Annual and Extraordinary General Meeting of Shareholders (the "AGM"), as summarized below:

Joseph Payne

For termination without cause or resignation for good reason unrelated to a change in control of the Company and conditioned on execution of a general waiver and release of claims, Mr. Payne shall be entitled to receive: (i) severance pay in the form of continuation of payment installments of Mr. Payne's final base salary for twelve (12) months, (ii) a pro rata portion of his annual bonus (as calculated by the Compensation Committee and Board at the end of the bonus period and paid in a lump sum when annual bonuses are paid to other executive officers) and (iii) payment of certain health insurance coverage premiums (COBRA payment) for up to eighteen (18) months following his termination of employment.

For termination without cause or resignation for good reason in connection with a change in control of the Company and conditioned on execution of a general waiver and release, Mr. Payne shall be entitled to receive: (i) a lump sum severance payment equal to one-year's annual base salary, (ii) an amount equal to his target annual bonus for the year of termination and (iii) an amount equal to a pro rata portion of his target annual bonus for the year of termination. Mr. Payne shall also be entitled to payment of certain health insurance coverage premiums (COBRA payment) for eighteen (18) months following termination. In addition, Mr. Payne's unvested option award and any other unvested time-based vesting equity awards then held by him shall accelerate and become immediately vested and exercisable, if applicable, and no longer subject to repurchase, if applicable, upon such termination and shall remain exercisable, if applicable, following Mr. Payne's termination as set forth in the applicable equity award.

Dr. Padmanabh Chivukula

For termination without cause or resignation for good reason unrelated to a change in control of the Company and conditioned on execution of a general waiver and release of claims, Dr. Chivukula shall be entitled to receive: (i) severance pay in the form of continuation of payment installments of Dr. Chivukula's final base salary

for twelve (12) months, (ii) a pro rata portion of his annual bonus (as calculated by the Compensation Committee and Board at the end of the bonus period and paid in a lump sum when annual bonuses are paid to other executive officers) and (iii) payment of certain health insurance coverage premiums (COBRA payment) for up to eighteen (18) months following his termination of employment.

For termination without cause or resignation for good reason in connection with a change in control of the Company and conditioned on execution of a general waiver and release, Dr. Chivukula shall be entitled to receive: (i) a lump sum severance payment equal to one-year's annual base salary, (ii) an amount equal to his target annual bonus for the year of termination and (iii) an amount equal to a pro rata portion of his target annual bonus for the year of termination. Dr. Chivukula shall also be entitled to payment of certain health insurance coverage premiums (COBRA payment) for eighteen (18) months following termination. In addition, Dr. Chivukula's unvested option award and any other unvested time-based vesting equity awards then held by him shall accelerate and become immediately vested and exercisable, if applicable, and no longer subject to repurchase, if applicable, upon such termination and shall remain exercisable, if applicable, following Dr. Chivukula's termination as set forth in the applicable equity award.

Andrew Sassine

Mr. Sassine received options to purchase 32,500 Ordinary Shares under the 2018 Plan for his service as a director of the Company. From the options to purchase 32,500 Ordinary Shares, options to purchase 20,000 Ordinary Shares will be considered as an "Inducement Award", options to purchase 10,000 Ordinary Shares will be considered as an "Annual Ongoing Equity Compensation" and options to purchase 2,500 Ordinary Shares will be made as a one-time grant to award Mr. Sassine for service on the Board from May 29, 2018 through the Meeting. Mr. Sassine's Inducement Award options and Annual Ongoing Equity Compensation options are subject to full acceleration in the event of a change in control.

Additional details of the compensation terms approved by Company shareholders at the AGM may be found in the Company's Notice and Proxy Statement dated July 27, 2018 for the Annual and Extraordinary General Meeting of Shareholders held on Friday, August 24, 2018 and exhibits thereto, filed as Exhibits 99.1, 99.2, 99.3 and 99.4 to the Company's Report of Foreign Private Issuer on Form 6-K filed on July 27, 2018.

Outstanding Equity Awards at Fiscal Year-End

The following table sets forth certain information regarding all outstanding equity awards held by our named executive officers as of December 31, 2018. None of the outstanding equity awards shown in the table below have been exercised or forfeited as of December 31, 2018.

Name	Number of Securities Underlying Unexercised Options (#) Exercisable	Number of Securities Underlying Unexercised Options (#) Unexercisable	Option Exercise Price (\$)	Option Expiration Date
Mr. Payne	0	120,000	\$ 8.00	8/23/2028
Dr. Chivukula	0	80,000	\$ 8.00	8/23/2028
Mr. Sassine	12,917	39,583	\$ 8.00	8/23/2028

Pension Benefits

None of our named executive officers participate in or have account balances in qualified or non-qualified defined benefit plans sponsored by us.

Non-Qualified Deferred Compensation

None of our named executive officers participate in or have account balances in qualified or non-qualified defined contribution plans or other non-qualified compensation plans sponsored by us.

Equity Benefit Plans

In August 2018, the Company adopted the 2018 Omnibus Equity Incentive Plan (“2018 Plan”). Under the 2018 Plan, the Company is authorized to issue up to a maximum of 1,100,000 Ordinary Shares pursuant to the exercise of incentive share options or other awards provided for therein.

Non-Employee Director Compensation

The following table and related footnotes show the compensation paid during the year ended December 31, 2018 to our non-employee directors, other than Mr. Payne and Mr. Sassine whose 2018 Board compensation is set forth above under “Executive Compensation” above.

Name	Fees Earned or Paid in			Total (\$)
	Cash (\$)	Option Awards (\$)	All Other Compensation (\$)	
Dr. Peter Farrell (1)	18,887	164,776	—	183,663
Mr. James Barlow (1)	13,736	164,776	—	178,512
Dr. Magda Marquet (1)	12,019	164,776	—	176,795
Mr. Andrew Sassine (1) (4)	8,585	164,776	—	173,361
Dr. Stuart Collinson (2)	18,000	—	—	18,000
Mr. Daniel Geffken (2)	27,708	—	—	27,708
Dr. David Shapiro (2)	23,958	—	—	23,958
Mr. Craig Willett (2)	35,167	—	50,000 (3)	85,167

- (1) These individuals started serving on the Company's Board of Directors on May 27, 2018.
- (2) These individuals served on the Company's Board of Directors until May 27, 2018.
- (3) Represents a one time payment to Mr. Willett for his services provided in 2017 in connection with the reverse merger.
- (4) Excludes compensation made to Mr. Sassine for his services as the Interim Chief Financial Officer in 2018, which is included in the Named Executive Compensation table above.

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

Major shareholders

The following table sets forth information with respect to the beneficial ownership of our Ordinary Shares as of March 1, 2019 by:

- each person or entity known by us to own beneficially 5% or more of our outstanding shares;
- each of our directors and executive officers individually; and
- all of our executive officers and directors as a group.

The beneficial ownership of Ordinary Shares is determined in accordance with the rules of the SEC and generally includes any Ordinary Shares over which a person exercises sole or shared voting or investment power, or the right to receive the economic benefit of ownership. For purposes of the table below, we deem shares subject to options or warrants that are currently exercisable or exercisable within 60 days of March 1, 2019, to be outstanding and to be beneficially owned by the person holding the options or warrants for the purposes of computing the percentage ownership of that person, but we do not treat them as outstanding for the purpose of computing the percentage ownership of any other person. The percentage of shares beneficially owned is based on 10,761,523 Ordinary Shares outstanding as of March 1, 2019 (excluding the shares repurchased by the Company as set forth herein).

The following table sets forth information regarding the beneficial ownership by each person or entity known to beneficially own more than 5% of our Ordinary Shares as of March 1, 2019, or a different date, if so provided in the table below or footnotes thereof.

According to our transfer agent, as of March 1, 2019, there were 53 record holders of our Ordinary Shares, one of which (Cede & Co., the nominee of the Depository Trust Company) is a U.S. holder holding 72% of our outstanding Ordinary Shares. The number of record holders in the United States is not representative of the number of beneficial holders nor is it representative of where such beneficial holders are resident since many of these Ordinary Shares are held by beneficially brokers or other nominees on behalf of their clients. None of our shareholders has different voting rights from other shareholders.

We are not owned or controlled, directly or indirectly, by another corporation or by any foreign government. We are not aware of any arrangement that may, at a subsequent date, result in a change of control of our company.

Except as indicated in footnotes to this table, we believe that the shareholders named in this table have sole voting and investment power with respect to all shares shown to be beneficially owned by them, based on information provided to us by such shareholders. Unless otherwise noted below, each beneficial owner's address is: c/o Arcturus Therapeutics Ltd., 10628 Science Center Drive, Suite 250, San Diego, California, 92121.

Ordinary Shares Beneficially Owned

<i>5% or Greater Shareholders</i>	Ordinary Shares Beneficially Owned	
	Number	Percentage
Craig Willett ⁽¹⁾	866,342	8.0%
ARK Investment Management LLC ⁽²⁾	815,176	7.5%
Bradley Sorenson ⁽³⁾	692,392	6.4%
<i>Directors and Executive Officers</i>		
Joseph E. Payne ⁽⁴⁾	1,469,097	13.6%
Andrew Sassine ⁽⁵⁾	257,178	2.4%
Padmanabh Chivukula ⁽⁶⁾	732,548	6.8%
Peter C Farrell ⁽⁷⁾	102,284	*
Magda Marquet ⁽⁷⁾	36,332	*
James Barlow ⁽⁷⁾	25,832	*
All directors and executive officers as a group (6 persons)	2,623,271	24.1%

* Represents beneficial ownership of less than 1% of our outstanding Ordinary Shares

- (1) Based on a Schedule 13D filed with the SEC on February 7, 2018. Consists of (i) 108,282 Ordinary Shares held directly by Mr. Willett, (ii) 280,810 Ordinary Shares held by DUR Holdings, L.C, (iii) 294,113 Ordinary Shares held by Phoenician Enterprises, Ltd., and (iv) 183,137 Ordinary Shares held by 6-W Discretionary Trust. Mr. Willett is the president of Elizann, Inc., which is the manager of DUR Holdings, L.C, and therefore Mr. Willett may be deemed to have voting and investment power with respect to the securities held by DUR Holdings, L.C. Mr. Willett is the general partner of Phoenician Enterprises, Ltd. and therefore may be deemed to have voting and investment power with respect to the securities held by Phoenician Enterprises, Ltd. Mr. Willett is the trustee of 6-W Discretionary Trust and therefore may be deemed to have voting and investment power with respect to the securities held by 6-W Discretionary Trust.
- (2) Based solely on Form 13F filed as of December 31, 2018.
- (3) Based solely on a Schedule 13D filed with the SEC on May 24, 2018. Consists of (i) 658,366 Ordinary Shares, (ii) presently-exercisable options to purchase 4,669 Ordinary Shares, and (iii) call options to purchase an aggregate of an additional 26,357 Ordinary Shares. The shareholder may own additional shares that would not have been required to have been subsequently reported.

- (4) Based on Form 3 filed on January 1, 2019, of which 366,274 shares are subject to repurchase by the Company.
- (5) Based on Form 3 filed on January 1, 2019 and 19,582 option shares exercisable are included.
- (6) Based on Form 3 filed on January 1, 2019, of which 183,137 shares are subject to repurchase by the Company
- (7) Based on Form 3 filed on January 1, 2019 and 15,832 options shares exercisable are included.

Securities Authorized for Issuance Under Equity Compensation Plans

The following information is provided as of December 31, 2018 with respect to the Company's equity compensation plans:

Plan Category	Number of Securities to be Issued upon Exercise of Outstanding Options, Warrants and Rights (a)	Weighted Average Exercise Price of Outstanding Options, Warrants and Rights (b)	Number of Securities Remaining Available for Future Issuance Under Equity Compensation Plans (Excluding Securities Reflected in Column a) (c)
Equity compensation plans approved by security holders (1)	1,189,433	\$ 7.41	470,000
Equity compensation plans not approved by security holders	—	\$ —	—
Total	1,189,433	\$ 7.41	470,000

- (1) The number of securities to be issued upon exercise of outstanding awards reflected in column (a) is from the 2010 and 2018 plans. The number of securities remaining available for future issuance under equity compensation plans reflected in column (c) is from the 2018 plan.

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

See Item 10.B. "Memorandum and Articles of Association – Approval of Related Party Transactions" of our Annual Report on Form 20-F for the fiscal year ended December 31, 2017 for a discussion of the requirements of Israeli law regarding special approvals for transactions involving directors, officers or controlling shareholders.

Providence Agreement

During 2016, the Company entered into a Research Collaboration and License Agreement with a related party, Providence Therapeutics, Inc. ("Providence") whose CEO and President is also a shareholder of the Company, to identify and optimize microRNA modulators and/or mimetics for the treatment of neoplastic diseases. In April 2017, the Providence Agreement was amended to include mRNA for the treatment of neoplastic disease. In July 2018, the Providence Agreement was amended and restated to cover brain neoplasms, breast neoplasms and ovarian neoplasms. Each party is responsible for their own research costs under the agreement, and Providence is responsible for all of the development costs through the completion of Phase 2 clinical trials. The Company is entitled to share a percentage of future product revenue of each product provided the Company shares in the same percentage of the product's post Phase 2 costs. Separately, Providence has agreed to pay a specified rate for the use of the Company's employees. For the years ended December 31, 2018 and 2017, the Company has recognized \$0.6 million and \$1.0 million, respectively, in revenue related to the amortization of the upfront payment and revenue related to the use of Company employees and expense reimbursements. There was no outstanding accounts receivable balance related to this agreement as of December 31, 2018 and December 31, 2017. During the third quarter of 2017, the Company's ordinary share agreement for the President and CEO of Providence was modified to remove the vesting conditions of the original grant and the Company recognized \$1.5 million in related stock compensation expense. As of December 31, 2018, the President and CEO of Providence held a 6.4% ownership interest in the Company.

Employment Agreements

We have entered into written employment agreements with each of our executive officers. These agreements provide for notice periods of varying duration for termination of the agreement by us or by the relevant executive officer, during which time the executive officer will continue to receive base salary and benefits. We have also entered into customary non-competition, confidentiality of information and ownership of inventions arrangements with our executive officers. However, the enforceability of the noncompetition provisions may be limited under applicable law.

Options

Since our inception we have granted options to purchase our Ordinary Shares to our officers and certain of our directors. Such option agreements may contain acceleration provisions upon certain merger, acquisition, or change of control transactions. See Note 11 of our Notes to Consolidated Financial Statements for additional information. If the relationship between us and an executive officer or a director is terminated, except for cause (as defined in the various option plan agreements), options that are vested will generally remain exercisable for ninety days or thirty-six months after such termination depending on whether the options were granted to an executive officer or director.

Indemnification Agreements and Insurance Coverage

Our amended and restated articles of association permit us to exculpate, indemnify and insure each of our directors and office holders to the fullest extent permitted by the Companies Law. We have entered into indemnification agreements with each of our directors and other office holders, undertaking to indemnify them to the fullest extent permitted by Israeli law. We have also obtained Directors' & Officers' insurance for each of our officers and directors.

Previously Disclosed Litigation in Israel and California and California Arbitration

On May 27, 2018, the Company entered into an Agreement and Release with former directors Stuart Collinson, Craig Willett, Daniel Geffken, David Shapiro (the "Resigning Directors") and current director Joseph Payne. The settlement agreement was approved by the Israeli District Court on May 28, 2018 and the Company's shareholders at its July 2018 extraordinary general meeting. Pursuant to the settlement agreement, all of the lawsuits and the arbitration resulting from disputes among the Company and certain of its directors were terminated.

In addition, pursuant to the settlement agreement, the Resigning Directors resigned from the Company's board of directors and from any other position in the Company, the Company agreed to vest the unvested shares of restricted stock owned by one Resigning Director, the Company agreed to maintain in effect the Company's existing directors' and officers' insurance policies on the same or better terms and the Company agreed to purchase a directors and officers "tail" insurance policy covering all current and former directors and officers for any acts or events occurring prior to the effective date of the settlement agreement for a period of at least six years. The Company also agreed to reimburse each of Mr. Payne and Dr. Chivukula for all of their respective reasonable fees and expenses incurred in connection with the pending litigation identified above and the entry into the settlement agreement.

Item 14. Principal Accounting Fees and Services.

The following table sets forth the fees billed to us and our subsidiaries by Ernst & Young LLP, an independent registered public accounting firm, and Kost, Forer, Gabbay and Kasierer, a member of Ernst & Young Global, an independent registered public accounting firm, which served as our principal accountant for the years ended December 31, 2018 and 2017, respectively.

(US Dollars in thousands)	2018	2017
Audit fees (1)	\$ 724	\$ 651
Audit-related fees (2)	—	171
Tax fees (3)	86	210
All other fees	—	—
Total	<u>\$ 810</u>	<u>\$ 1,032</u>

- (1) Includes fees for professional services rendered by our principal accountant in connection with the audit of our consolidated annual financial statements and services that would normally be provided by our principal accountant in connection with statutory and regulatory filings or engagements.
- (2) Audit-related fees are fees for assurance and related services rendered by our respective principal accountants that are reasonably related to the performance of their audit of our financial statements and that are not reported under "Audit-fees" above.
- (3) Tax fees are fees for services rendered by our respective principal accountants in connection with tax compliance, tax planning and tax advice.

Pre-Approval of Auditors' Compensation

Our audit committee has a pre-approval policy for the engagement of our independent registered public accounting firm to perform certain audit and non-audit services. Pursuant to this policy, which is designed to assure that such engagements do not impair the independence of our auditors, the audit committee pre-approves annually a catalog of specific audit and non-audit services in the categories of audit services, audit-related services and tax services that may be performed by our independent registered public accounting firm. If a type of service, that is to be provided by our auditors, has not received such general pre-approval, it will require specific pre-approval by our audit committee. The policy prohibits retention of the independent registered public accounting firm to perform the prohibited non-audit functions defined in applicable SEC rules.

Item 15. Exhibits, Financial Statement Schedules.

- (a)
 - (1) The information required by this item is included in Item 8 of Part II of this Annual Report.;
 - (2) The information required by this item is included in Item 8 of Part II of this Annual Report.
 - (3) See the exhibit index preceding the signature pages to this Annual Report, which is incorporated by reference herein.
- (b) See the exhibit index preceding the signature pages to this Annual Report, which is incorporated by reference herein.
- (c) Not applicable.

Item 16. Form 10-K Summary.

None.

Exhibit Number	Description
3.1	<u>Articles of Association of the Company. Incorporated by reference to Exhibit No. 4.1 to the Company's Registration Statement on Form S-8 filed on November 30, 2017 (File No. 333-221830).</u>
4.1†	<u>Arcturus Therapeutics Ltd. 2018 Omnibus Equity Incentive Plan. Incorporated by reference to Exhibit 99.3 to the Company's Report of Foreign Private Issuer on Form 6-K filed on July 27, 2018 (File No. 001-35932).</u>
4.2†	<u>Arcturus Therapeutics Ltd. Amended and Restated Compensation Policy for Company Office Holders. Incorporated by reference to Exhibit 99.2 to the Company's Report of Foreign Private Issuer on Form 6-K filed on July 27, 2018 (File No. 001-35932).</u>
4.3	<u>Agreement and Plan of Merger and Reorganization among Alcobra Ltd., Aleph MergerSub, Inc. and Arcturus Therapeutics, Inc., dated as of September 27, 2017. Incorporated by reference to Exhibit 99.2 to the Company's Report of Foreign Private Issuer on Form 6-K filed on September 28, 2017 (File No. 001-35932).</u>
4.4	<u>Form of Indemnification Agreement. Incorporated by reference to Exhibit 10.4 to Form F-1/A filed on February 19, 2013 (File No. 333-186003).</u>
4.5†	<u>Alcobra Ltd. Amended and Restated 2010 Incentive Option Plan. Incorporated by reference to Exhibit 4.3 to Form 20-F filed on April 28, 2017 (File No. 001-35932).</u>
4.6†	<u>2013 Equity Incentive Plan of Arcturus Therapeutics, Inc. Incorporated by reference to Exhibit 99.1 to Form S-8 filed on November 30, 2017 (File No. 333-221830).</u>
10.1	<u>Loan and Security Agreement, dated October 12, 2018, by and between Western Alliance Bank and Arcturus Therapeutics, Inc. Incorporated by reference to Exhibit 10.1 to the Company's Report of Foreign Private Issuer on Form 6-K filed on October 15, 2018 (File No. 001-35932).</u>
10.2	<u>Sales Agreement, dated October 15, 2018, by and between Arcturus Therapeutics Ltd. and Leerink Partners LLC. Incorporated by reference to Exhibit 10.2 to the Company's Report of Foreign Private Issuer on Form 6-K filed on October 15, 2018 (File No. 001-35932).</u>
10.3	<u>Amended and Restated Amendment to Development and Option Agreement, dated as of September 28, 2018, by and between CureVac AG and Arcturus Therapeutics Inc. Incorporated by reference to Exhibit 99.2 to the Company's Report of Foreign Private Issuer on Form 6-K filed on October 1, 2018 (File No. 001-35932).</u>
10.4	<u>Research Collaboration and License Agreement, by and between Arcturus Therapeutics, Inc. and Janssen Pharmaceuticals, Inc., dated October 18, 2017. Incorporated by reference to Exhibit 4.7 to Form 20-F filed on May 14, 2018 (File No. 001-35932).</u>
10.5	<u>Research and Exclusive License Agreement, by and between Arcturus Therapeutics, Inc. and Synthetic Genomics, Inc., effective October 24, 2017. Incorporated by reference to Exhibit 4.8 to Form 20-F filed on May 14, 2018 (File No. 001-35932).</u>
10.6	<u>Research Agreement, by and between Arcturus Therapeutics, Inc. and Millennium Pharmaceuticals, Inc., a wholly-owned subsidiary of Takeda Pharmaceutical Company Limited, effective December 6, 2016, as amended December 21, 2017. Incorporated by reference to Exhibit 4.9 to Form 20-F filed on May 14, 2018 (File No. 001-35932).</u>
10.7	<u>Research Collaboration and License Agreement, by and between Arcturus Therapeutics, Inc. and Ultragenyx Pharmaceutical Inc., entered into as of October 26, 2015, as amended October 17, 2017 and April 20, 2018. Incorporated by reference to Exhibit 4.10 to Form 20-F filed on May 14, 2018 (File No. 001-35932).</u>

Exhibit Number	Description
10.8	<u>Letter Agreement, by and between Arcturus Therapeutics, Inc. and Cystic Fibrosis Foundation Therapeutics, Inc., dated May 16, 2017. Incorporated by reference to Exhibit 4.11 to Form 20-F filed on May 14, 2018 (File No. 001-35932).</u>
10.9	<u>Development and Option Agreement, by and between Arcturus Therapeutics, Inc. and CureVac AG, dated January 1, 2018, as amended May 3, 2018. Incorporated by reference to Exhibit 4.12 to Form 20-F filed on May 14, 2018 (File No. 001-35932).</u>
10.10	<u>Co-Development and Co-Commercialization Agreement, by and between Arcturus Therapeutics, Inc. and CureVac AG, dated January 1, 2018. Incorporated by reference to Exhibit 4.13 to Form 20-F filed on May 14, 2018 (File No. 001-35932).</u>
10.11	<u>License Agreement, by and between Arcturus Therapeutics, Inc., as successor-in-interest to Marina Biotech, Inc., and Protiva Biotherapeutics Inc., dated as of November 28, 2012. Incorporated by reference to Exhibit 4.14 to Form 20-F/A filed on July 10, 2018 (File No. 001-35932).</u>
10.12	<u>Patent Assignment and License Agreement, by and between Arcturus Therapeutics, Inc. and Marina Biotech, Inc., dated as of August 9, 2013. Incorporated by reference to Exhibit 4.15 to Form 20-F filed on May 14, 2018 (File No. 001-35932).</u>
10.13*	<u>Share Exchange Agreement, dated as of February 11, 2019, by and between Arcturus Therapeutics Ltd. and Arcturus Therapeutics Holdings Inc.</u>
10.14*	<u>Amended and Restated Joint Venture, Research Collaboration and License Agreement, dated as of July 14, 2018 by and between Arcturus Therapeutics, Inc. and Providence Therapeutics, Inc.</u>
10.15*	<u>Research Collaboration Agreement, dated as of March 8, 2019 by and between Arcturus Therapeutics, Inc. and Millennium Pharmaceuticals, Inc., a wholly-owned subsidiary of Takeda Pharmaceutical Company Limited.</u>
14.1*	<u>Code of Business Conduct and Ethics.</u>
21.1	<u>Subsidiaries of the Registrant. Incorporated by reference to Exhibit 8.1 to Form 20-F filed on May 14, 2018 (File No. 001-35932).</u>
23.1*	<u>Consent of Independent Registered Public Accounting Firm</u>
23.2*	<u>Consent of Independent Registered Public Accounting Firm</u>
24.1*	<u>Power of Attorney (included on the signature page of this Annual Report).</u>
31.1*	<u>Certification by Principal Executive Officer pursuant to Rule 13a-14(a) or 15d-14(a) under the Securities Exchange Act of 1934, as amended.</u>
31.2*	<u>Certification by Principal Financial Officer pursuant to Rule 13a-14(a) or 15d-14(a) under the Securities Exchange Act of 1934, as amended.</u>
31.3*	<u>Certification by Principal Accounting Officer pursuant to Rule 13a-14(a) or 15d-14(a) under the Securities Exchange Act of 1934, as amended.</u>
32.1*	<u>Certification of Principal Executive Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.</u>
32.2*	<u>Certification of Principal Financial Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.</u>
32.3*	<u>Certification of Principal Accounting Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.</u>

Exhibit Number	Description
101*	The following financial statements and footnotes from the Registrant's Annual Report on Form 10-K for the fiscal year ended December 31, 2018 formatted in Extensible Business Reporting Language (XBRL): 101.INS XBRL Instance Document 101.SCH XBRL Taxonomy Extension Schema 101.CAL XBRL Taxonomy Extension Calculation Linkbase 101.DEF XBRL Taxonomy Extension Definition Linkbase 101.LAB XBRL Taxonomy Extension Label Linkbase 101.PRE XBRL Taxonomy Extension Presentation Linkbase

* Filed herewith.

† Management compensatory plan, contract or arrangement.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, as amended, the Registrant has duly caused this Report to be signed on its behalf by the undersigned, thereunto duly authorized.

ARCTURUS THERAPEUTICS LTD.

Date: March 15, 2019

By: /s/ Joseph E. Payne

Name: Joseph E. Payne

Title: President, Chief Executive Officer and Director

The undersigned officers and directors of Arcturus Therapeutics Ltd., hereby severally constitute and appoint Joseph E. Payne and Dr. Padmanabh Chivukula, and each of them individually, with full power of substitution and resubstitution, as their true and lawful attorneys and agents, to do any and all acts and things in their name and behalf in their capacities as directors and officers and to execute any and all instruments for them and in their names in the capacities indicated below, which said attorneys and agents, may deem necessary or advisable to enable said corporation to comply with the Securities Exchange Act of 1934, as amended, and any rules, regulations and requirements of the Securities and Exchange Commission, in connection with this Annual Report on Form 10-K, including specifically but without limitation, power and authority to sign for them or any of them in their names in the capacities indicated below, any and all amendments hereto, and they do hereby ratify and confirm all that said attorneys and agents, or either of them, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this annual report has been signed below by the following persons on behalf of the Registrant and in the capacities and on the dates indicated.

<u>Name</u>	<u>Title</u>	<u>Date</u>
<u>/s/ Joseph E. Payne</u> Joseph E. Payne	President, Chief Executive Officer and Director <i>(principal executive officer)</i>	March 15, 2019
<u>/s/ Dr. Padmanabh Chivukula</u> Dr. Padmanabh Chivukula	Chief Scientific Officer, Chief Operating Officer and Secretary	March 15, 2019
<u>/s/ Dr. Peter Farrell</u> Dr. Peter Farrell	Chairman of the Board	March 15, 2019
<u>/s/ Andrew Sassine</u> Andrew Sassine	Director and Chief Financial Officer <i>(principal financial officer)</i>	March 15, 2019
<u>/s/ Dr. Magda Marquet</u> Dr. Magda Marquet	Director	March 15, 2019
<u>/s/ James Barlow</u> James Barlow	Director	March 15, 2019
<u>/s/ Keith C. Kummerfeld</u> Keith C. Kummerfeld	Vice President of Finance and Corporate Controller <i>(principal accounting officer)</i>	March 15, 2019

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

<u>Reports of Independent Registered Public Accounting Firms</u>	F-2
<u>Consolidated Balance Sheets as of December 31, 2018 and 2017</u>	F-4
<u>Consolidated Statements of Operations and Comprehensive Loss for the Years ended December 31, 2018 and 2017</u>	F-5
<u>Consolidated Statements of Changes in Shareholders' Equity for the Years ended December 31, 2018 and 2017</u>	F-6
<u>Consolidated Statements of Cash Flows for the Years ended December 31, 2018 and 2017</u>	F-7
<u>Notes to Consolidated Financial Statements</u>	F-8

The Board of Directors and Shareholders
Arcturus Therapeutics Ltd.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheet of Arcturus Therapeutics Ltd. and its subsidiaries (the Company) as of December 31, 2018, the related consolidated statements of operations and comprehensive loss, changes in shareholders' equity and cash flows for the year ended December 31, 2018, and the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2018, and the results of its operations and its cash flows for the year ended December 31, 2018, in conformity with U.S. generally accepted accounting principles.

The Company's Ability to Continue as a Going Concern

The accompanying consolidated financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in Note 1 to the financial statements, the Company has suffered recurring losses from operations, has negative cash flows from operations and has stated that substantial doubt exists about the Company's ability to continue as a going concern. Management's evaluation of the events and conditions and management's plans regarding these matters are also described in Note 1. The consolidated financial statements do not include any adjustments that might result from the outcome of this uncertainty.

Basis for Opinion

These 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 audit. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our 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 the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audit we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audit 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 audit 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 audit provides a reasonable basis for our opinion.

/s/ Ernst & Young LLP
We have served as the Company's auditor since 2018
San Diego, California
March 15, 2019

Report of Independent Registered Public Accounting Firm

To the Shareholders and Board of Directors of

ARCTURUS THERAPEUTICS LTD. (FORMERLY ALCOBRA LTD.)

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheet of Arcturus Therapeutics Ltd. (formerly Alcobra Ltd.) and its subsidiaries (the "Company") as of December 31, 2017 and the related consolidated statements of operations and comprehensive loss, shareholders' equity and cash flows for the year ended December 31, 2017, 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, 2017, and the results of its operations and its cash flows for the year ended December 31, 2017, in conformity with U.S. generally accepted accounting principles.

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 audit. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audit we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audit 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 audit 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 audit provides a reasonable basis for our opinion.

KOST FORER GABBAY & KASIERER
A Member of Ernst & Young Global

We have served as the Company's auditor during 2018
Tel-Aviv, Israel
May 14, 2018

ARCTURUS THERAPEUTICS LTD. AND ITS SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS
(In U.S. dollars in thousands, except par value information)

	As of December 31,	
	2018	2017
Assets		
Current assets:		
Cash and cash equivalents	\$ 36,709	\$ 24,965
Restricted cash	—	166
Short-term investments	—	23,608
Accounts receivable, net	4,481	480
Prepaid expenses and other current assets	638	1,059
Intangible asset held for sale	—	590
Total current assets	41,828	50,868
Property and equipment, net	1,975	1,049
Equity method investment	288	—
Non-current restricted cash	107	107
Total assets	\$ 44,198	\$ 52,024
Liabilities and shareholders' equity		
Current liabilities:		
Accounts payable	\$ 2,398	\$ 1,790
Accrued liabilities	3,907	2,793
Deferred revenue	6,272	6,457
Total current liabilities	12,577	11,040
Deferred revenue, net of current portion	7,534	7,190
Long-term debt	9,911	—
Deferred rent	534	—
Total liabilities	30,556	18,230
Commitments and contingencies (Note 13)		
Shareholders' equity:		
Ordinary Shares: 30,000 shares authorized, 10,762 issued, 10,719 outstanding and 43 held in treasury at December 31, 2018; NIS 0.07 par value; 30,000 shares authorized, 10,699 issued, 10,656 outstanding and 43 held in treasury at December 31, 2017;	214	212
Additional paid-in capital	58,302	56,674
Accumulated other comprehensive loss	—	(3)
Accumulated deficit	(44,874)	(23,089)
Total shareholders' equity	13,642	33,794
Total liabilities and shareholders' equity	\$ 44,198	\$ 52,024

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

ARCTURUS THERAPEUTICS LTD. AND ITS SUBSIDIARIES
CONSOLIDATED STATEMENTS OF OPERATIONS AND COMPREHENSIVE LOSS

U.S. dollars in thousands (except per share data)

	Year Ended December 31,	
	2018	2017
Collaboration revenue	\$ 15,753	\$ 12,998
Operating expenses:		
Research and development, net	16,982	15,918
General and administrative	20,582	7,572
Total operating expenses	37,564	23,490
Net loss from operations	(21,811)	(10,492)
Loss from equity method investment	(302)	—
Finance income (expense), net	328	(409)
Net loss before taxes	(21,785)	(10,901)
Income tax expense	—	(1)
Net loss	\$ (21,785)	\$ (10,902)
Net loss per share, basic and diluted	\$ (2.16)	\$ (3.53)
Weighted-average shares outstanding, basic and diluted	10,069	3,087
Comprehensive loss:		
Net loss	\$ (21,785)	\$ (10,902)
Unrealized gain (loss) on short-term investments	3	(3)
Comprehensive loss	\$ (21,782)	\$ (10,905)

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

ARCTURUS THERAPEUTICS LTD. AND ITS SUBSIDIARIES
STATEMENTS OF CHANGES IN SHAREHOLDERS' EQUITY

U.S. dollars in thousands

	Series Seed Preferred Stock		Series A Preferred Stock		Ordinary Shares		Additional Paid-In Capital	Accumulated Other Comprehensive Loss	Accumulated Deficit	Total Stockholders' Equity
	Shares	Amount	Shares	Amount	Shares	Amount				
BALANCE - December 31, 2016	1,284	\$ —	1,481	\$ —	2,801	\$ —	\$ 13,764	\$ —	\$ (12,187)	\$ 1,577
Net loss	—	—	—	—	—	—	—	—	(10,902)	(10,902)
Unrealized loss on short-term investments	—	—	—	—	—	—	—	(3)	—	(3)
Share-based compensation	—	—	—	—	—	—	2,170	—	—	2,170
Issuance of common shares upon exercise of share options	—	—	—	—	348	—	675	—	—	675
Issuance of shares upon exercise of warrants	—	—	—	—	189	—	160	—	—	160
Issuance of shares upon conversion of notes	—	—	—	—	617	—	5,957	—	—	5,957
Conversion of preferred shares to Ordinary Shares	(1,284)	—	(1,481)	—	2,765	—	—	—	—	—
Beneficial conversion expense from notes	—	—	—	—	—	—	348	—	—	348
Issuance of shares in connection with merger, net	—	—	—	—	3,979	212	33,600	—	—	33,812
BALANCE - December 31, 2017	—	\$ —	—	\$ —	10,699	\$ 212	\$ 56,674	\$ (3)	\$ (23,089)	\$ 33,794
Net loss	—	—	—	—	—	—	—	—	(21,785)	(21,785)
Unrealized gain on short-term investments	—	—	—	—	—	—	—	3	—	3
Share-based compensation	—	—	—	—	—	—	1,259	—	—	1,259
Issuance of common shares upon exercise of share options	—	—	—	—	63	2	369	—	—	371
BALANCE - December 31, 2018	—	\$ —	—	\$ —	10,762	\$ 214	\$ 58,302	\$ —	\$ (44,874)	\$ 13,642

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

ARCTURUS THERAPEUTICS LTD. AND ITS SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CASH FLOWS

U.S. dollars in thousands

	Year Ended December 31,	
	2018	2017
OPERATING ACTIVITIES:		
Net loss	\$ (21,785)	\$ (10,902)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization	582	410
Share-based compensation expense	1,259	2,170
Loss from equity method investment	302	—
Non cash interest expenses	38	150
Debt conversion expense	—	348
Changes in operating assets and liabilities:		
Accounts receivable	(4,001)	3,153
Prepaid expenses and other assets	421	(202)
Accounts payable	578	(1,537)
Accrued liabilities	1,687	(104)
Deferred revenue	159	6,054
Net cash used in operating activities	(20,760)	(460)
INVESTING ACTIVITIES:		
Acquisition of property and equipment	(1,478)	(251)
Purchases of short-term investments	(6,594)	—
Proceeds from sale of equipment	—	29
Proceeds from maturities of short-term investments	30,206	10,577
Net cash provided by investing activities	22,134	10,355
FINANCING ACTIVITIES:		
Proceeds from long-term debt, net of debt issuance costs	9,872	—
Proceeds from exercise of stock options	332	711
Proceeds from issuance of convertible promissory notes	—	5,650
Proceeds from exercise of warrants	—	160
Net cash received in the issuance of shares for the net assets of Alcobra Ltd.	—	477
Net cash provided by financing activities	10,204	6,998
NET INCREASE IN CASH, CASH EQUIVALENTS AND RESTRICTED CASH	11,578	16,893
Cash, cash equivalents and restricted cash at beginning of year	25,238	8,345
Cash, cash equivalents and restricted cash at end of year	<u>\$ 36,816</u>	<u>\$ 25,238</u>
Supplemental disclosure of cash flow information:		
Cash paid for interest	\$ 146	\$ —
Cash paid for income taxes	\$ —	\$ 35
Sale of intangible assets for equity method investment	\$ 590	\$ —
Purchase of property and equipment in accounts payable	\$ 30	\$ —
Release of repurchase liability for restricted shares	\$ 39	\$ —
Conversion of notes to ordinary shares	\$ —	\$ 5,957
Fair value of assets acquired, excluding cash, cash equivalents and restricted cash	\$ —	\$ 35,241
Less: liabilities assumed	\$ —	\$ (1,906)
Net assets acquired, excluding cash, cash equivalents and restricted cash	\$ —	\$ 33,335

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

Note 1. Organization

Description of Business

Arcturus Therapeutics Ltd. and its subsidiaries (referred to as the “Company”) is a RNA medicines company focused on significant opportunities in rare, liver, and respiratory diseases. The Company’s key proprietary technology has the potential to address the major hurdles in RNA development, namely the effective and safe delivery of RNA therapeutics to disease-relevant target tissues.

Reverse Merger

On November 15, 2017, Alcobra Ltd. acquired Arcturus Therapeutics, Inc. pursuant to a merger between the companies (the “merger”). Prior to the merger, Alcobra Ltd.’s net assets consisted of cash, investments and nominal non-operating assets. Upon consummation of the merger, Alcobra Ltd. adopted the business plan of Arcturus Therapeutics, Inc. In connection with the merger, Alcobra Ltd. agreed to acquire all of the outstanding common stock of Arcturus Therapeutics, Inc. in exchange for the issuance of an aggregate 6,631,712 of Alcobra Ltd.’s Ordinary Shares, par value 0.07 NIS per share (the “Ordinary Shares”), after giving effect to a 1-for-7 reverse split effected immediately prior to the merger. As a result of the merger, Arcturus Therapeutics, Inc. became a wholly-owned subsidiary of Alcobra Ltd. While Alcobra Ltd. was the legal acquirer in the transaction, Arcturus Therapeutics, Inc. was deemed the accounting acquirer. Immediately after giving effect to the merger, on November 15, 2017, Alcobra Ltd. changed its name to Arcturus Therapeutics Ltd. (“Arcturus” or the “Company”). On November 16, 2017, the Company commenced trading under the symbol “ARCT.” The Company’s principal executive offices and location of all operations are in San Diego, California.

In accordance with the authoritative literature, a transaction where a private company merges into a public company with no operations and nominal net assets should be accounted for as a capital transaction rather than a business combination. Consequently, the reverse merger was accounted for as an issuance of shares by the Company for the net assets of Alcobra Ltd., accompanied by a recapitalization. Excess of considerations paid over net assets acquired and other merger-related costs were recorded as a charge to additional paid-in capital as discussed in Note 6. While Alcobra Ltd. was the legal acquirer in the merger, Arcturus was deemed the accounting acquirer. As a result, the financial statements of the Company prior to the merger date are the historical financial statements of Arcturus whereas the financial statements of the Company after the merger date reflect the results of the operations of Arcturus and Alcobra Ltd. on a combined basis. All historical information presented herein has been retroactively restated to reflect the effect of the merger shares exchange ratio, reverse stock split and change to the authorized number of Ordinary Shares in accordance with Accounting Standards Codification Topic 260, “Earnings Per Share”.

Going Concern

The Company’s activities since inception have consisted principally of performing research and development activities and raising capital. The Company’s activities are subject to significant risks and uncertainties, including failing to secure additional funding before the Company achieves sustainable revenues and profit from operations.

The Company is a pre-clinical bioscience company that is dependent on obtaining external equity and debt financings to fund its operations. Historically, the Company’s primary source of financing has been through the sale of its securities, through issuance of debt and through collaboration agreements. The Company raised \$10.0 million in gross proceeds from a long-term debt agreement executed in October 2018 (Note 9). In addition, in October 2018, the Company entered into a Sales Agreement (the “Sales Agreement”) with Leerink Partners LLC (“Leerink”), pursuant to which it may sell from time to time, at its option, up to an aggregate of \$30.0 million of the Company’s Ordinary Shares through Leerink, as sales agent. Research and development activities have required significant capital investment since the Company’s inception.

The Company expects its operations to continue to require cash investment to pursue the Company's research and development activities, including preclinical studies, formulation development, clinical trials and related drug manufacturing. The Company has experienced net losses since its inception and as of December 31, 2018 has an accumulated deficit of \$44.9 million. The Company expects to continue to incur additional losses for the foreseeable future, and the Company will need to raise additional debt or equity financing or enter into additional collaborations to fund its development. The ability of the Company to transition to profitability is dependent on identifying and developing successful mRNA drug candidates. In the near future, if the Company is not able to achieve planned milestones, incurs costs in excess of its forecasts, or does not meet covenant requirements of its debt (Note 9), it will need to reduce discretionary spending, discontinue the development of some or all of its products, which will delay part of its development programs, all of which will have a material adverse effect on the Company's ability to achieve its intended business objectives. There can be no assurances that additional financing will be secured or, if secured, will be on favorable terms. Management has prepared cash flow forecasts which indicate that based on the Company's expected operating losses and negative cash flows, there is substantial doubt about the Company's ability to continue as a going concern within twelve months after the date that the financial statements for the year ended December 31, 2018, are issued. The accompanying consolidated financial statements have been prepared assuming that the Company will continue as a going concern, which contemplates the realization of assets and the settlement of liabilities and commitments in the normal course of business. The consolidated financial statements do not reflect any adjustments related to the recoverability and classification of assets or the amounts and classification of liabilities that might be necessary if the Company is unable to continue as a going concern.

Note 2. Summary of Significant Accounting Policies

Basis of Presentation and Principles of Consolidation

The accompanying consolidated financial statements include the accounts of Arcturus Therapeutics Ltd. and its subsidiaries. All intercompany accounts and transactions have been eliminated in consolidation. These financial statements are prepared in conformity with accounting principles generally accepted in the United States (U.S. GAAP), which requires management to make estimates and assumptions regarding the valuation of certain debt and equity instruments, the equity method investment, share-based compensation, accruals for liabilities, income taxes, revenue and deferred revenue, expense accruals, and other matters that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could materially differ from those estimates.

Segment Information

Operating segments are identified as components of an enterprise about which separate discrete financial information is available for evaluation by the chief operating decision-maker in making decisions regarding resource allocation and assessing performance. The Company and its chief operating decision-maker view the Company's operations and manage its business in one operating segment which is the research and development of medical applications for the Company's nucleic acid-focused technology.

Cash and Cash Equivalents

Cash equivalents are short-term highly liquid investments that are readily convertible to cash with original maturities of three months or less at the date of purchase.

Restricted cash

Restricted cash represents cash required to be set aside as security for lease payments and to maintain a letter of credit for the benefit of the landlord for the Company's offices. At December 31, 2018 and 2017, the Company had restricted cash of \$107,000 in conjunction with property leases in San Diego, California, and such restriction is expected to be removed at the end of the lease term in 2025. At December 31, 2017, the Company also had restricted cash of \$166,000 in conjunction with property leases in Israel, and such restriction was lifted in 2018.

Short-term Bank Deposits

Short-term bank deposits (Note 4) are deposits with maturities of more than three months and up to one year when acquired. Short-term bank deposits are presented at their cost, including accrued interest and are included in the balance of short-term investments in the consolidated balance sheet.

Short-term Investments

The Company accounts for short-term investments (Note 4) in accordance with ASC No. 320, *Investments- Debt and Equity Securities*. Management determines the appropriate classification of its investments at the time of purchase and reevaluates such determinations at each balance sheet date.

The Company has classified all of its debt securities and certificates of deposit as available-for-sale securities. Available-for-sale securities are carried at fair value, with the unrealized gains and losses reported in accumulated other comprehensive loss in shareholders' equity. Realized gains and losses on sales of investments are included in interest income and are derived using the specific identification method for determining the cost of securities.

The amortized cost of debt securities is adjusted for amortization of premiums and accretion of discounts to maturity. Such amortization together with interest and dividends on securities are included in interest income.

The Company recognizes an impairment charge when a decline in the fair value of its investments in debt securities below the amortized cost basis of such securities is judged to be other-than-temporarily impaired. Factors considered in making such a determination include the duration and severity of the impairment, the reason for the decline in value, the potential recovery period and if the entity has the intent to sell the security, or if it is more likely than not that it will be required to sell the security before recovery of its amortized cost basis. The Company did not recognize any other-than-temporary impairment charges on its marketable securities during the year ended December 31, 2017. The Company held no available-for-sale securities as of December 31, 2018.

Fair Value Measurements

Fair value is defined as the exit price, or the amount that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants as of the measurement date. A hierarchy has been established for inputs used in measuring fair value that maximizes the use of observable inputs and minimizes the use of unobservable inputs by requiring that the most observable inputs be used when available (Note 5).

Observable inputs are inputs market participants would use in valuing the asset or liability developed based on market data obtained from sources independent of the Company. Unobservable inputs are inputs that reflect the Company's assumptions about the factors market participants would use in valuing the asset or liability developed based upon the best information available under the circumstances. The hierarchy consists of three levels. Level 1 inputs are quoted prices (unadjusted) in active markets for identical assets or liabilities. Level 2 inputs include quoted prices for similar assets or liabilities in active markets, quoted prices for identical or similar assets or liabilities in markets that are not active, and inputs (other than quoted prices) that are observable for the asset or liability, either directly or indirectly. Level 3 inputs are unobservable inputs for the asset or liability. Categorization within the valuation hierarchy is based upon the lowest level of input that is significant to the fair value measurement.

Accounts Receivable

Accounts receivable are recorded at the net invoice value and are non-interest bearing. The Company considers receivables past due based on the contractual payment terms. The Company reserves specific receivables if collectability is no longer reasonably assured. Estimates for allowances for doubtful accounts are determined based on existing contractual obligations, historical payment patterns, and individual customer circumstances. The Company reevaluates such reserves on a regular basis and adjusts its reserves as needed. Once a receivable is deemed to be uncollectible, such balance is charged against the reserve. No reserves have been recorded as of December 31, 2018 or 2017.

Concentration of Credit Risk and Significant Customers

Financial instruments, which potentially subject the Company to concentrations of credit risk, consist of cash, cash equivalents and short-term investments. The Company limits its exposure to credit loss by placing its cash, cash equivalents, and investments with high credit quality financial institutions in instruments with short maturities.

There was one customer that comprised 96% of the total accounts receivable balance at December 31, 2018 and one customer that comprised the total accounts receivable balance at December 31, 2017.

For the year ended December 31, 2018, the Company's top three customers collectively represented 80% of the Company's total revenue. For the year ended December 31, 2017, there were three customers that collectively represented 92% of the Company's total revenue.

Intangible Assets Held for Sale and Equity Method Investment

At the end of the second quarter of 2018, the Company completed the sale of its intangible assets related to the ADAIR technology, which was accounted for as an intangible asset held for sale as of December 31, 2017. Pursuant to the asset purchase agreement for ADAIR, the Company received a 30% ownership interest in the common stock of a privately held company in consideration for the sale of the ADAIR technology. As this ownership interest is greater than 20% and one executive of the Company holds a seat on the investee's board of directors, the Company has the ability to exercise significant influence over the operating and financial policies of this investee; therefore, the Company accounts for this investment as an equity method investment. The Company has no requirement to invest further in this private company and the ownership percentage may be diluted in the future. The Company will account for this investment as an equity method investment until the investment no longer meets the definition of an equity method investment.

The Company accounts for its share of the earnings or losses of the investee with a reporting lag of three months beginning the third quarter of 2018, as the financial statements of the investee are not completed on a basis that is sufficient for the Company to apply the equity method on a current basis. The Company has recorded \$0.3 million of its share of losses of the investee as of December 31, 2018.

Property and Equipment, net

Property and equipment are stated at cost, net of accumulated depreciation and amortization. The cost of property and equipment is depreciated or amortized using the straight-line method over the respective useful lives of the assets, ranging from three to five years. Leasehold improvements are amortized using the straight-line method over the shorter of the estimated useful life of the asset or the lease term. Long-lived assets, including property and equipment are reviewed for impairment whenever events or circumstances indicate that the carrying amount of these assets may not be recoverable. The determinants used for this evaluation include management's estimate of the asset's ability to generate positive income from operations and positive cash flow in future periods, as well as the strategic significance of the assets to the Company's business objectives. The Company did not recognize any impairment losses for the years ended December 31, 2018 or 2017.

Comprehensive Income/Loss

Comprehensive income/loss is defined as the change in shareholders' equity during a period from transactions and other events and circumstances from non-owner sources. Comprehensive loss represents unrealized losses on the Company's marketable securities. The income tax effect related to unrealized losses was immaterial for December 31, 2018 or 2017.

Revenue Recognition

The Company recognizes revenue when each of the following four criteria is met: (i) persuasive evidence of an arrangement exists; (ii) products are delivered or as services are rendered; (iii) the sales price is fixed or determinable; and (iv) collectability is reasonably assured.

Multiple-element arrangements may include (i) grants of licenses, or options to obtain licenses, to intellectual property, (ii) research and development services, (iii) participation on joint research or joint development committees, or (iv) manufacturing or supply services. Payments the Company may receive under these arrangements typically include one or more of the following: non-refundable upfront license fees, option exercise fees, funding of research or development efforts, amounts due upon the achievement of specified objectives, or royalties on future product sales.

Multiple-element arrangements require the separability of deliverables included in an arrangement into different units of accounting and the allocation of arrangement consideration to the units of accounting. The evaluation of multiple-element arrangements requires management to make judgments about (i) the identification of deliverables, (ii) whether such deliverables are separable from the other aspects of the contractual relationship, (iii) the estimated selling price of each deliverable, and (iv) the expected period of performance for each deliverable.

To determine the units of accounting under a multiple-element arrangement, management evaluates certain separation criteria, including whether the deliverables have stand-alone value, based on the relevant facts and circumstances for each arrangement. Management then estimates the selling price for each unit of accounting and allocates the arrangement consideration to each unit using the relative selling price method. The allocated consideration for each unit of accounting is recognized based on the method most appropriate for that unit of account and in accordance with the revenue recognition criteria detailed above.

If there are deliverables in an arrangement that are not separable from other aspects of the contractual relationship, they are treated as a combined unit of accounting, with the allocated revenue for the combined unit recognized in a manner consistent with the revenue recognition applicable to the final deliverable in the combined unit. Payments received prior to satisfying the relevant revenue recognition criteria are recorded as deferred revenue in the accompanying consolidated balance sheets and recognized as revenue when the related revenue recognition criteria are met.

Most of the collaboration agreements provide for non-refundable milestone payments. The Company recognizes revenue that is contingent upon the achievement of a substantive milestone in its entirety in the period in which the milestone is achieved. A milestone is considered substantive when the consideration payable to the Company for such milestone (i) is consistent with its performance necessary to achieve the milestone or the increase in value to the collaboration resulting from its performance, (ii) relates solely to its past performance and (iii) is reasonable relative to all of the other deliverables and payments within the arrangement. In making this assessment, management considers all facts and circumstances relevant to the arrangement, including factors such as the scientific, regulatory, commercial and other risks that must be overcome to achieve the milestone, the level of effort and investment required to achieve the milestone and whether any portion of the milestone consideration is related to future performance or deliverables.

Management periodically reviews the estimated performance periods under the collaboration agreements, which provide for non-refundable upfront payments and fees. Management adjusted the periods over which revenue was recognized when appropriate to reflect changes in assumptions relating to the estimated performance periods. In the first quarter of 2019, the Company will adopt new accounting guidance that will change future patterns of revenue recognition.

The Company records revenues related to the reimbursement of costs incurred under the collaboration agreements where it acts as a principal, controls the research or development activities and bears credit risk. Under its collaboration agreements, the Company is reimbursed for associated out-of-pocket costs and for a certain amount of full-time equivalent, or FTE, costs based on an agreed-upon FTE rate. The gross amount of these pass-through reimbursed costs is reported as revenue in the accompanying consolidated statements of operations and comprehensive loss, while the actual expenses for which the Company is reimbursed are reflected as research and development costs.

Research and Development Costs, net

Research and development costs are expensed as incurred. These expenses result from the Company's independent research and development efforts as well as efforts associated with collaboration arrangements. Research and development costs include salaries and personnel-related costs, consulting fees, fees paid for contract research and manufacturing services, the costs of laboratory supplies, equipment and facilities and other external costs are shown net of any grants.

Share-Based Compensation

The Company recognizes share-based compensation for equity awards granted to employees, officers, and directors as an expense on the statements of operations. Share-based compensation is recognized over the requisite service period of the individual awards using the straight-line attribution method, which generally equals the vesting period. Share options have a ten-year life and generally vest 25% on the first anniversary of the grant and in 1/48th equal installments on each monthly anniversary thereafter, such that options are fully vested on the four-year anniversary of the date of grant.

The fair value of share options is estimated using a Black-Scholes valuation model on the date of grant. This method requires certain assumptions be used as inputs, such as the fair value of the underlying common shares, expected term of the option before exercise, expected volatility of the Company's Ordinary Shares, expected dividend yield, and a risk-free interest rate. The Company has limited historical share option activity and therefore estimates the expected term of share options granted using the simplified method, which represents the average of the contractual term of the share option and its weighted-average vesting period. The expected volatility of share options is based upon the historical volatility of a peer group of publicly traded companies. The Company has not declared or paid any dividends and do not currently expect to do so in the foreseeable future. The risk-free interest rates used are based on the implied yield currently available in United States Treasury securities at maturity with a term equivalent to the expected term of the share options. The effect of forfeited awards is recorded when the forfeiture occurs.

Share-based awards granted to non-employees are remeasured at each reporting date and compensation costs are recognized as services are rendered, generally on a straight-line basis. The Company believes that the fair value of these awards is more reliably measurable than the fair value of the services rendered. There were no share-based awards granted to non-employees during 2018 and 2017.

Ordinary Shares Valuation

Prior to the merger and due to the absence of an active market for the Company's Ordinary Shares, the Company utilized third-party valuations which utilized methodologies in accordance with the framework of the American Institute of Certified Public Accountants Technical Practice Aid, Valuation of Privately-Held Company Equity Securities Issued as Compensation, to estimate the fair value of its Ordinary Shares.

Statement of cash flows

The following table provides a reconciliation of cash and cash equivalents and restricted cash reported within the consolidated balance sheets to the total of the same such amounts shown in the consolidated statement of cash flows:

(in thousands)	As of December 31,	
	2018	2017
Cash and cash equivalents	\$ 36,709	\$ 24,965
Restricted cash	—	166
Non-current Restricted cash	107	107
Total cash, cash equivalents and restricted cash shown in the statement of cash flows	\$ 36,816	\$ 25,238

Income Tax Expense

Income taxes are accounted for using an asset and liability approach that requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of temporary differences between the financial reporting basis and the tax basis of the Company's assets and liabilities at the applicable tax rates, along with net operating loss and tax credit carryovers. The Company records a valuation allowance against its deferred tax assets to reduce the net carrying value to an amount that it believes is more likely than not to be realized. Management has considered estimated taxable income and ongoing prudent and feasible tax planning strategies in assessing the amount of the valuation allowance. Based upon the weight of available evidence, which includes the Company's historical operating performance and limited potential to utilize tax credit carryforwards, the Company has determined that total deferred tax assets should be fully offset by a valuation allowance. When the Company establishes or reduces the valuation allowance against its deferred tax assets, its provision for income taxes will increase or decrease, respectively, in the period such determination is made.

The Company is required to file federal and state income tax returns in the United States and various other state jurisdictions. The Company also files income tax returns in the foreign countries in which it operates. The preparation of these income tax returns requires the Company to interpret the applicable tax laws and regulations in effect in such jurisdictions, which could affect the amount of tax paid by the Company.

Additionally, the Company follows an accounting standard addressing the accounting for uncertainty in income taxes that prescribes rules for recognition, measurement, and classification in the consolidated financial statements of tax positions taken or expected to be taken in a tax return.

The Tax Cuts and Jobs Act (the Act) was enacted on December 22, 2017 resulting in significant modifications to existing law. The Company follows the guidance of Staff Accounting Bulletin (SAB) 118, which provides additional clarification regarding the application of ASC 740 in situations where the Company does not have the necessary information available, prepared or analyzed in reasonable detail to complete the accounting for certain income tax effects of the Act for the reporting period in which the Act was enacted. SAB 118 provides for a measurement period beginning in the reporting period that includes the Act's enactment and ending when the Company has obtained, prepared and analyzed the information needed in order to complete the accounting requirements, but in no circumstances should the measurement period extend beyond one year from the enactment date.

The Company has completed its analysis of the Act's income tax effects. In total, the Company recorded \$2.4 million related to the remeasurement of deferred tax assets which was fully offset by a corresponding decrease in the valuation allowance.

Net Loss per Share

Basic net loss per share is calculated by dividing the net loss by the weighted-average number of Ordinary Shares outstanding for the period, without consideration for ordinary share equivalents. Diluted net loss per share is calculated by dividing the net loss by the weighted-average number of Ordinary Shares and dilutive ordinary share equivalents outstanding for the period determined using the treasury-stock method. Dilutive Ordinary Shares for the year ended December 31, 2018 are comprised of share options. For the year ended December 31, 2017, dilutive Ordinary Shares are comprised of options, convertible preferred stock, convertible notes, and warrants.

No dividends were declared or paid during the reported periods.

Recently Issued Accounting Pronouncements

In May 2014, the Financial Accounting Standards Board (FASB) amended the existing Accounting Standards Update (ASU) for revenue recognition No. 2014-09, *Revenue from Contracts with Customers* (Topic 606), which outlines a comprehensive revenue recognition model and supersedes most current revenue recognition guidance. ASU 2014-09 outlines a five-step process for revenue recognition that focuses on transfer of control, as opposed to transfer of risk and rewards, and also requires enhanced disclosures regarding the nature, amount, timing and uncertainty of revenues and cash flows from contracts with customers. Major provisions include determining which goods and services are distinct and require separate accounting (performance obligations), how variable consideration (which may include change orders and claims) is recognized, whether revenue should be recognized at a point in time or over time and ensuring the time value of money is considered in the transaction price.

The FASB subsequently issued amendments to ASU No. 2014-09 that have the same effective date and transition date. These new standards will become effective for the Company on January 1, 2019. The Company will implement the new guidance using the modified retrospective approach. The Company has performed a review of these new standards as compared to its current accounting policies for collaborative relationships. The Company is evaluating the impact of the new standard on historical revenue recorded for its collaboration agreements. This ongoing evaluation is dependent upon the resolution of certain questions relating to the application of the new revenue recognition guidance for collaboration agreements which will ultimately determine the impact, if any, the adoption of this standard may have on the consolidated financial statements.

In February 2016, the FASB issued ASU 2016-02, *Leases*, which outlines a comprehensive lease accounting model and supersedes the current lease guidance. The new accounting standard requires lessees to recognize lease liabilities and corresponding right-of-use assets for all leases with lease terms of greater than twelve months. It also changes the definition of a lease and expands the disclosure requirements of lease arrangements. The new accounting standard must be adopted using the modified retrospective approach and is effective for entities for annual reporting periods beginning after December 15, 2018, with early adoption permitted.

In July 2018, the FASB issued ASU 2018-11, *Leases (Topic 842): Targeted Improvements*, provides entities an optional transition method to apply the new guidance as of the adoption date, rather than as of the earliest period presented. In transition, entities may also elect a package of practical expedients that must be applied in its entirety to all leases commencing before the effective date, unless the lease modified, to not reassess (a) the existence of a lease, (b) lease classification or (c) determination of initial direct costs, which effectively allows entities to carryforward accounting conclusions under previous U.S. GAAP. The Company will adopt the standard on January 1, 2019, using the optional transition method to apply the new guidance as of January 1, 2019, rather than as of the earliest period presented, and elect the package of practical expedients described above.

The Company expects Topic 842 will have a material effect on its consolidated balance sheet. However, the Company does not expect Topic 842 will have a material effect on its consolidated statements of operations and comprehensive loss or consolidated statements of cash flows. While the Company continues to assess all of the effects of adoption, the most significant effects relate to (1) the recognition of right-of-use (ROU) assets and lease liabilities within a range of approximately \$5.5 million to \$6.5 million using an assumed incremental borrowing rate of 8.4%, primarily resulting from leases of office and laboratory space; (2) the derecognition of deferred rent of approximately \$0.5 million for certain lease incentives received; and (3) significant new disclosure requirements.

In June 2018, the FASB issued ASU No. 2018-07, *Compensation - Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting*, which amends the FASB Accounting Standards Codification in order to simplify the accounting for share-based payments granted to nonemployees for goods and services. Under the ASU, most of the guidance on such payments to nonemployees will be aligned with the requirements for share-based payments granted to employees. The guidance mandates the modified retrospective approach and is effective for annual and interim reporting periods beginning after December 31, 2018, with early adoption permitted. The Company plans to adopt this guidance in the first quarter of 2019 and does not expect adoption will have a material impact on the Company's consolidated financial statements.

Recently Adopted Accounting Pronouncements

Effective January 1, 2017, the Company adopted ASU No. 2017-09 *Compensation – Stock Compensation (Topic 718): Scope of Modification Accounting* (ASU No. 2017-09). ASU No. 2017-09 provides guidance about which changes to the terms or conditions of a share-based payment award require an entity to apply modification accounting. The Company's adoption of ASU No. 2017-09 had no impact on the Company's statements of financial position or results of operations and comprehensive loss.

In November 2016, the FASB issued ASU 2016-18, *Restricted Cash*, which requires entities to show the changes in the total of cash, cash equivalents, restricted cash and restricted cash equivalents in the statement of cash flows. As a result, entities will no longer present transfers between cash and cash equivalents and restricted cash and restricted cash equivalents in the statement of cash flows. This update is effective for annual periods beginning after December 15, 2017, and interim periods within those fiscal years with early adoption permitted. The Company adopted this pronouncement retrospectively effective in the December 31, 2017 consolidated financial statements. There was no effect on previously reported balances as a result of adoption of the standard.

In January 2017, the FASB issued ASU 2017-01, *Business Combinations* (Topic 805): “*Clarifying the Definition of a Business*” which clarifies the definition of a business and affects all companies and other reporting organizations that must determine whether they have acquired or sold a business. The amendments are intended to assist with the evaluation of whether transactions should be accounted for as acquisitions (or disposals) of assets or businesses. The guidance is effective for the Company for fiscal years beginning after December 15, 2018, and interim periods within those fiscal years and should be applied prospectively as of the beginning of the period of adoption. Early adoption is permitted under certain circumstances. The Company adopted ASU 2017-01 as of January 1, 2017 and the adoption did not have an impact on the Company’s accounting and disclosures.

NOTE 3. Collaboration Revenue

The Company has entered into license agreements and collaborative research and development arrangements with pharmaceutical and biotechnology companies. Under these arrangements, the Company is entitled to receive license fees, upfront payments, milestone payments if and when certain research and development milestones or technology transfer milestones are achieved, royalties on approved product sales and reimbursement for research and development activities. The Company’s costs of performing these services are included within research and development expenses. The Company’s milestone payments are typically defined by achievement of certain preclinical, clinical, and commercial success criteria. Preclinical milestones may include in vivo proof of concept in disease animal model(s), lead candidate identification, and completion of IND-enabling toxicology studies. Clinical milestones may, for example, include successful enrollment of the first patient in or completion of Phase I, II, and III clinical trials, and commercial revenue, milestone or royalty-based, is often tiered based on net or aggregate sale amounts. The Company cannot guarantee the achievement of these milestones and economics due to risks associated with preclinical and clinical activities required for development of nucleic acid medicine-based therapeutics.

The following table summarizes the Company’s collaboration revenues for the periods indicated (in thousands). Approximately \$5.0 million and \$1.0 million of total collaboration revenue represents revenue derived from foreign countries for the years ended December 31, 2018 and 2017, respectively.

(Dollars in thousands)	Year Ended December 31,	
	2018	2017
Collaboration Partner - Janssen	\$ 1,232	\$ 4,862
Collaboration Partner - Ultragenyx	6,794	5,639
Collaboration Partner - Takeda	1,137	1,403
Collaboration Partner - CureVac	4,427	—
Other	2,163	1,094
	\$ 15,753	\$ 12,998

The following paragraphs provide information on the nature and purpose of these collaboration arrangements.

Collaboration Partner – Janssen

Janssen 2015 Agreements

In 2015 the Company entered into two agreements with Janssen. The primary focus of the collaboration is to develop nucleic acid therapeutics for Hepatitis B (HBV). The Company analyzed the form and substance of both of the agreements and concluded they should be evaluated as a single arrangement for accounting purposes. Upon execution of the agreements, the Company received an upfront payment of \$2.0 million which was amortized over the estimated research and development period.

Under the 2015 agreements, the Company recognized revenue of \$4.9 million during the year ended December 31, 2017. The revenue recognized as of December 31, 2017 included labor and expense reimbursements of \$4.4 million with the remaining revenue representing the amortized portion of the upfront fee and milestone payment. During the quarter ended September 30, 2017, the 2015 agreement was terminated, and the remaining unamortized upfront payment was recognized as of September 30, 2017.

Janssen 2017 Agreement

In late-2017, the Company and Janssen entered into a new agreement. The Company reviewed the timing and nature of the arrangement upon the signing of the new agreement and determined that it was not linked to the prior agreements and should be considered as a standalone agreement.

The 2017 collaboration agreement allocated discovery, development, funding obligations, and ownership of related intellectual property among the Company and Janssen. The Company received an upfront payment of \$7.7 million and may receive preclinical, development and sales milestone payments of \$56.5 million, as well as royalty payments on any future licensed product sales. Janssen will reimburse the Company for research costs at a future defined period upon the achievement of the first research milestone. Janssen may also pay option exercise fees within the \$1.0 million to \$5.0 million range per target. Janssen will pay royalties on annual net sales of licensed products in the low to mid-single digits range, subject to reduction on a country-by-country and licensed-product-by-licensed-product basis and subject to certain events, such as expiration of program patents. In addition, the collaboration includes an exclusivity period.

As the license component of the contract has no standalone value, the license and the research and development activities, exclusivity, and joint steering committee obligations under this agreement should be considered as a single unit of accounting in the arrangement. The upfront fee of \$7.7 million is being deferred and recognized as revenue using the proportional performance method as the Company determined that the deliverables are fulfilled in a pattern other than straight-line due to the structure and nature of the collaborative arrangement. Total deferred revenue as of December 31, 2018 and December 31, 2017 for Janssen was \$6.5 million and \$7.6 million, respectively. The Company recognized revenue of \$1.2 million and \$0.1 million for the years ended December 31, 2018 and 2017, respectively. The revenue recognized included labor and expense reimbursements of a negligible amount with the remaining revenue representing the recognized portion of the upfront fee.

Collaboration Partner – Ultragenyx

In 2015 the Company entered into an agreement with Ultragenyx. During the initial phase of the collaboration, the Company will design and optimize therapeutics for certain rare disease targets. Ultragenyx has the option to add additional rare disease targets during the collaborative development period. Additionally, during the collaborative development period, the Company will participate with Ultragenyx in a joint steering committee. In addition, the collaboration includes an initial exclusivity period and an option to extend this period.

For each program, Ultragenyx will reimburse the Company for all internal and external development costs incurred and if Ultragenyx achieves certain, clinical, regulatory and sales milestones, then the Company is eligible to receive additional payments.

As part of the agreement, Ultragenyx paid an upfront fee and agreed to certain research and development funding obligations. The Company is also entitled to certain additional payments upon exercise of the Ultragenyx expansion option and/or exclusivity extension (if any), and for costs incurred by the Company in conducting the activities assigned under each collaboration development plan. In addition, on a development target-by-development target basis during the two-year period from the effective date of contract, Ultragenyx will pay the Company a one-time milestone payment after the first optimized lead designation for the first product with respect of such development target. For each development target for which Ultragenyx exercises its option, Ultragenyx will pay the Company a one-time option exercise fee within the \$2.0 million to \$5.0 million range per development target. In 2018, the Company signed an amendment with Ultragenyx, that may reduce milestone payments dependent on whether the Company does not incorporate a predefined chemistry methodology to increase mRNA half-life.

The agreement included potential milestone payments for selected targets from Ultragenyx to the Company. The current potential milestone payment for the remaining target as of December 31, 2018 is \$69.5 million. Ultragenyx will pay royalties as a percentage of net sales on a product-by-product and country-by-country basis during the applicable royalty term up to and including double digits. As of December 31, 2018, the Company has not yet reached the clinical phase of the contract.

The Company concluded that the license, research and development activities, exclusivity, and joint steering committee obligations under this agreement should be considered a single unit of accounting in the arrangement, and the upfront fee of \$10 million is being deferred and recognized as revenue over the same period as the estimated research activities. As of December 31, 2018, the amortization period is currently expected to end on March 31, 2019.

During 2017, the Company entered into an amendment with Ultragenyx to add one year to the exclusivity period for the reserved targets, in consideration for a one-time payment of \$2.0 million. The extension of the exclusivity period did not change the length of the research and development period. Further, the amendment allows Ultragenyx the opportunity to review and comment on its filings and prosecution efforts of pending Company patents that relate to Ultragenyx chemistry. Since the Company's deliverables under the agreement are considered a single unit of accounting, the payment consideration was added to the unamortized portion of the upfront signing fee and is being recognized systematically, on a straight-line basis, over the remainder of the period that the research and development services are expected to occur. During the fourth quarter of 2018, Ultragenyx extended the exclusivity on a specified number of reserved targets for an additional year with an annual reserve target list maintenance fee. This extension fee was deferred and will be recognized on a straight-line basis over the one-year exclusivity period. Total deferred revenue as of December 31, 2018 and December 31, 2017 for Ultragenyx was \$2.7 million and \$5.8 million, respectively.

The Company recognized revenue for Ultragenyx of \$6.8 million and \$5.6 million during the years ended December 31, 2018 and 2017, respectively. The revenue recognized included labor and expense reimbursements of \$2.3 million and \$3.7 million for the years ended December 31, 2018 and 2017, respectively, with the remaining revenue representing the amortized portion of the upfront fee on the arrangement.

Collaboration Partner – Takeda

In 2016 the Company entered into a contract with Millennium Pharmaceuticals, Inc., a wholly owned subsidiary of Takeda Pharmaceutical Company Limited ("Takeda") to perform certain discovery and development of RNA medicines for treatment of nonalcoholic fatty liver disease (NASH). The agreement provided a non-exclusive license of the Company's technology to Takeda for the 18 month research program term. As part of the agreement, Takeda paid an upfront fee of \$0.1 million upon contract execution and agreed to provide the Company with funding for the discovery and development costs. The Company concluded that the research funding, exclusivity and license fees were to be accounted for as a single unit of accounting and the upfront license fees were deferred and recognized as revenue over the same period as the initial research program term. In 2017, the Company and Takeda amended the agreement to extend the research program scope and term through December 20, 2018.

The amended agreement provided for \$3.7 million in regularly scheduled research funding payments through 2018. The scheduled fees paid are contractually refundable to Takeda if unearned by the Company. As noted above, the agreement ended during December of 2018 in accordance with the contractually agreed upon research term.

On March 8, 2019, the Company entered into a Research Collaboration Agreement with Takeda for the purpose of designing, optimizing and manufacturing LUNAR®-formulated mRNA Therapeutics. The Company recognized revenue from Takeda of \$1.1 million and \$1.4 million for the years ended December 31, 2018 and 2017, respectively. The revenue recognized includes expense reimbursements that are recognized as revenue when incurred as per the terms of the agreement and milestone payments.

Collaboration Partner - CureVac

In January 2018, the Company entered into a Development and Option Agreement with CureVac, (the “Development and Option Agreement”). Under the terms of the Development and Option Agreement, the parties have agreed to conduct joint preclinical development programs once CureVac makes a payment to pull down a target on the basis of which CureVac is granted options for taking a license on pre-agreed license terms to develop and commercialize certain products incorporating the Company’s patents and know-how related to delivery systems based on or incorporating lipid-mediated delivery systems (including the LUNAR® platform) (the “Arcturus LMD Technology”), and CureVac patents and know-how related to mRNA technology. Subject to certain restrictions, the parties will have an undivided one-half interest in the patents and know-how developed jointly by the parties during the course of the Development and Option Agreement. Pursuant to the terms of the Development and Option Agreement, CureVac will have a number of target options to co-develop from a reserved target list to enter into licenses under the Arcturus LMD Technology with respect to the development, manufacture and commercialization of licensed products (which can include products identified for development by the Company unless the Company is permitted by the terms of the Development and Option Agreement to place such products on a restricted list). A separate notice and fee will be required for each license agreement. If the target to which the license agreement relates is chosen by the parties for co-development under the Co-Development Agreement (which is defined below and discussed in the following paragraph) the license agreement will terminate as such programs will be covered under the Co-Development Agreement discussed below, and therefore CureVac will be given a credit for any exercise fees, milestone payments already paid and all other payments made in relation to the license agreement towards future such payments incurred with respect to future licenses under the Arcturus LMD Technology. Pursuant to a May 2018 amendment to the Development and Option Agreement (which was amended and restated on September 28, 2018), the Company increased the number of targets available to CureVac under the Development and Option Agreement and agreed upon the license forms to be executed upon selection of the targets by CureVac.

Concurrently with the Development and Option Agreement, the Company entered into a Co-Development and Co-Commercialization Agreement (the “Co-Development Agreement”). Under the terms of such agreement, the parties will collaborate to develop and commercialize mRNA-based products for treating ornithine transcarbamylase (“OTC”) deficiency, incorporating CureVac’s mRNA technology, the Company’s mRNA technology and the Arcturus LMD Technology. The overall collaboration with CureVac was managed by a joint steering committee. The parties also have the option to co-develop two mRNA programs for CureVac and one mRNA program for the Company that are not included on the target escrow list. All costs incurred from the Co-Development Agreement will be shared equally by the Company and CureVac, and any costs incurred by the Company in excess of CureVac will be divided evenly and recognized as revenue. The Company recognized \$3.3 million of collaboration revenue related to the Co-Development Agreement as of December 31, 2018.

The Company concluded that the contracts should be accounted for on a combined basis due to their being negotiated and signed concurrently as well as the interoperability between the two agreements, and that the research and development activities, exclusivity, license fees, governance and reserve target rights were to be accounted for as a single unit of accounting and the upfront license fees of \$5.0 million were deferred and recognized as revenue over the eight-year research program period. Further, the Company concluded that the options granted to CureVac are substantive and are to be evaluated as a separate arrangement and not a deliverable of the original arrangement since the option is at the sole election of the customer and due to the fact that the exercise price for the option is reasonable in comparison to other payments in the arrangement. Total deferred revenue as of December 31, 2018 was \$4.4 million under the Development and Option Agreement. The Company recognized revenue from CureVac under both agreements of \$4.4 million for the year ended December 31, 2018. The revenue recognized included labor and expense reimbursements of \$3.8 million for the year ended December 31, 2018, with the remaining revenue representing the amortized portion of the upfront fee under the Development and Option Agreement.

On February 11, 2019, the Company announced the termination of the obligations of CureVac under the Co-Development Agreement, effective 180 days from February 5, 2019 and the re-assumption by the Company of the worldwide rights thereto. Arcturus will reassume 100% global rights for its flagship asset, clinical development candidate ARCT-810, a messenger RNA (mRNA) drug to treat OTC deficiency. ARCT-810 was previously subject to equal cost sharing between Arcturus and CureVac under the Co-Development Agreement. CureVac elected not to continue its obligations for the preclinical development of ARCT-810 under and pursuant to the terms of the agreement.

Arcturus Therapeutics Ltd. and its Subsidiaries
Notes to Consolidated Financial Statements — Continued

Pursuant to the terms of the Co-Development Agreement, CureVac is obligated to continue to fund its share of the preclinical expenses for the OTC program until August of 2019.

Other Collaboration Agreements

The Company entered into several other smaller agreements and recorded revenue and deferred revenue consistently with the revenue recognition practices described in the significant accounting policies footnote. The total revenue of \$2.2 million from other smaller agreements was primarily related to a Research and Exclusive License Agreement with Synthetic Genomics, Inc. (“SGI”) which the Company entered into during the fourth quarter of 2017. Under the agreement, the Company granted SGI an exclusive license for the Arcturus LMD Technology to research, develop and sell products for diseases excluding all respiratory disease viruses other than influenza. Revenue related to this agreement is made up of labor reimbursements and sublicense revenue. The sublicense revenue is calculated as a percentage of all cash payments received by SGI from any sublicense for a LUNAR product, in the mid 10% to 20% range, less payments made to third parties to obtain the right to practice intellectual property used to develop or necessary to make, use, or sell all or part of licensed LUNAR product. Under certain circumstances, the Company will be owed a percentage ranging from 5% to 10% of amounts received by SGI should they enter into agreements. Additionally, in order to maintain exclusive rights, SGI must achieve certain specified sublicense milestones or pay the Company annual exclusivity maintenance fees. As part of the agreement, SGI paid an upfront fee of \$0.2 million upon contract execution which is creditable against any payments to Arcturus. Therefore, the upfront fee was fully deferred upon the receipt of funds. The Company recognized \$1.4 million of labor reimbursement and sublicense revenue as of December 31, 2018.

The remaining revenue from smaller collaboration agreements primarily relates to the agreement with Providence Therapeutics, Inc. (“Providence”), a related party. Under this agreement, the Company recognized revenue of \$0.6 million from amortization of an upfront payment, labor reimbursements, and out-of-pocket cost reimbursements. See Note 14 Related Party Transactions for further details of the Providence agreement.

NOTE 4. Short-term Investments

As of December 31, 2017, the Company’s short-term investments consisted of short-term bank deposits and marketable securities totaling \$23.6 million. The balance of investments as of December 31, 2017 included bank deposits of \$15.0 million with maturities of more than three months but less than one year as well as short-term deposits stated at cost which approximated market value. As of December 31, 2017, the Company’s short-term bank deposits bore interest at a weighted average annual interest rate of 1.6%. During 2018, all short-term bank deposits were liquidated.

There were no short-term investments as of December 31, 2018. The following is a summary of short-term investments at December 31, 2017:

	December 31, 2017			Fair value
	Amortized cost	Gross unrealized gains	Gross unrealized losses	
(Dollars in thousands)				
Certificates of deposit	\$ 1,462	\$ —	\$ —	\$ 1,462
Corporate debt securities	7,149	—	(3)	7,146
Total	\$ 8,611	\$ —	\$ (3)	\$ 8,608

All short-term investments are held as available-for-sale and mature within twelve months of December 31, 2017.

NOTE 5. Fair Value Measurements

The Company establishes the fair value of its assets and liabilities using the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. The Company established a fair value hierarchy based on the inputs used to measure fair value.

The three levels of the fair value hierarchy are as follows:

Level 1: Quoted prices in active markets for identical assets or liabilities.

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

Level 3: Unobservable inputs in which little or no market data exists, and are therefore determined using estimates and assumptions developed by the Company, which reflect those that a market participant would use.

The carrying value of cash, restricted cash, short-term bank deposits, accounts receivable, accounts payable, and accrued liabilities approximate their respective fair values due to their relative short maturities.

As of December 31, 2018, all assets measured at fair value on a recurring basis consisted of cash equivalents which were classified within Level 1 of the fair value hierarchy. The following table presents the fair value hierarchy for assets measured at fair value on a recurring basis as of December 31, 2017 (in thousands):

	December 31, 2017			
	Fair value measurements using input type			
	Level 1	Level 2	Level 3	Total
Cash equivalents	\$ 2,024	\$ —	\$ —	\$ 2,024
Certificates of deposit	—	1,462	—	1,462
Corporate debt securities	—	7,146	—	7,146
Total financial assets	<u>\$ 2,024</u>	<u>\$ 8,608</u>	<u>\$ —</u>	<u>\$ 10,632</u>

The fair value of certain financial instruments was measured and classified within Level 1 of the fair value hierarchy based on quoted prices. Certain financial instruments classified within Level 2 of the fair value hierarchy include the types of instruments that trade in markets that are not considered to be active, but are valued based on quoted market prices, broker or dealer quotations, or alternative pricing sources with reasonable levels of price transparency.

NOTE 6. Reverse Merger with Alcobra Ltd.

As described in Note 1 “Organization,” the reverse merger completed between Arcturus and Alcobra Ltd. was accounted for as an issuance of shares by the Company for the net assets of Alcobra Ltd., accompanied by a recapitalization. Arcturus was considered the acquirer for accounting and financial reporting purposes and acquired the assets and assumed the liabilities of Alcobra Ltd. Arcturus gained control of the combined company after the merger. The annual consolidated financial statements of the Company reflect the operations of the acquirer for accounting purposes together with a deemed issuance of shares, equivalent to the shares held by the former stockholders of the legal acquirer and a recapitalization of the equity of the accounting acquirer. The annual consolidated financial statements include the accounts of the Company since the effective date of the reverse capitalization and the accounts of Arcturus Therapeutics, Inc. since inception.

Arcturus Therapeutics Ltd. and its Subsidiaries
Notes to Consolidated Financial Statements — Continued

The following summarizes the estimated fair value of the assets and liabilities acquired at November 15, 2017, the date of the merger:

(in thousands)	
Cash and cash equivalents	\$ 2,032
Restricted cash	179
Short-term investments	34,188
Prepaid and other assets	434
Property, plant and equipment – held for sale	29
Intangible asset-held for sale	590
Total assets acquired	37,452
Accounts payable and accrued expenses	(1,906)
Net assets acquired	\$ 35,546

The estimated fair value of total considerations paid was \$40,841,000 based on the shares and options of Alcobra Ltd. outstanding on the merger date as adjusted per the merger agreement of 3,997,000 multiplied by the closing price of \$10.22 on the date of the merger. The excess of the fair value of the consideration paid over the fair value of the net assets acquired as detailed above was \$5,295,000, which was recorded as a charge to additional paid-in capital in the equity section of the consolidated balance sheet. The Company also incurred direct merger-related costs totaling \$1,734,000, which offset proceeds received from the transaction and were recorded as a reduction to additional paid-in capital on the consolidated balance sheet.

Assets acquired in the merger included an intangible asset consisting of in-process research and development for proprietary drug technology called ADAIR. At the closing date of the reverse merger, the Company entered into an agreement with Amiservice to which the Company agreed to transfer certain intellectual property related to ADAIR in exchange for a minority equity stake in a company to be formed by Amiservice for the purpose of acquiring the ADAIR assets. The Company determined that the asset met the classification criteria as held for sale in accordance with related accounting guidance when acquired and remained held for sale at December 31, 2017. To determine the fair value of the ADAIR asset, the Company utilized an independent valuation consultant who valued the asset using a market approach valuation method. In conjunction with this valuation, management judgment was required to forecast the occurrence of future events that would trigger the closing of the ADAIR sale agreement.

At the end of the second quarter of 2018, the Company completed the sale of its intangible assets related to the ADAIR technology (Note 2).

NOTE 7. Balance sheet details

Accrued liabilities consisted of the following as of December 31, 2018 and December 31, 2017.

(in thousands)	December 31,	
	2018	2017
Accrued compensation	\$ 974	\$ 1,812
Refundable fees received	2,259	—
Other accrued liabilities	674	981
Total	\$ 3,907	\$ 2,793

NOTE 8. Property and Equipment, Net

Property and equipment, net consisted of the following:

(in thousands)	December 31,	
	2018	2017
Research equipment	\$ 2,711	\$ 1,620
Computers and software	200	97
Office equipment and furniture	527	255
Leasehold improvements	34	44
Total	3,472	2,016
Less accumulated depreciation and amortization	(1,497)	(967)
Property and equipment, net	\$ 1,975	\$ 1,049

Depreciation and amortization expense was \$582,000 and \$410,000 for the years ended December 31, 2018 and December 31, 2017, respectively.

NOTE 9. Debt

Long-term debt with Western Alliance Bank

On October 12, 2018, the Company entered into a Loan and Security Agreement with Western Alliance Bank whereby the Company received gross proceeds of \$10.0 million under a long-term debt agreement (the "Loan"). The Loan has a maturity date of October 1, 2022 and carries interest at the U.S. prime rate plus 1.25%. The loan has an interest-only period of 19 months, which could be extended by an additional 6 months if certain conditions are met, followed by an amortization period of 30 months, or 24 months if the interest-only period is extended. As of December 31, 2018, the Company estimated that the interest-only period will be 19 months, followed by an amortization period of 30 months.

The Company paid a loan origination fee of \$128,000 which was recorded as a debt discount and is being accreted over the term of the Loan. In addition, the Company is required to pay a fee of \$350,000 upon certain change of control events.

Upon maturity or prepayment, the Company will be required to pay a 3% fee, or a 2% fee if the U.S. Food and Drug Administration accepts certain Investigational New Drug ("IND") applications prior to maturity. Because acceptance of an IND is outside of the Company's control, management estimated that the Company will be liable for a fee of 3% of the principal balance, or \$300,000 upon repayment or maturity, and such fee is accreted to the debt balance using the effective interest method over the term of the Loan.

The Loan is collateralized by all of the assets of the Company, excluding intellectual property, which is subject to a negative pledge. The Loan contains customary conditions of borrowing, events of default and covenants, including covenants that restrict the Company's ability to dispose of assets, merge with or acquire other entities, incur indebtedness and make distributions to holders of the Company's capital stock. In addition, the Company is required to maintain at least 50% of its deposit and investment accounts, or \$20 million, whichever is lower, with the Western Alliance Bank.

The Loan also includes covenants which include the Company's (1) nomination of a clinical candidate by December 31, 2018, which the Company is in compliance with, and (2) submission of a clinical candidate for Investigational New Drug application ("IND"), made to the U.S. Food and Drug Administration by December 31, 2019 and have it approved by January 31, 2020, provided that, if the Company has received net cash proceeds from sale, on or after October 12, 2018, of the Company's equity securities in an amount of not less than \$15,000,000, then the IND submission date shall be extended to May 31, 2020 and the approval date shall be extended to June 30, 2020.

Arcturus Therapeutics Ltd. and its Subsidiaries
Notes to Consolidated Financial Statements — Continued

Should an event of default occur, including the occurrence of a material adverse effect, the Company could be liable for immediate repayment of all obligations under the Loan. As of December 31, 2018, the Company is in compliance with all covenants and conditions of the Loan.

As of December 31, 2018, the outstanding long-term debt balance was \$9.9 million, inclusive of \$28,000 of accretion of the final payment and net of the unamortized debt discount of \$117,000.

Principal payments, including the final payment due at repayment, on the long-term debt are as follows as of December 31, 2018:

Year Ending December 31,	\$	
2019		—
2020		2,666,667
2021		4,000,000
2021		3,633,333
Total		10,300,000

Convertible Promissory Notes

On November 15, 2017 and in connection with the merger, holders of all of the Company’s convertible promissory notes that were issued in the second quarter of 2017 converted \$5,795,000 of principal value and \$162,000 of accrued interest into 616,824 Ordinary Shares at an average conversion rate of \$10.19 per share. Additionally, the Company recognized additional expense of \$348,000 as a result of the beneficial conversion feature received by the noteholders upon settlement per terms of the amended note agreements, which was charged to finance expense included in the consolidated statements of operations and comprehensive loss.

The Company recognized interest expense related to its long-term debt of \$186,000 and \$150,000 during the years ended December 31, 2018 and 2017, respectively.

NOTE 10. Shareholders’ Equity

Ordinary Shares

Merger and reverse stock split

The Company completed the merger with Alcobra Ltd. on November 15, 2017 as described in Note 6 to the consolidated financial statements. In connection with the merger, all outstanding shares of Arcturus Therapeutics, Inc. were exchanged for the Company’s Ordinary Shares at a rate of 0.293 Ordinary Shares of the Company’s stock for each share of Arcturus Therapeutics, Inc. common stock.

Also on November 15, 2017 and prior to and in connection with the merger, Alcobra Ltd. effected a 1-for-7 reverse stock split of Ordinary Shares and changed Ordinary Shares authorized to 30,000,000 shares. All historical information presented herein has been retroactively restated to reflect the effect of the merger exchange ratio, reverse stock split and change to the authorized number of Ordinary Shares in accordance with Accounting Standards Codification Topic 260, “*Earnings Per Share*”.

Restricted Ordinary Shares

In March 2013, the founders of the Company purchased 2,783,686 Ordinary Shares of stock for \$0.0068 per share. Of the shares purchased, 1,538,353 were subject to a repurchase option whereby the Company has an option for two months after date of termination of service to repurchase any or all of the unvested shares at the original purchase price per share. The repurchase option shall be deemed to be automatically exercised by the Company as of the end of the two-month period unless the Company notifies the purchaser that it does not intend to exercise its option. The shares will be vested (1) 25% after obtaining suitable siRNA license; (2) 25% after *in vivo* proof-of-concept achieved; (3) 25% after a regulatory agency new drug application (such as an Investigational New Drug

application) is filed and accepted by the applicable regulatory agency; and (4) 25% after human biological proof-of-concept is achieved. The Company met the first two milestones during 2013 and 2014 leaving an unvested balance of 769,176 Ordinary Shares. In 2017, the Ordinary Shares purchase agreements were amended to clarify vesting conditions and also to accelerate the vesting of 146,510 Ordinary Shares resulting in a modification expense of \$1,495,000 as of December 31, 2017. As of December 31, 2018 and 2017, there were 622,667 Ordinary Shares unvested and subject to the repurchase option.

Warrants

Warrants were issued in connection with the issuance of the Company's preferred stock. In 2017 and in conjunction with the merger, all 192,647 of the outstanding warrants were exercised for 188,980 Ordinary Shares (after subtraction of shares for net exercise, when selected). The Company received proceeds of \$160,000 in conjunction with the warrant exercises in 2017.

Net Loss per Share

Dilutive securities at December 31, 2018 that were not included in the calculation of diluted net loss per share for the year ended December 31, 2018 as they were anti-dilutive totaled 94,000. Dilutive securities that were not included in the calculation of diluted net loss per share because they were anti-dilutive totaled 3,057,000 potential shares at December 31, 2017.

For the years ended December 31, 2018 and 2017, the calculation of the weighted-average number of shares outstanding excludes both unvested restricted Ordinary Shares of 622,667 and shares held in treasury of 43,000. In addition, for only the year ended December 31, 2017, the calculation of weighted-average number of shares outstanding excludes 79,000 shares which were issued upon the early exercise of share options and subject to future vesting.

NOTE 11. Share-Based Compensation

Arcturus Therapeutics, Inc. had one stock compensation plan prior to the merger, the 2013 Equity Incentive Plan (the "2013 Plan") which provides for the granting of options, warrants, restricted stock awards, restricted stock units, and other equity-based compensation to the Company's directors, employees and consultants. In connection with the merger and as required in the 2013 Plan, all outstanding options in the 2013 Plan converted into options to purchase Alcobra Ltd.'s Ordinary Shares, as renamed Arcturus Therapeutics Ltd., and the applicable share amounts and exercise prices were adjusted to reflect the exchange ratio. The 2013 Plan has been extinguished and no additional grants shall be made from the 2013 Plan. Options granted under the 2013 Plan generally expire ten years from the date of grant. There were 38,751 shares available for future issuance under the 2013 Plan at December 31, 2018.

Prior to the merger, Alcobra Ltd. granted options to officers, directors, advisors, management and other key employees through the 2010 Incentive Option Plan (the "2010 Plan"). Substantially all options that were outstanding under the 2010 Plan became fully vested upon the closing of the merger. The value of these options was included as a component of the purchase price recorded in conjunction with the merger. The number of shares subject to and the exercise prices applicable to these outstanding options were adjusted in connection with the 1- for- 7 reverse share split. Options granted under the 2010 Plan generally expire ten years from the date of grant. Upon merger, the 2013 Plan was assumed by the 2010 Plan. The Company generally issues new shares upon option exercise. There were 94,001 shares available for future issuance under the 2010 Plan as of December 31, 2018; however, the Company does not intend to issue additional shares under the 2010 Plan.

In August 2018, the Company adopted the 2018 Omnibus Equity Incentive Plan ("2018 Plan"). Under the 2018 Plan, the Company is authorized to issue up to a maximum of 1,100,000 Ordinary Shares pursuant to the exercise of incentive share options or other awards provided for therein. In August 2018, the Company issued a certain number of options to purchase Ordinary Shares to a group of employees as well as options to purchase a total of 220,000 Ordinary Shares to its executives. The Company also issued options to purchase a total of 130,000 Ordinary Shares to the non-executive members of the Company's board of directors. As of December 31, 2018, there were 470,000 shares available for future issuance under the 2018 Plan.

Share Options

The following table presents the weighted-average assumptions used in the Black-Scholes valuation model by the Company in calculating the fair value of share options granted:

	For the Year Ended December 31,	
	2018	2017
Expected life (in years)	6.07	7.3
Expected volatility	73.3%	76.4%
Expected dividend yield	—%	—%
Risk-free interest rate	2.77%	1.87%
Grant date weighted average fair value	\$ 5.38	\$ 7.94

The following table summarizes the Company's share option activity for the year ended December 31, 2018:

	Number of Shares	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Term (Years)	Aggregate Intrinsic Value (in thousands)
Outstanding – December 31, 2017	344,055	\$ 8.70		
Granted	1,046,931	\$ 8.13		
Exercised	(62,224)	\$ 5.34		\$ 218
Forfeited/cancelled	(139,329)	\$ 16.92		
Outstanding – December 31, 2018	<u>1,189,433</u>	\$ 7.41	9.11	\$ 301
Exercisable – December 31, 2018	<u>280,782</u>	\$ 5.77	7.53	\$ 255
Exercisable and expected to vest – December 31, 2018	<u>1,189,433</u>	\$ 7.41	9.11	\$ 301

At December 31, 2018, the total unrecognized compensation cost of \$4.4 million will be recognized over the weighted-average remaining service period of approximately 3.1 years. The fair value of the options vested during the years ended December 31, 2018 and 2017 was \$972,000 and \$669,000, respectively.

Certain options granted were exercised prior to vesting, and are subject to repurchase by the Company at the lower of the original issue price or fair value and will vest according to the respective option agreement. As of December 31, 2017, 35,595 options were exercised but still subject to future vesting. No shares remained subject to repurchase as of December 31, 2018.

Share-based compensation expenses included in the Company's statements of operations and comprehensive loss for the years ended December 31, 2018 and 2017 were:

(in thousands)	For the Year Ended December 31,	
	2018	2017
Research and development	\$ 566	\$ 38
General and administrative	693	2,132
Total	<u>\$ 1,259</u>	<u>\$ 2,170</u>

Share-based compensation expense for the year ended December 31, 2017 includes \$1,495,000 of expense related to a modification of a restricted Ordinary Shares agreement as discussed in Note 10.

Arcturus Therapeutics Ltd. and its Subsidiaries
Notes to Consolidated Financial Statements — Continued

During 2017, the Company granted options for 58,600 shares to two board members at an exercise price below fair value at the grant date. The awards were subject to performance conditions based on closing the reverse merger with Alcobra Ltd. and execution of a facility lease. All of the options vested during 2017, and related expense of \$568,000 is included in general and administrative expense for the year ended December 31, 2017 related to the awards.

NOTE 12. Income Taxes

A reconciliation of loss before income taxes for domestic and foreign locations for the years ended December 31, 2018 and 2017 is as follows:

(In thousands)	For the Year Ended December 31,	
	2018	2017
United States	\$ (21,604)	\$ (10,820)
Foreign	(181)	(81)
Total loss before income taxes	\$ (21,785)	\$ (10,901)

The Company accounts for income taxes in accordance with ASC 740-10, *Accounting for Uncertainty in Income Taxes*. The impact of an uncertain income tax position on the income tax return must be recognized at the largest amount that is more likely than not to be sustained upon audit by the relevant taxing authority. An uncertain tax position will not be recognized if it has less than 50% likelihood of being sustained.

A reconciliation of income tax expense for the years ended December 31, 2018 and 2017 is as follows (in millions):

	December 31,			
	2018	0.4	2017	0.4
Beginning balance of unrecognized tax benefits	\$	0.4	\$	0.4
Settlement of prior period tax positions		—		—
Increase for prior period tax positions		—		—
Increase for current period tax positions		—		—
Ending balance of unrecognized tax benefits	\$	0.4	\$	0.4

Included in the balance of unrecognized tax benefits at both December 31, 2018 and 2017 is \$0.4 million that could impact the Company's effective tax rate, if recognized, subject to a valuation allowance. None of the unrecognized tax benefits currently impact the Company's effective tax rate due to the full valuation allowance the Company has recorded against its deferred tax assets.

The Company is subject to taxation and files income tax returns in the United States, California and Israel. Currently, no historical years are under examination. The Company's tax years from 2013 to date are subject to examination by the Israeli, U.S. and state taxing authorities due to the carryforward of unutilized net operating losses and research and development credits. The Company's policy is to recognize interest expense and penalties related to income tax matters as income tax expense. As of December 31, 2018, there are unrecognized tax benefits of \$0.2 million and \$0.2 million for the United States and California, respectively. There was no tax related interest or penalties recognized for the years ended December 31, 2018 and 2017.

The Company does not anticipate any material changes to its unrecognized tax benefits within the next twelve months.

Arcturus Therapeutics Ltd. and its Subsidiaries
Notes to Consolidated Financial Statements — Continued

The significant components of deferred income taxes at December 31, 2018 and 2017:

(in thousands)	December 31,	
	2018	2017
Deferred tax assets:		
Net operating loss	\$ 8,399	\$ 25,101
Tax credits	35	35
Accrued liabilities	261	227
Deferred revenue	1,713	1,162
Depreciation and amortization	46	—
Share-based compensation	85	90
Total gross deferred tax assets	10,539	26,615
Deferred tax liabilities:		
Depreciation and amortization	—	(96)
Valuation allowance	(10,539)	(26,519)
Net deferred tax asset	\$ —	\$ —

The Company has established a valuation allowance against net deferred tax assets due to the uncertainty that such assets will be realized. The Company periodically evaluates the recoverability of the deferred tax assets. At such time as it is determined that it is more likely than not that deferred tax assets will be realizable, the valuation allowance will be reduced.

At December 31, 2018, the Company had federal and state net operating losses, or NOL, carryforwards of approximately \$33.2 million and \$30.2 million, respectively. The federal NOL carryforwards begin to expire in 2034, and the state NOL carryforwards begin to expire in 2034. The Company has foreign NOL carryforwards of approximately \$89.0 million that do not expire and can be carried forward indefinitely. Due to the Company's recent plan of the Redomiciliation, it is more likely than not that the foreign NOL will not be realized. As a result, the Company has removed the foreign NOL carryforwards from its deferred tax asset schedule and recorded a corresponding decrease to its valuation allowance beginning January 1, 2018.

Excluded from the deferred tax assets for the net operating losses are pre-acquisition Alcobra Inc. and Alcobra Ltd. federal and foreign losses of \$0.3 million and \$20.4 million, respectively. The Company does not believe these losses will be available to use in the future due to limitations under IRC Section 382, lack of operations in Israel where the NOLs were generated and contemplated restructuring.

At December 31, 2018, the Company had federal and state research and development credit carryforwards of approximately \$0.2 million and \$0.2 million, respectively. The federal credit carryforwards begin to expire in 2033, and the state credits carry forward indefinitely.

The Company has also incurred research and development expenses of \$17.0 million and \$15.9 million for the years ended December 31, 2018 and 2017, respectively. The Company believes that a portion of these expenditures will yield additional federal and California tax credits; however, the potential credits under the tax laws have not yet been calculated.

Pursuant to Internal Revenue Code of 1986, as amended (the Code) Sections 382 and 383, annual use of the Company's federal and California net operating loss and research and development credit carryforwards may be limited in the event a cumulative change in ownership of more than 50% occurs within a three-year period. The Company has not completed a Code Section 382 analysis regarding the limitation of net operating loss carryforwards and other tax attributes. There is a risk that changes in ownership have occurred since Company's formation. If a change in ownership were to have occurred, the NOL carryforwards and other tax attributes could be limited or restricted. If limited, the related asset would be removed from the deferred tax asset schedule with a corresponding reduction in the valuation allowance. Due to the existence of the valuation allowance, limitations created by future ownership changes, if any, related to the Company's operations in the U.S. will not impact the Company's effective tax rate.

Arcturus Therapeutics Ltd. and its Subsidiaries
Notes to Consolidated Financial Statements — Continued

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

	For the Year Ended December 31,	
	2018	2017
Federal statutory income tax rate	21.0%	34.0%
State income taxes, net of federal benefit	5.3%	4.4%
Foreign rate differential	(1.3%)	0.2%
Share-based compensation	(0.2%)	—%
Tax Cuts and JOBS Act	—%	(22.0%)
Change in tax rate	—%	(8.3%)
Change in valuation allowance	(20.7%)	1.8%
Other	(3.0%)	(1.8%)
Permanent differences	(1.1%)	(8.3%)
Provision for income taxes	—%	—%

The Tax Cuts and Jobs Act (the Act) was enacted in the U.S. on December 22, 2017. The Act reduced the corporate tax rate to 21% from 35% rate, required companies to pay a one-time transition tax on earnings of certain foreign subsidiaries that were previously tax deferred and created new taxes on certain foreign-sourced earnings. In 2017, the Company recorded provisional amounts for certain enactment-date effects of the Act by applying the guidance in SAB 118 because it had not yet completed its enactment-date accounting for these effects.

SAB 118 measurement period

The Company applied the guidance in SAB 118 when accounting for the enactment-date effects of the Act in 2017. At December 31, 2017, the Company had not completed its accounting for all of the enactment-date income tax effects of the Act under ASC 740, Income Taxes. At December 31, 2018, the Company completed its accounting for all of the enactment-date income tax effects of the Act. As further discussed below, during 2018, the Company did not recognize adjustments to the provisional amounts recorded at December 31, 2017.

As of December 31, 2017, the Company remeasured certain deferred tax assets and liabilities based on the rates at which they were expected to reverse in the future (which was generally 21%), by recording a provisional amount of \$2.4 million, which was fully offset by a valuation allowance of the same amount. Upon further analysis of certain aspects of the Act and refinement of its calculations during the 12 months ended December 31, 2018, the Company found no other adjustments were necessary.

NOTE 13. Commitments and Contingencies

Cystic Fibrosis Foundation Therapeutics Funding agreement

The Company has received royalty bearing grants sponsored by Cystic Fibrosis Foundation Therapeutics, Inc. ("CFFT"). Should the awards result in a successful product, the Company will pay CFFT a specified payment amount in installments following commercialization based on a formula that is six times the total award amount, plus a payment equal to the awarded payments, within sixty days after aggregate net sales of the product exceed certain thresholds. Further, in the event of a license, sale or other transfer of the product or the Company's development program technology (including a change of control transaction), the Company will pay CFFT a percentage of such transfer payments actually received by the Company or the Company's shareholders (subject to a royalty cap). As of December 31, 2018, the Company has received \$0.5 million in grants and has not had a successful product utilizing CFFT grants.

Operating Leases

The Company leases office and lab space for its corporate headquarters in San Diego, California under a noncancellable operating lease. The initial lease term ended February 2018 and had monthly rental payments with escalations during the term of the lease.

Arcturus Therapeutics Ltd. and its Subsidiaries
Notes to Consolidated Financial Statements — Continued

In October 2017, the Company entered into a new lease for office space adjacent to its previously occupied headquarters. The commencement of the lease began in March 2018 and the lease extends for approximately 84 months from the commencement date. Monthly rental payments are due under the lease and there are escalating rent payments during the term of the lease. The Company is also responsible for its proportional share of operating expenses of the building and common areas. In conjunction with the new lease, the Company will receive free rent for four months and received a tenant improvement allowance of \$74,000. The lease may be extended for one five year period at then current market rate with annual escalations. The Company entered into an irrevocable standby letter of credit with the landlord for security of \$96,000 upon executing the lease which is included (along with additional funds required to secure the letter of credit) in the balance of non-current restricted cash as of December 31, 2018.

For operating leases, minimum lease payments, including minimum scheduled rent increases, are recognized as rent expense on a straight-line basis over the lease term. Leasehold improvement incentives paid to the Company by the landlord are recorded as a deferred rent and amortized as a reduction of rent expense over the lease term. Rent expense totaled \$1.1 million and \$334,000 for the years ended December 31, 2018 and 2017, respectively.

Future minimum payments under leases and lease commitments with initial terms greater than one year were as follows at December 31, 2018 (*in thousands*):

2019	\$	1,268
2020		1,277
2021		1,315
2022		1,350
2023		1,390
Thereafter		1,745
Total	\$	<u>8,345</u>

Note 14. Related Party Transactions

During 2016, the Company entered into a Research Collaboration and License Agreement with a related party, Providence, whose CEO and President is also a shareholder of the Company, to identify and optimize microRNA modulators and/or mimetics for the treatment of neoplastic diseases. In April 2017, the Providence Agreement was amended to include mRNA for the treatment of neoplastic disease. In July 2018, the Providence Agreement was amended and restated to cover brain neoplasms, breast neoplasms and ovarian neoplasms. Each party is responsible for their own research costs under the agreement, and Providence is responsible for all of the development costs through the completion of Phase 2 clinical trials. The Company is entitled to share in future product revenue of each product provided the Company shares in the product's post Phase 2 costs. Separately, Providence has agreed to pay for FTEs at a specified rate. For the years ended December 31, 2018 and 2017, the Company has recognized \$0.6 million and \$1.0 million, respectively, in revenue related to the amortization of the upfront payment and revenue related to the payment for FTEs and expense reimbursements. There were no outstanding accounts receivable balances related to this agreement as of December 31, 2018 and December 31, 2017. During the third quarter of 2017, the Company's ordinary share agreement for the President and CEO of Providence was modified to remove the vesting conditions of the original grant and the Company recognized \$1.5 million in related stock compensation expense.

During May 2018, the Company agreed to reimburse professional fees related to the proxy incurred by Joseph Payne, President & CEO, Board of Director, and Padmanabh Chivukula, COO & CSO, totaling \$1.4 million.

Note 15. Litigation

Previously Disclosed Litigation in Israel and California and California Arbitration

The Company, executive officers Joseph Payne (CEO) and Padmanabh Chivukula (COO and CSO) and certain former and current members of the Company's board of directors were party to now terminated lawsuits filed in Israel and California and an arbitration in California. These lawsuits and the arbitration emanated from disputes among certain of these parties in connection with actions taken by former board members to terminate the employment of Mr. Payne and Dr. Chivukula and lawsuits filed by Mr. Payne in response to these terminations.

Mr. Payne and Dr. Chivukula have been reappointed to their roles as CEO (Payne) and COO and CSO (Chivukula) with the Company and the Company entered into an Agreement and Release with its current officers and certain former directors and officers to terminate all of the then ongoing litigation in Israel and the United States and the arbitration that arose in connection with the terminations of Mr. Payne and Dr. Chivukula. Accordingly, all of the previously described lawsuits and the arbitration have been dismissed with prejudice.

Note 16. Subsequent Events

Effective January 1, 2019, the Company appointed Andrew Sassine as its Chief Financial Officer, whose employment terms are pending approval from the shareholders under the Israeli law. All compensation paid to Mr. Sassine from January 1, 2019 to the date of this filing is subject to refund to the Company should his appointment not be approved by shareholders.

On February 11, 2019, the Company announced its intention to initiate a process to redomicile from an Israeli limited company to a U.S. corporation. The final form and timing of the redomiciliation has not yet been finalized and the redomiciliation is subject to the approval of the shareholders. On February 11, 2019, the Company filed an application with the Tel Aviv District Court to approve the convening of a general shareholders meeting of the Company for the approval of the redomiciliation pursuant to Sections 350 and 351 of the Companies Law.

AGREEMENT

drawn up and signed on February 8, 2019

between: **ARCTURUS THERAPEUTICS LTD.**
 Company number 514098995
 of 58 Harakevet Street
 Tel-Aviv, Israel
(the “Israeli Company”)

of the first part;

and: **ARCTURUS THERAPEUTICS HOLDINGS INC.**
 of 251 Little Falls Drive
 New Castle County
 The State of Delaware, 19808 United States
(the “New Company”)

of the second part;

Whereas the Israeli Company is a public company incorporated in Israel and whose shares are listed for trading on the NASDAQ;

Whereas the New Company is a private company that was incorporated in the State of Delaware, United States, prior to the signing of this Agreement;

Whereas the Israeli Company wholly owns (100%) the American Company (as defined hereunder);

Whereas the New Company was incorporated for the designated purpose of implementing the share exchange that is the subject of this Agreement, has not yet issued any of its shares and is not engaging in, and has not engaged in, any business and/or other activity since the day of its incorporation, other than for the purposes of this Agreement;

Whereas the parties desire to engage in this Agreement for the purpose of implementing a reorganization proceeding, by way of an arrangement pursuant to sections 350 and 351 of the Companies Law, under which the Option-holders of the Israeli Company and the Shareholders of the Israeli Company shall receive, in lieu of their holdings of the Israeli Company Options and Shares, with shares and options for shares of the New Company, and furthermore, the American Company’s shares held by the Israeli Company shall be transferred to the New Company, all as specified in this Agreement;

Whereas the consummation of the transaction that is the subject of this Agreement is subject to the receipt of the Court's approval, as well as the receipt of the additional approvals specified in this Agreement;

Whereas the parties desire to prescribe and define in the provisions of this Agreement all legal relations between them in relation to all matters pertaining to the execution of the exchange of the Israeli Company Options and Shares, the transfer of the American Company's shares to the New Company, as well as in relation to all other matters specified in this Agreement, all being in conformity with and subject to the provisions of this Agreement;

wherefore the parties agree and stipulate as follows:

1. **Recitals and definitions**

- 1.1 The recitals to this Agreement constitute an integral part thereof.
- 1.2 The clause headings are solely for reference purposes and may not be used for any other purpose, including for the purpose of interpreting This Agreement.
- 1.3 In This Agreement, the following terms shall have the definitions ascribed alongside them:
 - (a) **the "Consideration Options"** – Up to 1,658,183 options of the New Company, the terms of which shall be identical to those of the Israeli Company Options (*mutatis mutandis*) and which shall be issued to the Optionholders, pursuant to the terms of this Agreement, and which shall constitute the full consideration in respect of the Israeli Company Options, which shall be voided on the Consummation Date;
 - (b) **the "Court"** – The competent court in Israel to deliberate the Arrangement;
 - (c) **the "Shareholders of the Israeli Company"** – The holders of shares of the Israeli Company as they shall be on the Record Date;
 - (d) **the "Israeli Company Options"** – Up to 1,658,183 options to purchase shares of the Israeli Company, whereby each option vests the holder thereof with the right to exercise it for one share of the Israeli Company;
 - (e) **the "Application"** – Application for approval of the Arrangement;
 - (f) **the "Arrangement"** – Arrangement pursuant to sections 350 and 351 of the Companies Law, under which that stated hereunder in clause 2 shall be approved;

- (g) the “American Company” – Arcturus Therapeutics Inc., which is a private company incorporated and registered in the State of Delaware, United States, and wholly owned (100%) by the Israeli Company;
- (h) the “Tax Ruling” – A pre-ruling by the Israel Tax Authority regarding the taxation and withholding tax arrangements that shall apply in respect of a sale of the Israeli Company’s shares and the Israeli Company Options in consideration of the Consideration Shares and the Consideration Options, voiding of the Israeli Company Options and in respect of the transfer of the American Company’s shares from the Israeli Company to the New Company;
- (i) the “Deadline for Fulfilling the Suspending Conditions” – May 31, 2019, unless extended as stated hereunder in clause 7.4;
- (j) the “Record Date” – The date determining eligibility to receive the Consideration Shares, which shall be the date to be specified in the Court ruling regarding approval of the Arrangement;
- (k) the “Shares Being Purchased” – Up to 11,139,723 ordinary shares of NIS 0.07 each of the Israeli Company, which constitute on the Consummation Date 100% of the Israeli Company’s issued and paid-up share capital, being Free and Clear, which shall be purchased by the New Company from the Shareholders of the Israeli Company in consideration of the Consideration Shares, in conformity with the terms of This Agreement;
- (l) the “Suspending Conditions” – All of the suspending conditions specified hereunder in clause 7;
- (m) the “Consideration” – As defined hereunder in clause 3;
- (n) the “Companies Law” – The Israeli Companies Law, 5759 – 1999, and the regulations enacted pursuant thereto;
- (o) the “Securities Law” – The Israeli Securities Law, 5728 – 1968, and the regulations enacted pursuant thereto;
- (p) the “Consummation Date” – The date on which the Arrangement shall be completed according to the date to be stipulated by the Court;
- (q) the “Option-holders” – The holders of the Israeli Company Options as they shall be on the Consummation Date;

- (r) **the "Israeli Company Options and Shares"** the Shares Being Purchased and the Israeli Company Options
- (s) **the "Consideration Shares"** – Up to 11,139,723 shares of common stock, par value USD 0.001 per share, of the New Company, which shall constitute on the Consummation Date 100% of the issued and outstanding share capital of the New Company, being Free and Clear, which shall be issued to the Shareholders of the Israeli Company in consideration of the Shares Being Purchased, in conformity with the terms of this Agreement, and which shall constitute the full consideration in respect of the Shares Being Purchased;
- (t) **the "Form S-4 Registration Statement"** – the registration statement on Form S-4 to be filed with the SEC by the New Company registering the public offering and sale of the Consideration Shares to the Shareholders of the Israeli Company, as said registration statement may be amended prior to the time it is declared effective by the SEC.
- (u) **"NASDAQ"** – The Nasdaq Global Market stock exchange in the United States (National Association of Securities Dealers Automated Quotations);
- (v) **"Free and Clear"** – Free and clear of any encumbrance, pledge, attachment, debt, liability, lien, arrangement, blocking, hypothecation, right of first refusal, preferential right, right of offer, tag-along right, purchase option, lawsuit, demand, claim or any third-party right of any kind whatsoever other than any restrictions imposed by applicable United States securities laws and regulations;
- (w) **the "Interim Period"** – The period between the signing date of this Agreement and the Consummation Date;
- (x) **the "Companies Regulations"** – The Israeli Companies Regulations (Application for Settlement or Arrangement), 5762 – 2002;
- (z) **the "SEC"** – The United States Securities and Exchange Commission.

2. **The Arrangement**

Subject to the provisions of this Agreement and the fulfillment of the Suspending Conditions in their entirety, the following operations shall be carried out simultaneously and together on the Consummation Date:

- 2.1 All of the Shares Being Purchased and the Israeli Company Options shall be transferred to the New Company, so that all of the Israeli Company's issued and paid-up share capital shall be held by the New Company and, as a result, the Israeli Company shall become a private subsidiary of the New Company.
- 2.2 The New Company shall issue the Consideration Shares and the Consideration Options to the Shareholders of the Israeli Company and to the Option-holders, according to their holdings of Israeli Company Options and Shares on the Record Date, such that one share out of the Consideration Shares shall be issued against every one share out of the Shares Being Purchased that shall be transferred to the New Company (exchange on a one-for-one basis) and one option out of the Consideration Options shall be issued against every one options out of the Israeli Company Options. Consequently, all of the New Company's issued and outstanding share capital shall be held by the Shareholders of the Israeli Company.
- 2.3 The Consideration Shares shall be listed for trading on the NASDAQ.
- 2.4 The Israeli Company shall void all options existing at that time in its equity.
- 2.5 The New Company shall issue the Consideration Options to the Option-holders.
- 2.6 The Israeli Company shall transfer to the New Company by way of a dividend distribution in kind, all of its holdings of shares of the American Company, so that the American Company shall become a wholly-owned subsidiary of the New Company.
- 2.7 In any instance whereby, subsequent to the Consummation Date, the performance of any additional action is required in order to carry out the provisions of this Agreement, each of the parties to this Agreement shall do everything reasonably necessary to that end, including by signing any document that might be required for that purpose.

3. **The Consideration**

On the Consummation Date, the New Company shall issue one share out of the Consideration Shares, as stated above in clause 2.2, against every one share out of the Shares Being Purchased that is held by the Shareholders of the Israeli Company on the Record Date; on the Consummation Date, the New Company shall issue one options out of the Consideration Options, as stated above in clause 2.5, against every one option out of the Israeli Company's Options that is held by the Option-holders (jointly: "**the Consideration**").

The New Company covenants that the Considerations Shares shall be issued to the Shareholders of the Israeli Company as fully paid-up shares, being Free and Clear, without any other restriction whatsoever on their tradability (including blocking), having equal rights for all intents and purposes, but *mutatis mutandis*, to the Shares Being Purchased.

4. **The parties' warrants and covenants**

- 4.1 The parties agree that, immediately following the completion of the Arrangement, the validity of all representations specified in this clause 4 shall expire and that no party shall have any claim or allegation against the other party and/or against officers therein and/or against its consultants in respect of the inaccuracy of all or a portion of the representations.
- 4.2 The Israeli Company warrants and covenants to the New Company that:
- (a) It was duly incorporated according to the laws of the State of Israel, it is duly registered with the Israeli Companies Registrar, and there is no pending proceeding for its liquidation or striking from the records of the Companies Registrar.
 - (b) It is a public company pursuant to the Companies Law.
 - (c) Its shares are listed for trading on the NASDAQ.
 - (d) Its registered capital is NIS 2,100,000, divided into 30,000,000 ordinary shares of NIS 0.07 par value each, and its issued and paid-up share capital is 10,761,523 ordinary shares of NIS 0.07 par value each.
 - (e) There are 1,188,183 options in its equity, which were issued to officers, employees, consultants and service-providers currently and in the company's past, with each of them being exercisable for one share of the Israeli Company.
 - (f) Subject to the receipt of the approvals and the fulfillment of the Suspending Conditions, there is no prohibition, restriction or other obstacle, whether by law or by virtue of an agreement or commitment, to the Israeli Company's engagement in this Agreement and to the fulfillment of all of its covenants pursuant thereto in their entirety, and the transaction pursuant to this Agreement shall not contradict its incorporation documents.
 - (g) Apart from the Suspending Conditions, no third-party approval or consent is required for the fulfillment of its covenants pursuant to this Agreement, and the fulfillment of its covenants pursuant to this Agreement shall not constitute a breach of any of its obligations.
 - (h) It shall not perform any changes in its incorporation documents during the Interim Period, unless required for the purpose of executing this Agreement..
 - (i) It shall not preform any changes in its capital structure on the Record date and following it, unless required for the purpose of executing this Agreement.
 - (j) It shall not take action to preform any change of the capital structure of the American Company or any of its incorporation documents during the Interim Period, unless required for the purpose of executing this Agreement.
 - (k) The signatories of this Agreement on its behalf are authorized to legally obligate it by their signatures, and all resolutions have been passed that are required by law for the purposes of its engagement in this Agreement and the fulfillment of its covenants pursuant thereto, subject to the fulfillment of the Suspending Conditions.

4.3 The New Company warrants and covenants to the Israeli Company that:

- (a) It was duly incorporated prior to the signing of this Agreement according to the laws of the State of Delaware, United States, it is duly registered and there is no pending proceeding for its liquidation or dissolution in the State of Delaware, United States.
- (b) Its registered capital includes 40,000,000 shares, divided into 30,000,000 shares of common stock, USD 0.001 par value per share, and 10,000,000 shares of preferred stock, USD 0.001 par value per share.
- (c) As at the signing date of this Agreement, it has not yet issued any shares and shall not issue any securities that are convertible or nonconvertible and/or exercisable for its shares during the Interim Period, unless required for the purpose of executing this Agreement.
- (d) The New Company shall not conduct any activity whatsoever throughout the entire Interim Period unless required for the purpose of executing this Agreement, it shall not be a party to any agreements (apart from this Agreement) and it shall not have any obligations, apart from those deriving from this Agreement.
- (e) Subject to the receipt of the approvals and the fulfillment of the Suspending Conditions, there is no prohibition, restriction or other obstacle, whether by law or by virtue of an agreement or commitment, to the New Company's engagement in this Agreement and to the fulfillment of all of its covenants pursuant hereto in their entirety, and the transaction pursuant to this Agreement shall not contradict its governing documents.
- (f) It shall not perform any operation to change its capital structure or its incorporation documents during the Interim Period, unless required for the purpose of executing this Agreement.
- (g) The signatories of this Agreement on its behalf are authorized to legally obligate it by their signatures, and all resolutions have been passed that are required by law for the purposes of its engagement in this Agreement and the fulfillment of its covenants pursuant thereto.

5. **Proceedings to execute the Arrangement**

- 5.1 Shortly after the signing date of this Agreement, the Israeli Company shall file an appropriate application with the Court for the purpose of obtaining its approval of the Arrangement.
- 5.2 Shortly after the signing date of this Agreement, the Israeli Company shall file an application with the Israel Tax Authority in order to receive the Tax Ruling.

- 5.3 Shortly after the signing date of this Agreement, the New Company shall file the Form S-4 Registration Statement with the SEC, and complete any related filings, and shall publish or disseminate any document that it shall be so required for the purpose of registering and listing the Consideration Shares under applicable United States securities law, for trading on the NASDAQ on the Consummation Date.
- 5.4 Throughout the entire Interim Period, the parties shall take all actions to fulfill all provisions of the law relating to the Arrangement, including the publishing of immediate reports as is required by, and in conformity with, the reporting obligations applying to the Israeli Company, the publishing of announcements in newspapers as required according to the Companies Regulations, the summoning of meetings of shareholders, option holders and/or creditors, the sending of notices etc., all in compliance with the instructions of the Court, the Companies Law and the Companies Regulations and applicable United States securities laws.
- 5.5 The parties shall act in cooperation and each shall exert its best efforts to bring about the approval of the Arrangement by the Court.
- 5.6 Trading of the Israeli Company's shares shall be discontinued on the Record Date and, as of the discontinuance of trading as stated, it shall not be possible to execute transactions and transfers of shares of Israeli Company the on the NASDAQ.

6. **Covenants during the Interim Period**

- 6.1 The parties shall act as follows during the Interim Period:
 - (a) The parties to this Agreement covenant to perform all actions and to sign all documents to the extent required for the purposes of carrying out the provisions of this Agreement and on time, and to exert maximum efforts to obtain any approval required to complete the Arrangement pursuant to, and in conformity with, the provisions of this Agreement, inclusive of all parts thereof (it is clarified that that stated does not constitute any covenant with regard to the manner of voting by the Shareholders of the Israeli Company during a meeting of the Shareholders of the Israeli Company and/or by the Option-holders and/or by the creditors of the Israeli Company, insofar as their votes shall be required for the purpose of approving the Arrangement). Without derogating from the general purport of that stated, none of the parties shall perform any action that contradicts the covenants given by them and/or by any thereof in this Agreement.
 - (b) The Israeli Company covenants to not conduct any activities whatsoever in the New Company in a manner that might cause any of the New Company's representations and warranties in this Agreement to no longer be true and accurate, also on the Consummation Date.

7. **The Suspending Conditions**

- 7.1 The conditions specified hereunder are suspending conditions to the validation of this Agreement and/or to the completion of the Arrangement pursuant thereto, and they must be fulfilled by the Deadline for the Fulfillment of the Suspending Conditions. If all of the said Suspending Conditions are not fulfilled by the Deadline as stated, and the Deadline is not expressly extended by all of the parties in writing (and it is clarified that the parties may do so by mutual consent), then this Agreement shall be null and void, and none of the parties nor any third party shall have any cause deriving from this Agreement, including a cause and/or allegation and/or right to sue any of the parties to this Agreement, officers thereof, directors serving therein, their managers, their employees, their shareholders, their consultants, service-providers to them and/or any party on their behalf, apart from allegations in respect of a breach of covenants included in this Agreement, if any are breached:
- (a) Receipt of the Court's approval for the Arrangement, including the approval that the issuance of the Consideration Shares and the Consideration Options is not a public offering and is exempt from publishing a prospectus in Israel, pursuant to the provisions of section 15.A(a)(3) of the Securities Law;
 - (b) Receipt of Nasdaq's approval to list the Consideration Shares for trading on the NASDAQ and the Form S-4 Registration Statement has been declared effective by the SEC;
 - (c) Receipt of the Tax Ruling;
 - (d) Receipt of approvals from additional parties, insofar as might be required by law (in Israel and in the United States) for the purpose of carrying out the Arrangement pursuant to its conditions.
- 7.2 Subject to the provisions of the law, the parties are allowed to agree, each at its independent and absolute discretion, to waive the fulfillment of any of the Suspending Conditions.
- 7.3 If any of the approvals required within the scope of one of the Suspending Conditions is received while being made contingent upon the fulfillment of conditions, then the said Suspending Condition shall be deemed as if fulfilled only if both parties agree thereto.
- 7.4 If the Suspending Conditions are not fulfilled by May 31, 2019, or by a later date that might be mutually agreed upon between the parties, then, as of that date and thereafter, each of the parties shall be entitled to terminate this Agreement by issuing written notice to the other party. If a notice as stated is issued, then the validity of this Agreement shall be terminated on that date and none of the parties shall have any claim or allegation against the other party.

8. **Miscellaneous**

- 8.1 If any party delays or refrains from exercising or enforcing any of its rights pursuant to this Agreement, they shall not be construed as that party waiving or refraining from exercising its rights in the future, and it shall be allowed to use all or a portion of its rights at any time that it shall deem fit. No waiver, discount, extension, situation, amendment, addition to or elimination from this Agreement, or pursuant thereto, shall have any validity unless set forth in writing and signed by all parties to this Agreement.
- 8.2 Any amendment, correction and/or addition to this Agreement shall not have any validity and shall be deemed as if not made, unless set forth in writing and signed by all of the parties.
- 8.3 this Agreement may be signed in a number of copies, including by way of signing via fax or another electronic method , and each thereof shall be deemed an original copy, but together, they shall be deemed a single copy of that document.
- 8.4 Each party to this Agreement shall bear the tax liabilities applying to it by law.
- 8.5 The provisions of Israeli law shall apply to this Agreement. The competent courts in the District of Tel-Aviv – Jaffa, Israel, shall have sole jurisdiction in relation to any matter pertaining to this Agreement.
- 8.6 Any notice by any of the parties relating to this Agreement must be sent to the addressee via personal delivery or by registered mail to its address or via facsimile or via e-mail, as stated above, and shall be deemed delivered to the addressee on the date of delivery via personal delivery, or three days after its dispatch by registered mail, as stated above, or on the first business day after receiving confirmation of its transmission by facsimile or of delivery via e-mail, all as the case may be.

And in witness whereof the parties have hereunto signed:

/s/ Joseph E. Payne
Arcturus Therapeutics Ltd.

By: Joseph E. Payne
Title: Chief Executive Officer

/s/ Joseph E. Payne
Arcturus Therapeutics Holdings Inc.

By: Joseph E. Payne
Title: Chief Executive Officer

***Text Omitted and Filed Separately
with the Securities and Exchange Commission.
Confidential Treatment Requested
Under 17 C.F.R. Sections 200.80(b)(4) and Rule 24b-2

**AMENDED AND RESTATED
JOINT VENTURE, RESEARCH COLLABORATION AND LICENSE AGREEMENT**

THIS AMENDED AND RESTATED JOINT VENTURE, RESEARCH COLLABORATION AND LICENSE AGREEMENT (this “*Agreement*”) is entered into as of July __, 2018 (the “*Restatement Date*”), by and between PROVIDENCE THERAPEUTICS INC., a corporation incorporated under the laws of Alberta, Canada having a registered address at MaRS Centre, West Tower, 661 University Ave, Suite 1300, Toronto, Ontario, Canada (“*Providence*”), and ARCTURUS THERAPEUTICS, INC., a Delaware corporation with its principal place of business located at 10628 Science Center Drive, Suite 250, CA 92121, USA (“*Arcturus*”). Arcturus and Providence are sometimes referred to herein individually as a “*Party*” and collectively as the “*Parties*”.

RECITALS

WHEREAS, Arcturus and Providence entered into that certain Joint Venture, Research Collaboration and License Agreement dated March 16, 2016, as amended by that certain First Amendment to Joint Venture, Research Collaboration and License Agreement dated April 2017 (collectively, the “*Original Agreement*”); and

WHEREAS, the Parties wish to amend and restate the Original Agreement in its entirety, effective as of the Restatement Date, as set forth in this Agreement.

NOW THEREFORE, in consideration of the premises and the mutual promises and covenants contained in this Agreement, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties hereto agree as follows:

ARTICLE 1

DEFINITIONS

All references to particular Exhibits, Articles or Sections shall mean the Exhibits to, and Articles and Sections of, this Agreement, unless otherwise specified. For the purposes of this Agreement and the Exhibits hereto, the following words and phrases shall have the following meanings:

1.1 “**Accounting Standards**” means, as applicable, (a) Canadian generally accepted accounting principles, (b) U.S. Generally Accepted Accounting Principles, or (c) International Financial Reporting Standards; in each case consistently applied throughout the organization of a Party. Unless otherwise defined or stated herein, financial terms shall be calculated under applicable Accounting Standards.

1.2 “**Affiliate**” means, with respect to any Person (other than an individual), any other Person (excluding an individual) which controls, is controlled by or is under common control with such Person, for as long as such control exists. For purposes of this Section, “**control**” shall mean the direct or indirect ownership of more than fifty percent (50%) of the voting or economic interest of a Person, or the power, whether pursuant to contract, ownership of securities or otherwise, to direct the management and policies of a Person.

1.3 “**After-Acquired IP**” means any item of Know-How, any Patent Right or any other intellectual property right of a Third Party with respect to which, in each case, Arcturus first obtains a right to grant access, or a license or sublicense, from such Third Party after the Effective Date, under an agreement or arrangement obligating Arcturus to pay royalties and/or milestone payments to such Third Party with respect to products covered by or using such Know-How, Patent Right or other intellectual property right.

1.4 “**Alliance Manager**” shall have the meaning set forth in Section 2.2.2.

1.5 “**Arcturus FTE**” means a full-time employee or consultant, or more than one employee or consultant working the equivalent of a full-time employee or consultant, with “full-time” meaning 1,880 hours per calendar year.

1.6 “**Arcturus FTE Rate**” means \$[...***...]¹ per Arcturus FTE.

1.7 *Intentionally Omitted.*

1.8 “**Arcturus Invention**” means any Invention made solely by one or more employees, consultants or contractors of Arcturus.

1.9 “**Arcturus Know-How**” means any Know-How that is: (i) Controlled by Arcturus or any of its Controlled Affiliates as of the Effective Date or during the Research Period; and (ii) necessary or useful for the Development or Commercialization of Collaboration Compounds or Products in the Licensed Field; including, without limitation, Arcturus Inventions, but excluding Arcturus Patents, and Arcturus’ interest in Joint Inventions and Joint Patents.

1.10 “**Arcturus Patents**” means all Patent Rights that are: (i) Controlled by Arcturus or any of its Controlled Affiliates as of the Effective Date or during the Term; and (ii) necessary or useful for the Development or Commercialization of Collaboration Compounds or Products in the Licensed Field but excluding Arcturus’ interest in Joint Patents.

1.11 “**Arcturus Platform Improvement**” means any Invention, regardless of inventorship, that is an improvement, enhancement or modification to any Arcturus Platform Technology.

1.12 “**Arcturus Platform Technology**” means (a) any Arcturus proprietary technology that Arcturus uses to formulate oligotherapeutics for delivery, or otherwise be combined with, or applied to, oligotherapeutics to enable or improve delivery or distribution of

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such oligotherapeutics (including, without limitation, Arcturus' proprietary LUNAR™ lipid-enabled delivery system); and (b) any Arcturus proprietary chemistry that Arcturus uses to modify oligotherapeutics for improved or enhanced potency, safety, stability or other physicochemical properties (including, without limitation, Arcturus' proprietary Unlocked Nucleic Acid (UNA) chemistry).

1.13 "Arcturus Product-Specific Patent" shall have the meaning provided in Section 10.2.1.

1.14 "Arcturus Services" shall have the meaning set forth in Section 5.2.

1.15 "Arcturus Technology" means Arcturus Patents and Arcturus Know-How.

1.16 "Brain Neoplasm" means a neoplasm that is located in, and the primary origin of which is, the brain. For clarity, a neoplasm that is metastatic to the brain but originated outside the brain does not constitute a Brain Neoplasm for purposes of this Agreement.

1.17 "Breast Neoplasm" means a neoplasm that is located in, and the primary origin of which is, the breast. For clarity, a neoplasm that is metastatic to the breast but originated outside the breast does not constitute a Breast Neoplasm for purposes of this Agreement.

1.18 "C.F.R." means the United States Code of Federal Regulations.

1.19 "Collaboration" shall have the meaning set forth in Section 3.1.

1.20 "Collaboration Compound" means, with respect to a particular patient, under no circumstances will a Collaboration Compound be applicable to multiple patients:

(a) any mRNA Vaccine expressing such patient's Individual Epitope(s), which mRNA Vaccine is identified or optimized (i) by or on behalf of a Party or jointly by the Parties or (ii) by or on behalf of Providence (including, for purposes of this Section 1.20(a), any Affiliate or Sublicensee of Providence); or

(b) any chemical modification (*e.g.*, by substituting a non-natural nucleotide for a natural nucleotide in such sequence, or chemically modifying a nucleotide in such sequence) of an mRNA Vaccine described in Section 1.20(a), whether such chemical modification is made by a Party or jointly by the Parties or by or on behalf of Providence (including, for purposes of this Section 1.20(b), any Affiliate or Sublicensee of Providence).

1.21 "Collaboration Program" shall have the meaning set forth in Section 14.2.1.

1.22 "Collaboration Tumor Type" means [...***...] ².

1.23 "Combination Product" means a Product that is sold in a finished dosage form containing a Collaboration Compound in combination with one or more Other Actives.

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1.24 “**Commercialization**” or “**Commercialize**” means the conduct of any and all activities directed to marketing, advertising, promoting, detailing, distributing, importing, exporting and selling any Product, including manufacturing, making, having made, using, offering for sale, selling, importing, exporting or otherwise exploiting a Product. Cognates of the word “**Commercialize**” shall have correlative meanings.

1.25 “**Commercialization Expenses**” shall have the meaning provided in **Exhibit B**.

1.26 “**Commercially Reasonable Efforts**” means, with respect to a Party’s efforts to perform any of its obligations with respect to the discovery, research, development or commercialization of Collaboration Compounds and Products under this Agreement, those diligent and sustained efforts and reasonable resources commensurate with the efforts and resources that a similarly-situated pharmaceutical or biotechnology company in the exercise of its reasonable business judgment would commonly devote to a compound or product of similar market potential or profit potential at a similar stage in development or product life resulting from its own research efforts, taking into account issues of safety and efficacy, the proprietary position of the product, the regulatory status and approval process, Regulatory Authority-approved labeling, product profile, the competitiveness of alternative products in the marketplace, and other relevant technical, legal, scientific or medical factors.

1.27 “**Confidential Information**” shall have the meaning provided in Section 13.1.1.

1.28 “**Confidentiality Agreement**” means that certain Confidential Disclosure Agreement between the Parties dated June 26, 2015.

1.29 “**Control**” or “**Controlled**” means, with respect to any Know-How, Patent Right or other intellectual property right, the possession by a Party of the ability (whether by ownership, license or other right, other than pursuant to a license or right granted to such Party by the other Party under this Agreement) to grant access to, or a license or sublicense of, such Know-How, Patent Right or other intellectual property right without violating the terms of any agreement or other arrangement with any Third Party, and without becoming obligated to pay any royalties or milestone payments to such Third Party with respect to compounds or products that use or are covered by such Know-How, Patent Right or other intellectual property right. Notwithstanding the foregoing, if Arcturus determines in good faith that a particular item of After-Acquired IP may be necessary or useful for the Development or Commercialization of Collaboration Compounds or Products in the Licensed Field, Arcturus shall promptly provide to Providence a reasonable description of such item of After-Acquired IP (provided that Arcturus need not disclose any information that would enable Providence to practice such item of After-Acquired IP) and shall disclose to Providence in writing Arcturus’ royalty and/or milestone payment obligations to the applicable Third Party with respect to such item of After-Acquired IP. At Providence’s written request made within thirty (30) days of Arcturus’ provision of such description and disclosure of payment obligations to Providence, the Parties shall discuss the possibility of including such item of After-Acquired IP in the Arcturus Technology licensed to Providence hereunder; provided, however, that such item of After-Acquired IP shall not be deemed to be within the “Control” of Arcturus for purposes of this Agreement except upon the mutual written agreement of the Parties on a case-by-case basis (it being understood that neither Party shall have any obligation to give such written agreement).

1.30 “**Controlled Affiliate**” means, with respect to a Party, any corporation or other business entity that is controlled by such Party. For the purposes of this definition, the term “controlled by” has the meaning provided in Section 1.2.

1.31 “**Designated Executive Officers**” means the Chief Executive Officer of Arcturus and the Chief Executive Officer of Providence, or their duly authorized respective designees with decision-making authority within the applicable Party with respect to the relevant matters.

1.32 “**Development**” and “**Develop**” means the conduct of all non-clinical (such as, but not limited to, IND-enabling toxicology and production of GMP quality Collaboration Compound or Product) and clinical development activities with respect to a Collaboration Compound or Product necessary or useful to obtain and maintain Regulatory Approvals of a Product, including, without limitation, chemical synthesis, process development, manufacturing scale up, test method development and stability testing, toxicology and pharmacology studies, clinical trials (including post-Regulatory Approval clinical trials), formulation development and statistical analysis. Cognates of the word “**Develop**” shall have correlative meanings.

1.33 “**Disclosing Party**” shall have the meaning set forth in Section 13.1.1.

1.34 “**Dollars**” means U.S. Dollars, and “\$” shall be interpreted accordingly.

1.35 “**Effective Date**” means March 16, 2016.

1.36 “**EMA**” means the European Medicines Agency or any successor entity thereto.

1.37 “**FDA**” means the United States Food and Drug Administration or any successor entity thereto.

1.38 “**Formulation Budget**” shall have the meaning set forth in Section 3.5.2.

1.39 “**Formulation Plan**” shall have the meaning set forth in Section 3.3.

1.40 “**Formulation Program**” shall have the meaning set forth in Section 3.3.

1.41 “**Governmental Authority**” means any court, agency, department, authority or other instrumentality of any national, state, county, city or other political subdivision.

1.42 “**ICH**” means the International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use.

1.43 “**IND**” shall mean an Investigational New Drug Application filed with the FDA, or the equivalent application or filing filed with any equivalent Regulatory Authority outside the U.S. (including any supra-national agency such as in the EU) necessary to commence human clinical trials in such jurisdiction.

1.44 “**Individual Epitopes**” means, with respect to a particular patient with an Individual Neoplasm of a particular Collaboration Tumor Type, patient-specific Epitopes identified through genetic analysis of a biopsy of such patient’s Individual Neoplasm. These may

include, but are not limited to, tumor-specific RNA mutations, common mutations, or over expressed antigens.

1.45 “**Individual Neoplasm**” means, with respect to a particular patient with a tumor of a particular Collaboration Tumor Type, such patient’s [...***...] ³.

1.46 “**Infringe**” or “**Infringement**” means any infringement as determined by Law, including, without limitation, direct infringement, contributory infringement or any inducement to infringe.

1.47 “**Initiation**” means, with respect to a clinical trial, the first dosing in the first human subject in such clinical trial.

1.48 “**Invention**” means any invention, whether or not patentable, made in the course and as a result of Research Plan activities.

1.49 “**Joint Invention**” means any Invention made jointly by one or more employees, consultants or contractors of Arcturus and one or more employees, consultants or contractors of Providence; but excluding any Arcturus Platform Improvement.

1.50 “**Joint Patents**” means all Patent Rights that claim any Joint Invention.

1.51 “**Joint Product-Specific Patent**” shall have the meaning provided in Section 10.2.2.

1.52 “**Joint Steering Committee**” or “**JSC**” shall have the meaning set forth in Section 2.2.1.

1.53 “**Joint Technology**” means Joint Inventions and Joint Patents.

1.54 “**Joint Venture**” shall have the meaning set forth in Section 2.1.

1.55 “**Know-How**” means techniques, technology, trade secrets, inventions (whether patentable or not), methods, know-how, ideas, works of authorship, materials (including biological and chemical materials), data and results (including pharmacological, toxicological and clinical data and results), analytical and quality control data and results, regulatory documents, and other information, including documents and other media (including paper, notebooks, books, files, ledgers, records, tapes, discs, diskettes, trays and containers and any other media) containing or storing any of the foregoing, and whether stored or transmitted in oral, documentary, electronic or other form.

1.56 “**Law**” means, individually and collectively, any and all laws, ordinances, rules, directives, administrative circulars and regulations of any kind whatsoever of any Governmental Authority within the applicable jurisdiction.

1.57 “**License**” shall have the meaning set forth in Section 4.1.

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1.58 “**Licensed Field**” means, with respect to a particular Collaboration Tumor Type, the treatment, prevention and diagnosis of a patient’s Individual Neoplasm of such Collaboration Tumor Type using an mRNA Vaccine personalized for such patient’s Individual Neoplasm.

1.59 “**Licensed LUNAR Formulation**” shall have the meaning set forth in Section 3.3.

1.60 “**LUNAR Formulation**” is a proprietary multi-lipid component based delivery system that can efficiently encapsulate and effectively deliver nucleic acid medicines including but not limited to messenger RNA, siRNA, miRNA, antisense, DNA and mixture thereof to clinically important cell types and tissues including hepatocytes, stellate cells, myocytes, lung cells, cells of the eye via various routes of administration.

1.61 “**Manufacture**” means all activities associated with the production, manufacture, processing, filling, finishing and packaging, as applicable, of a Product as part of its Development or Commercialization, as the case may be, including process development, manufacturing scale-up, quality stability testing, impurity characterization, assurance and quality control. Cognates of the word “**Manufacture**” shall have correlative meanings.

1.62 “**Manufacturing Plan**” shall have the meaning set forth in Section 6.2.2.

1.63 “**mRNA**” means [...***...] 4.

1.64 “**mRNA Vaccine**” shall mean a personalized (i.e., patient-specific) mRNA-based cancer vaccine coding for [...***...] 5 from an individual patient’s [...***...] 6.

1.65 “**NDA**” means: (a) a New Drug Application, as more fully defined in 21 C.F.R. 314.5 et seq. (or any successor regulation thereto); or (b) the equivalent application filed with any equivalent Regulatory Authority outside the U.S.; including, in each case, all amendments and supplements thereto.

1.66 “**Net Sales**” shall have the meaning set forth in **Exhibit B**.

1.67 “**Other Active**” means any active pharmaceutical ingredient that is not a Collaboration Compound.

1.68 “**Other Approved Operating Expenses**” shall have the meaning set forth in Section 9.6.1.

1.69 “**Other Product Revenue**” shall have the meaning set forth in **Exhibit B**.

1.70 “**Ovarian Neoplasm**” means a neoplasm that is located in, and the primary origin of which is, the ovary(ies) or fallopian tubes. For clarity, a neoplasm that is metastatic to the

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ovary(ies) or fallopian tubes but originated outside the ovary(ies) or fallopian tubes does not constitute an Ovarian Neoplasm for purposes of this Agreement.

1.71 “**Patent Rights**” means any provisional and non-provisional patents and patent applications, together with all additions, divisions, continuations, continuations-in-part, substitutions, and reissues claiming priority thereto, as well as any re-examinations, extensions, registrations, patent term extensions, supplemental protection certificates, renewals and the like with respect to any of the foregoing and all foreign counterparts thereof.

1.72 “**Person**” means any corporation, limited or general partnership, limited liability company, joint venture, trust, unincorporated association, Governmental Authority, any other entity or body, or an individual.

1.73 “**Phase 1 Clinical Trial**” means any human clinical trial that would satisfy the requirements for a Phase 1 study as defined in 21 C.F.R. § 312.21(a) or a Phase I study as defined in the ICH E8 Guideline (or, in either case, any amended or successor regulation or guideline), or, except for purposes of Section 8.3.2, a similar clinical study prescribed by the Regulatory Authorities in any other country or regulatory jurisdiction.

1.74 “**Phase 2 Clinical Trial**” means any human clinical trial that would satisfy the requirements for a Phase 2 study as defined in 21 C.F.R. § 312.21(b) or a Phase II study as defined in the ICH E8 Guideline (or, in either case, any amended or successor regulation or guideline), or a similar clinical study prescribed by the Regulatory Authorities in any other country or regulatory jurisdiction.

1.75 “**Phase 3 Clinical Trial**” means any human clinical trial that would satisfy the requirements for a Phase 3 study as defined in 21 C.F.R. § 312.21(c) or a Phase III study as defined in the ICH E8 Guideline (or, in either case, any amended or successor regulation or guideline), or a similar clinical study prescribed by the Regulatory Authorities in any other country or regulatory jurisdiction.

1.76 “**Pivotal Study**” shall have the meaning provided in Section 9.4.

1.77 “**Post-Phase 2 Development Activities**” means, with respect to any Collaboration Program, all Phase 3 Clinical Trials of Products from such Collaboration Program and all stages and activities of the Development of Collaboration Compounds and Products from such Collaboration Program in the Licensed Field that would normally be undertaken in connection with Phase 3 Clinical Trials and/or after initiation of the first Phase 3 Clinical Trial, in each case as set forth in the applicable Product Plan approved by the JSC; but excluding, in any event, any and all Phase 2 Clinical Trials (except to the extent specified in Section 9.4 with respect to any Phase 2 Clinical Trial that is or becomes a Pivotal Study).

1.78 “**Post-Phase 2 Development Expenses**” means, with respect to any Collaboration Program, the documented direct costs and expenses incurred by Providence or its Affiliate in conducting or having a Third Party subcontractor conduct on its behalf, Post-Phase 2 Development Activities in accordance with this Agreement and the applicable Product Plan, to the extent consistent with the applicable Product Budget. Post-Phase 2 Development Expenses shall in any event exclude all direct and indirect overhead costs of Providence and its Affiliates,

except to the extent that certain direct overhead costs are (i) included in the applicable Providence FTE Rate; or (ii) Other Approved Operating Expenses.

1.79 “**Product**” means a personalized mRNA Vaccine for an individual patient with a Collaboration Neoplasm, which mRNA Vaccine (a) contains or comprises a Collaboration Compound derived from such patient’s Collaboration Neoplasm and (b) is encapsulated in the Licensed LUNAR Formulation (alone or with Other Active(s), *provided* that the Licensed LUNAR Formulation is not used to encapsulate or deliver any Other Active), in all dosage strengths.

1.80 “**Product Budget**” shall have the meaning set forth in Section 9.6.1.

1.81 “**Product Plan**” shall have the meaning set forth in Section 9.6.1.

1.82 “**Product Revenue**” shall have the meaning set forth in **Exhibit B**.

1.83 “**Product-Specific Patent**” means any Arcturus Patent or Joint Patent that claims: (i) the composition or formulation of a Collaboration Compound; or (ii) any method of using or making a Collaboration Compound. Notwithstanding the foregoing, Product-Specific Patents shall *exclude* any Arcturus Patent or Joint Patent that claims:

(a) any RNA oligotherapeutic (including, without limitation, any mRNA oligotherapeutic) that is not a Collaboration Compound;

(b) subject matter broadly applicable to RNA oligotherapeutics (including, without limitation, mRNA oligotherapeutics) beyond compositions, formulations or method of using or making a Collaboration Compound;

(c) any mRNA oligotherapeutic that is not a Collaboration Compound;

or

(d) Arcturus Platform Technology.

1.84 “**Providence FTE Rate**” shall have the meaning specified in Section 9.6.1.

1.85 “**Providence Invention**” means any Invention made solely by one or more employees, consultants or contractors of Providence, but excluding any Arcturus Platform Improvement.

1.86 “**Receiving Party**” shall have the meaning set forth in Section 13.1.1.

1.87 “**Regulatory Approval**” means any and all approvals, licenses, registrations or authorizations of any Regulatory Authority in a country or other regulatory jurisdiction necessary for the development, manufacturing, use, storage, import, marketing and full commercial sale of a product in such country or other regulatory jurisdiction, including any necessary pricing and reimbursement approval.

1.88 “**Regulatory Authority**” means any national, supranational or other regulatory agency, department, bureau or other governmental or regulatory authority having the administrative authority to regulate the development or marketing of pharmaceutical products in any country or other jurisdiction, including the FDA and EMA.

1.89 “**Regulatory Filing**” means any IND, NDA, drug dossier or master file filed, or Regulatory Approval obtained, with respect to a Collaboration Compound or Product, including all amendments, supplements, annual reports and the like filed or otherwise provided to the applicable Regulatory Authority.

1.90 “**Representatives**” of a Party shall mean such Party’s officers, directors, employees, consultants, contractors, or agents.

1.91 “**Research Budget**” shall have the meaning set forth in Section 3.5.2.

1.92 “**Research Plan**” shall have the meaning set forth in Section 3.2.

1.93 “**Research Program**” shall have the meaning set forth in Section 3.2.

1.94 “**Shared D&C Costs**” shall have the meaning set forth in Section 9.6.1.

1.95 “**Statement of Work**” shall have the meaning set forth in Section 5.2.

1.96 “**Sublicensee**” shall mean any Third Party that is granted a sublicense under this Agreement, whether such sublicense is granted to such Third Party directly by Providence or its Affiliate or indirectly through multiple tiers of sublicense.

1.97 “**Term**” shall have the meaning set forth in Section 14.1.

1.98 “**Territory**” means the entire world.

1.99 “**Third Party**” means a Person other than (a) Providence or any of its Affiliates and (b) Arcturus or any of its Affiliates.

1.100 “**Third Party Challenge**” shall have the meaning set forth in Section 10.5.2.

ARTICLE 2

JOINT VENTURE AND GOVERNANCE

2.1 **Scope of Joint Venture.** The Parties have entered into this joint venture (such enterprise, the “**Joint Venture**”) to identify and optimize Collaboration Compounds and the Licensed LUNAR Formulation, and for Arcturus to grant Providence the exclusive rights to Develop and Commercialize Collaboration Compounds and Products in the Licensed Field throughout the Territory as set forth in, and pursuant to the terms of, this Agreement.

2.2.1

Overview. The Parties have established a joint steering committee (the “**Joint Steering Committee**” or the “**JSC**”) which shall oversee the Joint Venture between the Parties.

2.2.2

Alliance Managers. Each of Providence and Arcturus shall appoint one representative who possesses a general understanding of development, regulatory, manufacturing and commercialization matters to act as its respective manager(s) for this relationship (an “**Alliance Manager**”). As of the Restatement Date, the Alliance Manager appointed by Providence is [...***...] ⁷ and the Alliance Manager appointed by Arcturus is [...***...] ⁸. Each Party may replace its respective Alliance Manager at any time upon written notice to the other in accordance with this Agreement. Each Alliance Manager will be responsible for:

(a) providing a primary single point of communication responsible for the flow of communication and for seeking consensus both within the respective Party’s organization on matters requiring the Parties’ agreement or coordination under this Agreement;

(b) ensuring awareness of the governance procedures and rules set forth herein and monitoring compliance therewith;

(c) identifying and raising disputes to the JSC for discussion in a timely manner; and

(d) planning and coordinating internal and external communications in accordance with the terms of this Agreement.

The Alliance Managers shall have the right to attend all subcommittee meetings in a non-voting capacity. Consistent with Section 2.2.3(c), each Alliance Manager may bring any matter to the attention of the JSC where such Alliance Manager reasonably believes that such matter requires attention of the JSC.

2.2.3**Joint Steering Committee.**

(a) **Composition.** The Joint Steering Committee shall be comprised of two (2) named representatives of each Party (or such other number as the Parties may agree) in addition to each Party’s Alliance Manager who are members ex-officio. The JSC will be led by two (2) co-chairs, one (1) appointed by each of the Parties. Each Party may replace one or more of its representatives, in its sole discretion, effective upon written notice to the other Party of such change.

(b) **Function and Powers of the JSC.** The JSC shall, in accordance with the terms and conditions set forth in the Agreement:

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- (i) Review, approve, and approve changes to, the Research Plan, Research Budget, Formulation Plan, Formulation Budget, Statement of Work, Manufacturing Plan, Product Plan and Product Budget;
- (ii) review progress of the Joint Venture against its goals;
- (iii) establish, direct and oversee any subcommittees, as appropriate;
- (iv) discuss and attempt to address scientific or technical issues arising in the course of Research Program and Formulation Program activities; and
- (v) perform any and all tasks and responsibilities that are expressly delegated to the JSC under the Agreement.

Each Party shall be responsible for ensuring that, at all times, its JSC representatives act reasonably and in good faith in carrying out their respective responsibilities hereunder.

(c) **Frequency of Meetings.** The Joint Steering Committee shall meet at least once per quarter or more or less often as otherwise agreed by the Parties, and such meetings may be conducted by telephone, videoconference or in person as determined by the co-chairs. Each Party may also call for special meetings of the Joint Steering Committee with reasonable prior written notice (it being agreed that at least five (5) business days shall constitute reasonable notice) to resolve particular matters requested by such Party and within the decision-making responsibility of the Joint Steering Committee. Each co-chair shall ensure that its Joint Steering Committee members receive adequate notice of such meetings. Each Party shall be responsible for all of its own expenses incurred in connection with participating in all such meetings.

(d) **Minutes.** Responsibility for preparing definitive minutes of each JSC meeting shall alternate between the Parties. The responsible Party shall circulate a draft of the minutes of each meeting to all JSC members for comments within ten (10) days after such meeting. Such minutes shall provide a description, in reasonable detail, of the discussions at the meeting and shall document all actions and determinations approved by the JSC at such meeting. The Parties shall promptly discuss any comments on such minutes and finalize the minutes no later than the date of the next JSC meeting.

(e) **Subcommittees.** The JSC may establish and disband subcommittees as deemed necessary by the JSC. Each subcommittee shall report to the JSC and may make recommendations to the JSC, but no subcommittee shall have any decision-making authority. Each Party shall be responsible for all of its own expenses incurred in connection with participating in all such meetings.

2.2.4 Cooperation. Each Party shall provide the JSC such information as reasonably requested by the other Party and reasonably available, relating to the progress of the goals or performance of activities under the Joint Venture.

2.2.5 Decisions. Decisions of the JSC shall be made by unanimous vote, with each Party's representatives on the JSC collectively having one vote. No vote of the JSC may be taken unless at least one of each Party's representatives is present for the vote.

(a) Dispute Resolution If the JSC cannot reach consensus with regard to any matter within its authority within fifteen (15) days after such matter has been brought to the JSC's attention, the co-chair of either Party may cause such dispute to be referred to the Designated Executive Officers, who shall promptly meet and attempt in good faith to resolve such issue within thirty (30) days from the date upon which such matter is referred to them. In the event that the Designated Executive Officers are unable to resolve such issue within thirty (30) days of the issue being referred to them, then Providence shall have the tie-breaking vote; *provided, however,* that, in each case, Providence shall give good faith consideration to Arcturus' position and make reasonable efforts to take Arcturus' position into account in making its decision; and *provided, further,* that the unanimous vote of the JSC (without resort to Providence's tie-breaking vote) will be required:

(i) to approve any proposed amendment to the Research Plan that, individually or in the aggregate with preceding amendments, would alter or increase in a material manner Arcturus' Research Program commitment;

(ii) to approve, and to approve changes to, (A) the Manufacturing Plan that, individually or in the aggregate with preceding amendments, would alter or increase in a material manner Arcturus' commitment thereunder, (B) any Statement of Work, and (C) the applicable Providence FTE Rate under any Product Budget.

2.2.6 Authority. The JSC shall have only such rights, powers and authorities as are expressly assigned under this Agreement. Each Party shall retain the rights, powers and discretion granted to it under this Agreement and no such rights, powers or discretion shall be delegated or vested in the JSC or subcommittee. Notwithstanding any other provision of this Agreement to the contrary, neither the JSC nor any subcommittee shall have any right, power or authority:

(a) to determine any issue in a manner that would conflict with the express terms and conditions of this Agreement; or

(b) to modify or amend the terms and conditions of this Agreement.

2.2.7 Discontinuation of JSC. The JSC shall continue to exist until the Parties mutually agree to disband the JSC.

ARTICLE 3

RESEARCH COLLABORATION

3.1 Scope of Collaboration. Subject to the terms and conditions of this Agreement the Parties agree to conduct a collaborative research project directed to the discovery and optimization of Collaboration Compounds for each Collaboration Tumor Type and the design

and synthesis of a LUNAR Formulation suitable for encapsulation and delivery of Collaboration Compounds of all Collaboration Tumor Types.

3.2 Research Programs. For each Collaboration Tumor Type, the Parties, via the JSC, shall: (a) promptly (but no later than sixty (60) days) following the Restatement Date (if not already approved prior to the Restatement Date), approve a written plan describing the research activities to be conducted by Arcturus to identify and optimize Collaboration Compounds for such Collaboration Tumor Type (each, a “**Research Program**”); and (b) consider and approve appropriate amendments and modifications to each such plan (each such plan, as so amended, a “**Research Plan**”). Prior to the Restatement Date, the Parties have agreed upon the initial Research Plan for the Research Program directed to Brain and Ovarian Neoplasms which initial Research Plan is deemed approved by the JSC hereunder. Upon JSC approval of the Research Plan for any other Collaboration Tumor Type, or upon JSC approval of any amendment or modification to any Research Plan, the JSC will attach such Research Plan, or such amendment or modification (as applicable), to the minutes of the JSC meeting at which the same is approved.

3.3 Formulation Program. Promptly (but no later than sixty (60) days) following the Restatement Date, the Parties, via the JSC, shall approve a written plan describing the research activities to be conducted by Arcturus to design and synthesize a LUNAR Formulation (the “**Licensed LUNAR Formulation**”) suitable for encapsulation and delivery of Collaboration Compounds of all Collaboration Tumor Types (the “**Formulation Program**”). From time to time, consider and approve appropriate amendments and modifications to such plan (such plan, as so amended, the “**Formulation Plan**”). Upon JSC approval of the Formulation Plan, or upon JSC approval of any amendment or modification to the Formulation Plan, the JSC will attach such Formulation Plan, or such amendment or modification (as applicable), to the minutes of the JSC meeting at which the same is approved.

3.4 Performance Standards. On a Collaboration Tumor Type-by-Collaboration Tumor Type basis, Arcturus shall use Commercially Reasonable Efforts to perform the Research Program for each Collaboration Tumor Type in an expeditious manner. In addition, Arcturus shall use Commercially Reasonable Efforts to perform the Formulation Plan in an expeditious manner. Arcturus shall perform each Research Program and the Formulation Program in accordance with the applicable Research Plan and the Formulation Program, respectively, and the terms and conditions of this Agreement. In addition, Arcturus shall use Commercially Reasonable Efforts to perform all Research Plan and Formulation Plan activities in good scientific manner and in compliance with all applicable Laws. Arcturus may engage subcontractors to perform certain of its Research Plan or Formulation Plan obligations, subject to Section 5.5 (*mutatis mutandis*).

3.5 Costs of Performance of Research Program.

3.5.1 Providence Activities. Providence shall be responsible for bearing all its costs associated with its performance of its responsibilities under the Research Program for each Collaboration Tumor Type. Providence acknowledges and agrees that it shall not have any right to reimbursement or credit from Arcturus for the cost and expenses associated with such Research Program activities.

3.5.2

Arcturus Activities. Promptly (but no later than sixty (60) days) following the Restatement Date, the Parties shall mutually agree in writing upon a written budget for Research Program activities to be conducted by or on behalf of Arcturus under each Research Plan (each, a “**Research Budget**”) and Formulation Program activities to be conducted by or on behalf of Arcturus under the Formulation Plan (the “**Formulation Budget**”).

3.6

Disclosure of Results. During the Research Period, Arcturus shall keep Providence regularly informed, primarily via the JSC and the Alliance Managers, of the progress and results of Research Program activities. Without limiting the generality of the foregoing, Arcturus shall provide to Providence written reports of the Research Program activities performed by or on behalf of Arcturus, and all data and results generated or achieved in such activities, reasonably in advance of each regularly-scheduled meeting of the JSC. Arcturus will only disclose composition and sequence of the Licensed LUNAR Formulation.

3.7

Research Program Records. Arcturus shall maintain, and use Commercially Reasonable Efforts to cause its employees, subcontractors and consultants to maintain, complete and accurate records of all Research Program activities conducted by or on behalf of Arcturus, and of all results, data, inventions and developments made in the performance of such activities, in sufficient detail and in good scientific manner appropriate for regulatory and patent purposes. Such records shall fully and properly reflect all work done, data and developments made, and results achieved. Upon reasonable prior written notice, Arcturus shall permit Providence to inspect such records, and shall provide copies of requested records, for each Research Program, to the extent reasonably required for Providence’s commercialization of the applicable Collaboration Tumor Type; *provided, however*, that in no event shall Arcturus be obligated to permit Providence to inspect, or to provide Providence with copies of, any records or information relating to the Arcturus Platform Technology or the use thereof; and *provided, further*, that if it is not feasible to provide Providence with access to Arcturus’ original records of Research Plan activities without revealing information relating to the Arcturus Platform Technology or the use thereof, then Arcturus shall instead make available for Providence’s inspection redacted copies of such Research Plan activity records that do not disclose such Arcturus Platform Technology-related information. Providence shall maintain all such records and the information contained therein in confidence in accordance with Article 13 hereof and shall not use such records or information except to the extent permitted by this Agreement.

3.8

Biological Materials. Arcturus may from time to time provide to Providence samples of Collaboration Compounds (“**Arcturus Materials**”). Except as otherwise provided under this Agreement, such transfer shall convey no rights in such Arcturus Materials. All such Arcturus Materials delivered shall remain the sole property of Arcturus. Except as otherwise authorized under this Agreement, such Arcturus Materials shall not be used for any purpose other than the commercialization of the applicable Collaboration Tumor Type, and shall not be used by, delivered to or used for the benefit of, any Third Party (other than its subcontractors pursuant to Section 4.1) without the prior written consent of Arcturus, and shall not be used in research or testing involving human subjects. Because not all of their characteristics may be known, the Arcturus Materials supplied under this Section 3.8 must be used with prudence and appropriate caution in any experimental work. THE ARCTURUS MATERIALS ARE PROVIDED “AS IS” AND WITHOUT ANY REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED

ARTICLE 4

LICENSE GRANTS

4.1 Research, Development and Commercialization License to Providence. Subject to the terms and conditions of this Agreement, on a Collaboration Tumor Type-by-Collaboration Tumor Type basis, Arcturus hereby grants to Providence, an exclusive (subject to Section 4.5 and except as expressly set forth below in this Section 4.1), royalty-bearing, non-transferable (except as provided in Section 15.4) license, with the right to sublicense through multiple tiers of sublicense (subject to Section 4.2), under the Arcturus Technology and Arcturus' interest in Joint Technology, to Research, Develop and Commercialize Collaboration Compounds for such Collaboration Tumor Type and Products containing such Collaboration Compounds, in the Licensed Field in the Territory; *provided, however*, that (a) the Arcturus Platform Technology and Arcturus Platform Improvements shall be included in the Arcturus Technology licensed to Providence solely to the extent they are incorporated into such Collaboration Compounds or the Licensed LUNAR Formulation, and (b) the license granted with respect to any such Arcturus Platform Technology or Arcturus Platform Improvement shall be non-exclusive.

4.2 Sublicenses. Providence shall be entitled, without the prior consent of Arcturus, to sublicense under any license granted to Providence under Section 4.1 in full or in part, to any Affiliate or to one or more Third Parties through multiple tiers of sublicense, whether such sublicense or license is granted to such Third Party directly by Arcturus or its Affiliate or indirectly through multiple tiers of sublicense; *provided, however*, that any such sublicense shall be (a) in writing and (b) consistent with, and subject and subordinate in all respects to, the terms and conditions of this Agreement. Providence shall continue to be responsible for full performance of Providence's obligations under the Agreement and shall be responsible and liable for any failure of any Sublicensee to comply with this Agreement (or the corresponding provisions of the applicable sublicense agreement) to the same extent as Providence would be for its own failure to comply with this Agreement. Providence shall provide Arcturus with a copy of any sublicense agreement entered into by Providence or its Affiliate, and any amendment thereto, within five (5) days of its execution, provided that Providence may redact from such copy any confidential or proprietary information contained therein that is not reasonably necessary or appropriate for Arcturus to ascertain Providence's compliance with this Agreement.

4.3 Availability of Arcturus Know-How. As promptly as practicable Arcturus shall make available to Providence all Arcturus Know-How that is available in written, graphic, electronic or other recorded form (or true and complete copies thereof), that is reasonably necessary or useful for Providence to exercise its rights and perform its obligations under this Agreement with respect to Collaboration Compounds for such Collaboration Tumor Type and Products containing such Collaboration Compounds.

4.4 Exclusivity. On a Collaboration Tumor Type-by-Collaboration Tumor Type basis, for so long as Providence's License under Section 4.1 with respect to such Collaboration Tumor Type remains effective, Arcturus shall: (a) not conduct research to identify or optimize, or develop or commercialize mRNA Vaccine as defined in Section 1.64 for such Collaboration Tumor Type by itself or its Affiliates or in collaboration with any Third Party, except pursuant to this Agreement; and (b) not grant any Third Party a license to research to identify or optimize, or develop or commercialize mRNA Vaccine as defined in Section 1.64 for such Collaboration Tumor Type. For the avoidance of any doubt, this Section 4.4 shall not shall not prohibit or restrict any Third Party Acquirer or its affiliated companies from developing or commercializing any Product *so long as* such Product is: (i) covered by Patent Rights Controlled by the Third Party Acquirer prior to consummation of the Sale Transaction or (ii) acquired by the Third Party Acquirer from another Third Party after consummation of the Sale Transaction.

4.5 Negative Covenants. Providence hereby covenants not to practice, and not to permit or cause any Affiliate, Sublicensee or other Third Party to practice, any Arcturus Technology for any purpose other than as expressly authorized in this Agreement. Without limiting the foregoing, Providence shall not, and shall not permit or cause any Affiliate, Sublicensee or other Third Party to, use any Arcturus Technology with or for, or apply any Arcturus Technology to, any active therapeutic ingredient that is not a Collaboration Compound or any product that is not a Product.

4.6 No Other Rights. Each Party acknowledges that the rights and licenses granted to it under this Article 4 and elsewhere in this Agreement are limited to the scope expressly granted. Accordingly, except for the rights expressly granted under this Agreement, no right, title, or interest of any nature whatsoever is granted whether by implication, estoppel, reliance, or otherwise, by the other Party to such Party. All rights that are not specifically granted herein are reserved to the possessing Party.

ARTICLE 5

DEVELOPMENT

5.1 Development. On a Collaboration Tumor Type-by-Collaboration Tumor Type basis, for so long thereafter as Providence's license under Section 4.1 for such Collaboration Tumor Type remains in effect (during which period such Collaboration Tumor Type shall be a "**Licensed Collaboration Tumor Type**"), Providence shall be responsible in its sole discretion for the Development of Collaboration Compounds and Products for such Licensed Collaboration Tumor Type in the Licensed Field in the Territory (other than the activities assigned to Arcturus under Section 5.2).

5.2 Arcturus Services. If requested by Providence and acceptable to Arcturus, Arcturus may perform certain research or other Development activities ("**Arcturus Services**") with respect to Collaboration Compounds and/or Products for a Licensed Collaboration Tumor Type, such as *in vitro* and *in vivo* efficacy and proof-of-concept studies, including in animal disease models, subject to mutual written agreement of the Parties. The specific Arcturus Services shall be set forth in a written statement of work, research plan, or the like on terms and in a form mutually agreeable to the Parties, and unanimously approved by the JSC, without

resort to Providence's tie-breaking authority (each, a "**Statement of Work**"). Each Statement of Work shall be signed by both Parties and shall set forth at a minimum the following:

5.2.1 the specific activities to be undertaken;

5.2.2 any materials or information to be provided by Providence to Arcturus for use in the performance of such Arcturus Services;

5.2.3 the deliverables to be provided to Providence;

5.2.4 the budgeted costs for such Statement of Work and the applicable payment schedule for payments to Arcturus; and

5.2.5 the anticipated timeline for performance of such Arcturus Services.

Each Statement of Work shall be subject to all of the terms and conditions of this Agreement, in addition to the specific details set forth in such Statement of Work. To the extent any terms of a Statement of Work conflict with the terms of this Agreement, the terms of this Agreement shall control, unless and only to the extent that such Statement of Work expressly states the intent of the Parties that the Statement of Work supersede this Agreement with respect to a specific matter. Each fully-executed Statement of Work shall be deemed incorporated herein by reference, and a copy thereof shall be attached to this Agreement. Any changes to a Statement of Work shall be in writing, executed by an authorized representative of each Party, attached to the original Statement of Work, and incorporated herein and therein by reference.

5.3 Performance of Development. Each Party shall commence and conduct its respective Development activities under this Agreement, in good scientific manner and in accordance with all applicable Laws.

5.4 Biological Materials. In order to facilitate the Development activities by the Parties pursuant to this Agreement, and the Development and Commercialization of Collaboration Compounds and Products in the Licensed Field by Providence under this Agreement, each of the Parties may from time to time provide to the other biological or other materials owned by or licensed to a Party ("**Biological Materials**"). Except as otherwise provided under this Agreement, such transfer shall convey no rights in such Biological Materials, except for the Development activities by the Parties pursuant to this Agreement, and the Development and Commercialization of Collaboration Compounds and Products in the Licensed Field by Providence under this Agreement. All such Biological Materials delivered shall remain the sole property of the delivering Party. Except as otherwise authorized under this Agreement, such Biological Materials shall not be used for any purpose other than the Development activities by the Parties pursuant to this Agreement, and the Development and Commercialization of Collaboration Compounds and Products in the Licensed Field by Providence under this Agreement, as the case may be, and shall not be used by, delivered to or used for the benefit of, any Third Party (excluding any Sublicensee or subcontractor (including contract research organizations and contract manufacturing organizations) relating to the Development and Commercialization of the Collaboration Compound or Product) without the prior written consent of the delivering Party, and shall not be used in research or testing involving human subjects. Because not all of their characteristics may be known, the Biological Materials supplied under

this Section 5.4 must be used with prudence and appropriate caution in any experimental work. THE BIOLOGICAL MATERIALS ARE PROVIDED "AS IS" AND WITHOUT ANY REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF DESIGN, MERCHANTABILITY, MERCHANTABILITY, DURABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF THE INTELLECTUAL PROPERTY RIGHTS OF THIRD PARTIES.

5.5 Subcontracting. Either Party may engage its Affiliates, or Third-Party subcontractors (including contract research organizations and contract manufacturing organizations) to perform certain of its obligations under this Article 5; provided that Arcturus shall obtain Providence's prior written consent (which may be included in the applicable Statement of Work) for any such subcontractor of Arcturus to perform any Development activities under this Agreement. Any Third-Party subcontractor to be engaged by a Party to perform its obligations set forth in this Agreement will meet the qualifications typically required by such Party for the performance of work similar in scope and complexity to the subcontracted activity. The activities of any of each Party's Third-Party subcontractors will be considered activities of such Party under this Agreement. Each Party will be responsible for ensuring compliance by any of its Third-Party subcontractors with the terms of this Agreement, as if such Third Party(ies) are such Party hereunder.

5.6 Development Records. Each Party shall maintain, and cause its employees, subcontractors and consultants to maintain, complete and accurate records of all Development activities conducted by or on behalf of such Party, and of all results, data, inventions and developments made in the performance of such activities, in sufficient detail and in good scientific manner appropriate for regulatory and patent purposes. Such records shall fully and properly reflect all work done, data and developments made, and results achieved.

5.7 Disclosure of Results. Each Party shall keep the other Party regularly informed, primarily via the JSC and the Alliance Managers, of the progress and results of Development activities, including a detailed written quarterly report of its progress.

5.8 Data Sharing. Arcturus shall, at Providence's written request, promptly make available to Providence all data generated by Arcturus and its Affiliates or on their behalf under each Statement of Work and allow Providence to inspect and, to the extent necessary or useful for regulatory or intellectual property protection purposes, copy such records. Providence shall maintain all such records and the information contained therein in confidence in accordance with Article 13 hereof and shall not use such records or information except to the extent permitted by this Agreement.

ARTICLE 6

MANUFACTURE AND SUPPLY

6.1 Manufacture and Supply. Providence shall be solely responsible for the Manufacture and supply, at its sole cost and expense, of all Collaboration Compounds and Products required for Development or Commercialization of Products including, without

limitation, formulation, labeling and packaging, in accordance with the requirements of applicable Regulatory Authorities.

6.2 Manufacturing Plan and Arrangements.

6.2.1 Providence acknowledges that Arcturus has unique experience and know-how relating to [...***...]⁹.

6.2.2 Providence and Arcturus shall jointly develop through the JSC a Manufacturing plan (a “**Manufacturing Plan**”) for the Manufacture and supply of Products. It is understood that the components of the Manufacturing Plan will evolve and change as the applicable Product moves through the development, regulatory, and commercialization life cycle, with the amendments, changes, modifications, additions and updates to the Manufacturing Plan being discussed and established by agreement of the JSC. The Manufacturing Plan shall set forth at a minimum the following: (a) the activities to be undertaken for scale-up manufacturing; (b) the Parties’ responsibilities for Manufacturing; (c) deliverables, and (d) timelines.

6.2.3 Any arrangement for Arcturus to Manufacture and supply Products would be subject to negotiation on commercially reasonable and customary terms and conditions to be agreed by the Parties in good faith, and would include reasonable provisions permitting Providence to establish a second source of supply and providing for manufacturing technology transfer by Arcturus to Providence or a Third Party contract manufacturing organization in connection therewith.

6.2.4 Providence may contract for the Manufacture and supply of Products (including materials and components thereof) with one or more Third Party contract manufacturing organizations having the ability and facilities for the Manufacture of Products in accordance with applicable Laws and the requirements of applicable Regulatory Authorities.

ARTICLE 7

REGULATORY MATTERS

7.1 Regulatory.

7.1.1 **Providence Right.** Providence will own all right, title and interest in and to all Regulatory Filings and Regulatory Approvals for Collaboration Compounds and for Products and all such Regulatory Filings and Regulatory Approvals will be held in the name of Providence. All decisions concerning the Regulatory Approval of Collaboration Compounds or Products including the clinical and regulatory strategy of Products covered under this Agreement shall be within the sole discretion of Providence.

7.1.2 **Cooperation.** At Providence’s request and sole cost and expense, Arcturus will cooperate reasonably with Providence and provide reasonable assistance to Providence in preparing, submitting and maintaining any Regulatory Filings and/or Regulatory Approvals for Products. If Arcturus or its Controlled Affiliate is Manufacturing or having

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Manufactured any Collaboration Compound or Product on behalf of Providence or its Affiliates or Sublicensees and maintains any drug master file(s) with respect to such Collaboration Compound or Product anywhere in the world, Providence and its Affiliates and Sublicensees shall have a right of reference to such drug master file(s) solely for purposes of obtaining and maintaining Regulatory Approvals for Products.

ARTICLE 8

COMMERCIALIZATION AND DILIGENCE

8.1 Commercialization. Providence shall be responsible in its sole discretion for the Commercialization of Collaboration Compounds and Products in the Licensed Field, including the distribution, marketing and sales activities with respect to Collaboration Compounds and Products.

8.2 Diligence. On a Licensed Collaboration Tumor Type-by-Licensed Collaboration Tumor Type basis, Providence (directly or through its Affiliates or Sublicensees) shall use Commercially Reasonable Efforts to Develop, obtain Regulatory Approval for, and Commercialize at least one Product for each Licensed Collaboration Tumor Type in the Licensed Field in each of the Major Markets.

8.3 Diligence Milestones. For purposes of determining whether Providence, its Affiliates or Sublicensees have satisfied Providence's diligence obligations under Section 8.2, the Parties agree that the following milestone events and timeframes shall apply:

8.3.1 Providence shall have completed cumulative equity financing of not less than [...
***...] 10;

8.3.2 Providence shall have initiated at least one IND-enabling preclinical study within [...***...] 11 and initiated at least one Phase 1 Clinical Trial in any country or regulatory jurisdiction within [...***...] 12.

8.4 Diligence Failure. In the event that Providence breaches the diligence requirements set forth in Section 8.2 or Section 8.3, at Arcturus' option this Agreement shall terminate in whole or in part; *provided, however*, that (a) with respect to any failure to Develop any Collaboration Compound or Product, the termination of Licenses will be on a Licensed Collaboration Tumor Type-by-Licensed Collaboration Tumor Type basis, and (b) prior to any termination, the Parties will meet and discuss in good faith extending Providence's timeframes for performance deadlines for meeting such milestones within a reasonable term, which will not exceed six (6) months absent Arcturus's sole consent, if the Parties mutually agree that such extension will enable completion of such milestones in such reasonable term. If there is a good faith dispute between the Parties as whether Providence has breached its diligence requirements set forth in Section 8.2 or Section 8.3, then any termination by Arcturus under this Section will be stayed until a final determination pursuant to Section 15.1.

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ARTICLE 9

FINANCIAL TERMS

9.1 Upfront Payment. As partial consideration for the rights granted to Providence by Arcturus under this Agreement, Providence has paid to Arcturus a one-time payment of [...***...] 13.

9.2 Material Costs. Arcturus acknowledges that up to [...***...]14 of agreed upon FTE rates covers incidental material costs. Arcturus will provide Providence records of costs of materials used on the Joint Venture at each JSC and Providence will reimburse Arcturus for [...***...] 15. With respect to dedicated equipment and 3rd party work orders (such as lipid orders, mRNA, and GXP formulation batches), Providence will be solely responsible to purchase those items directly. All costs and expenses pertaining to mRNA synthesized by Arcturus and formulations prepared by Arcturus are pass-through.

9.3 Development Costs Through to Completion of Phase 2 Clinical Trials. On a Collaboration Program-by-Collaboration Program basis, Providence shall be responsible for and shall pay one hundred percent (100%) of the costs and expenses for all stages and activities of the Development of Collaboration Compounds and Products in the Licensed Field leading up to or necessary for the completion of all Phase 2 Clinical Trials (including all Phase 2 Clinical Trials-related costs, whenever incurred).

9.4 Sharing of Development Costs Post-Phase 2 Clinical Trials. Subject to Section 9.6, on a Collaboration Program-by-Collaboration Program basis, the Parties shall share all of the costs and expenses for all Phase 3 Clinical Trials of Products and the costs and expenses for all stages and activities of the Development of Collaboration Compounds and Products in the Licensed Field that would normally be undertaken in connection with Phase 3 Clinical Trials and/or after initiation of the first Phase 3 Clinical Trial (collectively, "**Post-Phase 2 Activities**"), provided that Post-Phase 2 Activities shall in any event exclude any and all Phase 2 Clinical Trials (except to the extent specified below in this Section 9.4 with respect to any Phase 2 Clinical Trial that is or becomes a Pivotal Study), on the following basis: [...***...]16.

For clarity, the costs and expenses shared under this Section 9.4 shall include the costs and expenses of all Phase 3 Clinical Trials, as well as any other human clinical trial that the applicable Regulatory Authority has agreed, whether before first dosing of the first patient in such trial (*e.g.*, pursuant to a special protocol assessment agreement with the FDA) or after first dosing of the first patient in such trial (*e.g.*, based on an interim data analysis), is sufficient to form the primary basis of an efficacy claim in an NDA submission, regardless of whether the sponsor of such trial characterizes or refers to such trial as a "Phase 3," "Phase 2b" or "Phase 2b/3" trial (or otherwise) in the applicable protocol, on clinicaltrials.gov, or in any other context (each, a "**Pivotal Study**"). If a human clinical trial does not constitute a Pivotal Study at the time

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of first dosing of the first patient in such trial, but is later determined by the applicable Regulatory Authority to be sufficient to form the primary basis of an efficacy claim in an NDA submission, then, for purposes of this Section 9.4, such clinical trial will be deemed to be a Pivotal Study only upon such determination by the applicable Regulatory Authority.

9.5 Sharing of Commercialization Expenses. Subject to Section 9.6, on a Collaboration Program-by-Collaboration Program basis, the Parties shall share all Commercialization Expenses (as defined in **Exhibit B** hereto) with respect to Collaboration Compounds and Products in the Licensed Field on the following basis: [...***...].¹⁷

9.6 Authorization and Payment of Shared Development and Commercialization Costs.

9.6.1 Product Plan and Product Budget. Promptly after it becomes certain to the Parties that costs will be incurred for Post-Phase 2 Activities with respect to a particular Collaboration Program, Providence and Arcturus shall jointly develop, through the JSC, and implement a written plan for the Post-Phase 2 Development Activities and Commercialization activities to be conducted with respect to such Collaboration Program (each a “**Product Plan**”), including a budget (each a “**Product Budget**”) for all shared Post-Phase 2 Development Expenses and Commercialization Expenses pursuant to Section 9.4 and Section 9.5, respectively (“**Shared D&C Costs**”). Each Product Budget shall specify a mutually agreeable and commercially reasonable FTE rate to be used by each Party in determining such Party’s and its Affiliates’ internal costs of performing Post-Phase 2 Development Activities and Commercialization activities for purposes of calculating Post-Phase 2 Development Expenses and Commercialization Expenses, respectively, as such FTE rate may be updated by unanimous vote of the JSC or mutual written agreement of the Parties from time to time (such rate, as applicable to Providence, the “**Providence FTE Rate**”). Each Product Budget may also include any other internal expense incurred by Providence or its Affiliates in connection with an activity of Providence or its Affiliates under this Agreement that is considered and approved by the JSC as an expense relating directly to Commercialization of Products (“**Other Approved Operating Expenses**”). It is understood that the components of each Product Plan and Product Budget will evolve and change as the applicable Collaboration Program moves through the development, regulatory, manufacture, pre-launch, launch and commercialization life cycle, with the amendments, changes, modifications, additions and updates to the Product Plan and Product Budget being discussed and established by agreement of the JSC in accordance with Article 2.

9.6.2 Providence Statement of Shared D&C Costs. Within [...***...] 18, on a Collaboration Program-by-Collaboration Program basis, Providence shall provide to Arcturus quarterly detailed written statements of the Shared D&C Costs expended by Providence for Product Plan activities conducted for each Collaboration Program in each quarter. Shared D&C Costs (including the components thereof) may not exceed the amount set forth in the applicable Product Budget with respect to the Development or Commercialization activities set forth in the applicable Product Plan by more than ten percent (10%) without the unanimous approval of the JSC (without resort to Providence’s tie-breaking vote). Subject to Section 9.7.2, within thirty

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(30) days after delivery to Arcturus of each quarterly Shared D&C Cost report, the Parties shall make payments or adjustment as between them so that each shall share such Shared D&C Costs according to their respective shares pursuant to Section 9.4 and Section 9.5, for such quarter for each Product.

9.6.3 Arcturus Right to Opt-Out of Sharing of Development Costs Post-Phase 2

Clinical Trials. On a Collaboration Program-by-Collaboration Program basis, Arcturus shall have the onetime right, at any time, and for any reason, to opt-out of contributing its share of the Shared Development Costs Post-Phase 2 Clinical Trials under Section 9.4, upon written notice to Providence. No exercise by Arcturus of such opt-out right for any Collaboration Program shall constitute a breach of this Agreement by Arcturus, but in the case of any such exercise, Arcturus' and Providence's respective shares in Product Revenues and Commercialization Expenses from such Collaboration Program under Section 9.5 and Section 9.7.1 shall be adjusted in accordance with Section 9.7.2.

9.7 Sharing of Product Revenue.

9.7.1 Parties' Share of Product Revenue.

On a Collaboration Program-by-Collaboration Program basis, the Parties shall share all the Product Revenue under this Agreement with respect to each Collaboration Program on the following basis: [...***...]¹⁹

9.7.2 Opting-Out by Arcturus from Sharing of Development Costs Post-Phase 2

Clinical Trials. On a Collaboration Program-by-Collaboration Program basis, in the event of any exercise by Arcturus of its opt-out right under Section 9.6.3 with respect to sharing of Development Costs Post-Phase 2 Clinical Trials for a Collaboration Program, [...***...] ²⁰ shall be proportionally reduced according to the formula set out below, and Providence's share in such Commercialization Expenses and Product Revenue shall be correspondingly increased; *provided that* [...***...] ²¹

9.7.3 Payment of Shared Product Revenue.

Within [...***...] ²² in which Product Revenue is received by Providence: (a) Providence shall provide Arcturus with a statement detailing its Product Revenue for each Collaboration Program for such quarter on a Product-by-Product basis, which statement shall set forth in reasonable detail the calculation of Product Revenue (including its components) with respect to such Collaboration Program; and (b) Subject to Section 9.7.2, within thirty (30) days after delivery of the statement of Product Revenue, Providence shall make payments to Arcturus of its share of Product Revenue so that each shall share Product Revenue according to the provisions set forth above, as applicable, for such quarter for each Collaboration Program.

9.8 No Other Compensation. Except as expressly set forth in this Agreement, neither Party will be obligated to pay any additional fees, milestone payments, royalties or other payments of any kind to the other hereunder.

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9.9 Method of Payment. Unless otherwise specified in this Agreement or agreed by the Parties, all payments due by one Party under this Agreement shall be paid in U.S. Dollars by wire transfer or electronic funds transfer of immediately available funds to an account designated by the receiving Party.

9.10 Currency Conversion. In the case of Product Revenue, including Net Sales outside the United States, payments received by Providence or its Affiliate will be expressed in the U.S. Dollar equivalent calculated on a quarterly basis in the currency of the non-United States country and converted to their U.S. Dollar equivalent using the average rate of exchange over the applicable calendar quarter to which the sales relate, in accordance with applicable Accounting Standards and the then current standard methods of Providence or the applicable Sublicensee, to the extent reasonable and consistently applied; *provided, however*, that if, at such time, Providence does not use a rate for converting into U.S. Dollar equivalents that is maintained in accordance with applicable Accounting Standards, then Providence shall use a rate of exchange which corresponds to the rate of exchange for such currency reported in The Wall Street Journal, Internet U.S. Edition at www.wsj.com, as of the last day of the applicable reporting period (or, if unavailable on such date, the first date thereafter on which such rate is available). Providence will inform Arcturus as to the specific exchange rate translation methodology used for a particular country or countries. If at any time legal restrictions prevent the prompt remittance of any Product Revenue share in any jurisdiction, Providence may notify Arcturus and make such payments by depositing the amount thereof in local currency in a bank account or other depository in such country in the name of the Arcturus or its designee, and Providence shall have no further obligations under this Agreement with respect thereto.

9.11 Late Payments. In the event that any payment due hereunder is not made when due, the payment shall accrue interest beginning on the day following the due date thereof, calculated at the annual rate equal to the prime interest rate quoted by The Wall Street Journal, Internet U.S. Edition at www.wsj.com on the date said payment is due, the interest being compounded on the last day of each calendar quarter; *provided, however*, that in no event shall said annual interest rate exceed the maximum rate permitted by Law. Each such payment when made shall be accompanied by all interest so accrued.

9.12 Records and Audits. Providence will keep complete and accurate records of the underlying revenue and expense data relating to the calculations of Product Revenue and Shared D&C Costs generated in the then current calendar year and during the preceding three (3) calendar years. Arcturus will keep complete and accurate records of the underlying expense data relating to any amounts payable by Providence hereunder for Arcturus Services during the then current calendar year and during the preceding three (3) calendar years. Arcturus or Providence (the “**Auditing Party**”) will have the right, once annually at its own expense, to have a nationally recognized, independent, certified public accounting firm, selected by it and subject to the other Party’s prior written consent (which shall not be unreasonably withheld), review any such records of the other Party and their Affiliates (the “**Audited Party**”) in the location(s) where such records are maintained by the Audited Party upon reasonable written notice (which shall be no less than [...***...] ²³ prior written notice) and during regular business hours and under obligations of strict confidence, for the sole purpose of verifying the basis and accuracy of the

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any payments due hereunder within [...] ²⁴ preceding the date of the request for review. No calendar year will be subject to audit under this Section 9.12 more than once. The Audited Party will receive a copy of each such report concurrently with receipt by the Auditing Party. Should such inspection lead to the discovery of a discrepancy to the Auditing Party's detriment, the Audited Party will, within [...] ²⁵ after receipt of such report from the accounting firm, pay any undisputed amount of the discrepancy together with interest at the rate set forth in Section 9.11. The Auditing Party will pay the full cost of the review unless the underpayment of amounts due to the Auditing Party is greater than five percent (5%) of the amount due for the entire period being examined, in which case the Audited Party will pay the cost charged by such accounting firm for such review. Should the audit lead to the discovery of a discrepancy to the Audited Party's detriment, the Audited Party may credit the amount of the discrepancy, without interest, against future payments payable to the Auditing Party under this Agreement, and if there are no such payments payable, then the Auditing Party shall pay to the Audited Party the amount of the discrepancy, without interest, within forty-five (45) days of the Auditing Party's receipt of the report.

9.13 Taxes.

9.13.1

Withholding.

In the event that any Law requires either Party to withhold taxes with respect to any payment to be paid by the paying Party to the receiving Party pursuant to this Agreement, the paying Party will notify the receiving Party of such withholding requirement prior to making the payment to the receiving Party and provide such assistance to the receiving Party, including the provision of such standard documentation as may be required by a tax authority, as may be reasonably necessary in the receiving Party's efforts to claim an exemption from or reduction of such taxes. The paying Party will, in accordance with such Law, withhold taxes from the amount due, remit such taxes to the appropriate tax authority, and furnish the receiving Party with proof of payment of such taxes within thirty (30) days following the payment. If taxes are paid to a tax authority, the paying Party shall provide reasonable assistance to the receiving Party to obtain a refund of taxes withheld or obtain a credit with respect to taxes paid.

9.13.2

VAT.

All payments paid by the paying Party to the receiving Party pursuant to this Agreement shall be paid exclusive of any value-added, goods or services, or sales tax (which, if applicable, shall be payable by the paying Party upon receipt of a valid invoice). If Party receiving payment determines that it is required to report any such tax, the paying Party shall promptly provide the receiving Party with applicable receipts and other documentation necessary or appropriate for such report. For clarity, this Section 9.13.2 is not intended to limit Providence's right to deduct value-added taxes in determining Net Sales.

9.14

Arcturus Opportunity to Participate in Providence Financings.

During the Term, Providence will advise Arcturus of, and Arcturus will be given the opportunity to participate in, issuances of equity or debt securities of Providence in connection with a financing or series of financings by Providence, such participation by Arcturus to be up to 49% of any such offering .

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9.15 Arcturus Right to Appoint Director. During the Term and so long as Providence is a privately held company Arcturus shall have the right (the “*Arcturus Appointment Right*”) to appoint one representative designated by Arcturus from time to time and acceptable to Providence, acting reasonably, to serve as a member of Providence’s Board of Directors (the “*Arcturus Representative*”), exercisable upon written notice thereof to Providence, and in such capacity, the Arcturus Representative shall be entitled to receive, and Providence shall provide to the Arcturus Representative, all notices, minutes, consents and other materials, financial or otherwise, which Providence provides to other members of its Board of Directors.

ARTICLE 10

INTELLECTUAL PROPERTY AND PATENT RIGHTS

10.1 Ownership of Inventions. Inventorship of Inventions shall be determined in accordance with the rules of inventorship under U.S. patent laws. Arcturus shall solely own all Arcturus Inventions and all Arcturus Platform Improvements, and Providence hereby assigns to Arcturus all right, title and interest in and to all Arcturus Platform Improvements. Providence shall solely own all Providence Inventions. The Parties shall jointly own all Joint Inventions. Subject to the rights, obligations, and licenses granted under this Agreement, including Arcturus’ obligations under Section 4.4, each Party shall have the right to use, and grant licenses to use, any Joint Invention and Joint Patent Right without the other Party’s consent and shall have no duty to account to the other Party for such use or license, and each Party hereby waives any right it may have under the laws of any country to require any such consent or accounting.

10.2 Prosecution and Maintenance. For purposes of this Section 10.2, the terms “prosecution” and “maintenance” (including variations such as “prosecute” and “maintain”) shall mean, with respect to a Patent Right, the preparation, filing, prosecution and maintenance of such Patent Right, in the applicable jurisdiction.

10.2.1 Arcturus Product-Specific Patents. On a Licensed Collaboration Tumor Type-by-Licensed Collaboration Tumor Type basis and for so long as the license granted to Providence under Section 4.1 for such Collaboration Tumor Type remains in effect, Providence shall have the first right, but not the obligation, to control the prosecution and maintenance of Arcturus Patents that are Product-Specific Patents (“*Arcturus Product-Specific Patents*”) directed to Collaboration Compounds for such Licensed Collaboration Tumor Type and Products containing such Collaboration Compounds, at Providence’s sole expense and by counsel of its choice. Providence shall consult with Arcturus as to the prosecution and maintenance of Arcturus Product-Specific Patents reasonably prior to, and in any event at least thirty (30) days prior to, any deadline or action with any patent office and shall furnish to Arcturus copies of all relevant drafts and documents reasonably in advance of such consultation. Providence shall keep Arcturus reasonably informed of progress with regard to the prosecution and maintenance of Arcturus Product-Specific Patents and shall provide to Arcturus copies of all material patent office submissions promptly following submission thereof by Providence. In the event that Providence desires to abandon or cease prosecution or maintenance of any Arcturus Product-Specific Patent, Providence shall provide written notice to Arcturus of such intention to abandon promptly after Providence makes such determination (which notice shall be given no later than

ninety (90) days prior to the next deadline for any action that must be taken with respect to such Arcturus Product-Specific Patent in the relevant patent office). In such case, Arcturus shall have the right, in its discretion, exercisable upon written notice to Providence delivered no later than thirty (30) days after receipt of notice from Providence, to assume responsibility for prosecution and maintenance of such Arcturus Product-Specific Patent, at its sole cost and expense and by counsel of its own choice, and if Arcturus assumes such responsibility, Providence's license under Section 4.1 with respect to such Arcturus Product-Specific Patent shall terminate and be of no further force or effect.

10.2.2

Joint Product-Specific Patents. On a Licensed Collaboration Tumor Type-by-Licensed Collaboration Tumor Type basis and for so long as the license granted to Providence under Section 4.1 for such Collaboration Tumor Type remains in effect, Providence shall have the first right, but not the obligation, to control the prosecution and maintenance of Joint Patents that are Product-Specific Patents ("**Joint Product-Specific Patents**") directed to Collaboration Compounds for such Licensed Collaboration Tumor Type and Products containing such Collaboration Compounds, at Providence's sole expense and by counsel of its choice. Providence shall consult with Arcturus as to the prosecution and maintenance of Joint Product-Specific Patents reasonably prior to any deadline or action with any patent office and shall furnish to Arcturus copies of all relevant drafts and documents reasonably in advance of, and in any event at least thirty (30) days prior to, such consultation. Providence shall keep Arcturus reasonably informed of progress with regard to the prosecution and maintenance of Joint Product-Specific Patents and shall provide to Arcturus copies of all material patent office submissions promptly following submission thereof by Providence. In the event that Providence desires to abandon or cease prosecution or maintenance of any Joint Product-Specific Patent, Providence shall provide written notice to Arcturus of such intention to abandon promptly after Providence makes such determination (which notice shall be given no later than ninety (90) days prior to the next deadline for any action that must be taken with respect to such Joint Product-Specific Patent in the relevant patent office). In such case, Arcturus shall have the right, in its discretion, exercisable upon written notice to Providence delivered no later than thirty (30) days after receipt of notice from Providence, to assume responsibility for prosecution and maintenance of such Joint Product-Specific Patent, at its sole cost and expense and by counsel of its own choice, and if Arcturus assumes such responsibility, Providence's license under Section 4.1 with respect to Arcturus' interest in such Joint Product-Specific Patent shall terminate and be of no further force or effect but, for clarity, Providence shall retain all its ownership rights as a co-owner in and to such Joint Product-Specific Patent.

10.2.3

Other Arcturus Patents. At all times, Arcturus shall have the sole right, but not the obligation, to control the prosecution and maintenance of Arcturus Patents other than Arcturus Product-Specific Patents, at Arcturus' sole expense and by counsel of its choice.

10.2.4

Other Providence Patents. At all times, Providence shall have the sole right, but not the obligation, to control the prosecution and maintenance of all Patents Rights that are Controlled by Providence or any of its Controlled Affiliates, other than any Joint Patents.

10.2.5

Other Joint Patents. Arcturus shall have the first right, but not the obligation, to control the prosecution and maintenance of Joint Patents other than Joint Product-Specific Patents, at Arcturus' sole expense and by counsel of its choice, in such countries or

jurisdictions as Arcturus determines to be appropriate. If Providence requests in writing that Arcturus prosecute and maintain any such Joint Patent in any country or jurisdiction in which Arcturus has not elected to do so, Arcturus shall prosecute and maintain such Joint Patent in such country or jurisdiction, provided that Providence shall be solely responsible for the reasonable and documented costs and expenses thereof. Arcturus shall consult with Providence as to the prosecution and maintenance of such Joint Patents reasonably prior to any deadline or action with any patent office and shall furnish to Providence copies of all relevant drafts and documents reasonably in advance of such consultation. Arcturus shall keep Providence reasonably informed of progress with regard to the prosecution and maintenance of such Joint Patents and shall provide to Providence copies of all material patent office submissions promptly following submission thereof by Arcturus. In the event that Arcturus desires to abandon or cease prosecution or maintenance of any such Joint Patent, Arcturus shall provide written notice to Providence of such intention to abandon promptly after Arcturus makes such determination (which notice shall be given no later than ninety (90) days prior to the next deadline for any action that must be taken with respect to such Joint Patent in the relevant patent office). In such case, Providence shall have the right, in its discretion, exercisable upon written notice to Arcturus delivered no later than thirty (30) days after receipt of notice from Arcturus, to assume responsibility for prosecution and maintenance of such Joint Patent, at its sole cost and expense and by counsel of its own choice.

10.3 Patent Term Extensions.

10.3.1 Product-Specific Patents. On a Licensed Collaboration Tumor Type-by-Licensed Collaboration Tumor Type basis and for so long as the license granted to Providence under Section 4.1 for such Collaboration Tumor Type remains in effect, Providence shall have the right to determine the Product-Specific Patents for which it will apply for patent extension in any country and/or region for any Product in the Licensed Field. Providence shall file for any such extension at Providence's cost and expense. Arcturus shall provide all reasonable assistance to Providence in connection with such filings, provided that Providence shall pay or reimburse any out-of-pocket costs incurred by Arcturus in providing such assistance.

10.3.2 Other Arcturus Patents. Except as expressly set forth in Section 10.3.1 as applicable to Product-Specific Patents, Arcturus shall have the sole right to apply for extension of any Arcturus Patent, at Arcturus' sole cost and expense.

10.3.3 Other Joint Patents. Except as expressly set forth in Section 10.3.1 as applicable to Joint Product-Specific Patents, if either Party wishes to apply for extension of any Joint Patent other than a Joint Product-Specific Patent, any such application for extension will require the mutual written agreement of the Parties.

10.4 Cooperation. Each Party agrees to cooperate fully in the prosecution and maintenance of, and in the obtaining and maintenance of patent term extensions with respect to, Patent Rights in accordance with this Article 10. Such cooperation includes, but is not limited to: (i) executing all papers and instruments, or requiring its employees or contractors to execute such papers and instruments, so as to effectuate the ownership of Arcturus Platform Improvements, Joint Inventions and Joint Patent Rights set forth in Section 10.1, and to enable the other Party to apply for and to prosecute patent applications in any country in accordance

with Section 10.2 and to file for patent term extensions in accordance with Section 10.3.1 or Section 10.3.3; and (ii) promptly informing the other Party of any matters coming to such Party's attention that may affect the preparation, filing, prosecution or maintenance of any such patent applications.

10.5 Defense and Settlement of Third Party Claims.

10.5.1

Notice of Third Party Infringement Claim. During the Term, each Party shall bring to the attention of the other Party all information regarding potential infringement or any claim of infringement of Third Party intellectual property rights in connection with the development, manufacture, production, use, importation, offer for sale, or sale of Products in the Territory. The Parties shall discuss such information and decide how to handle such matter. Subject to Article 12, each Party shall be solely responsible for defending any claim, suit or action brought against it alleging infringement of Third Party intellectual property rights in connection with its activities under this Agreement, at such Party's sole expense.

10.5.2

Notice of Third Party Challenge. If a declaratory judgment action is brought by a Third Party naming either Party as a defendant and alleging non-infringement, invalidity or unenforceability of any Product-Specific Patent or Joint Patent (a "**Third Party Challenge**"), the Party first having notice of the Third Party Challenge shall promptly notify the other Party, and the Parties shall promptly confer to consider the claim or assertion and the appropriate course of action. If a declaratory judgment action is brought by a Third Party naming Providence as a defendant and alleging non-infringement, invalidity or unenforceability of any Arcturus Patent other than a Product-Specific Patent (an "**Arcturus Patent Challenge**"), Providence shall promptly notify Arcturus, and Arcturus shall have the sole right, but not the obligation, to defend such Arcturus Patent Challenge, at Arcturus' sole cost and expense using patent counsel of its choice. Arcturus shall have the sole right to enter into any settlement of such Arcturus Patent Challenge in Arcturus' sole and absolute discretion; provided that any term or condition of such settlement that would impose any financial liability on Providence, limit or restrict the ability of Providence to sell Products anywhere in the Territory, or impose any other restrictions or obligations on Providence, would require the prior written consent of Providence.

10.5.3

Responsibility for Defense. On a Licensed Collaboration Tumor Type-by-Licensed Collaboration Tumor Type basis and for so long as the license granted to Providence under Section 4.1 for such Collaboration Tumor Type remains in effect:

(a) to the extent the Third-Party Challenge relates to a Product-Specific Patent or Joint Patent that Covers any Collaboration Compound or Product being Developed or Commercialized by or on behalf of Providence, then Providence shall have the right to defend such Third-Party Challenge; and

(b) to the extent the Third-Party Challenge relates to a Product-Specific Patent or Joint Patent that does not Cover any Collaboration Compound or Product being Developed or Commercialized by or on behalf of Providence, then Arcturus shall have the right to defend such Third-Party Challenge.

10.5.4

Settlement. Neither Party shall enter into any settlement of any Third-Party Challenge that admits to the invalidity or unenforceability of any Patent Right Controlled by the other Party (or that otherwise affects the scope, validity or enforceability of any such Patent Right), incurs any financial liability on the part of the other Party or requires an admission of liability, wrongdoing or fault on the part of the other Party without such other Party's written consent. In any event, the other Party shall reasonably assist the defending Party and cooperate in any such litigation at the defending Party's request and expense. Additionally, if the defending Party is not the Party that Controls the Patent Right in question, then the other Party has the right to join any such action.

10.6

Infringement by Third Parties. Each Party shall promptly notify the other Party in writing of any existing or threatened infringement of any Product-Specific Patent or Joint Patent anywhere in the Territory of which it becomes aware, and the Parties will consult with each other regarding any actions to be taken with respect to any infringing activity that involves the manufacture, use, import, offer for sale or sale of any Product in the Territory (a "**Product Infringement**"). In addition, Providence shall promptly notify Arcturus in writing of any existing or threatened Product Infringement of any Arcturus Patent other than an Arcturus Product-Specific Patent of which it becomes aware.

10.6.1

Product-Specific Patents.

(a)

Right to Enforce Product Infringement. On a Licensed Collaboration Tumor Type-by-Licensed Collaboration Tumor Type basis and for so long as the license granted to Providence under Section 4.1 for such Collaboration Tumor Type remains in effect, Providence shall have the first right, but not the obligation, to bring and control any action or proceeding with respect to Product Infringement of any Product-Specific Patent in the Territory, at its own expense and by counsel of its own choice, and Arcturus shall have the right, at its own expense, to be represented in any such action by counsel of its own choice. If Providence fails to bring any such action or proceeding within [...***...] ²⁶ then Arcturus shall have the right to bring and control any such action at its own expense and by counsel of its own choice, and Providence shall have the right, at its own expense, to be represented in any such action by counsel of its own choice.

(b)

Right to Enforce Other Infringements. At all times, Arcturus shall have the first right, but not the obligation, to bring and control any action or proceeding with respect to infringement (other than Product Infringement) of any Product-Specific Patent in the Territory, at its own expense and by counsel of its own choice, and, on a Licensed Collaboration Tumor Type-by-Licensed Collaboration Tumor Type basis and for so long as the license granted to Providence under Section 4.1 for such Collaboration Tumor Type remains in effect, Providence shall have the right, at its own expense, to be represented in any such action by counsel of its own choice. On a Licensed Collaboration Tumor Type-by-Licensed Collaboration Tumor Type basis and for so long as the license granted to Providence under Section 4.1 for such Collaboration Tumor Type remains in effect, if Arcturus fails to bring any such action or proceeding within (A) 120 days following the notice of alleged infringement or (B) fifteen (15) days before the time limit, if any, set forth in the appropriate laws and

²⁶ Confidential treatment requested

regulations for the filing of such actions, whichever comes first, then Providence shall have the right to bring and control any such action at its own expense and by counsel of its own choice, and Arcturus shall have the right, at its own expense, to be represented in any such action by counsel of its own choice.

10.6.2 Other Arcturus Patents. Arcturus shall have the sole right, but not the obligation, to bring and control any action or proceeding with respect to any infringement (including, without limitation, Product Infringement) of any Arcturus Patent other than an Arcturus Product-Specific Patent, at Arcturus' sole cost and expense using patent counsel of its choice.

10.6.3 Other Joint Patents. Arcturus shall have the first right, but not the obligation, to bring and control any action or proceeding with respect to any infringement (including, without limitation, Product Infringement) of any Joint Patent other than a Joint Product-Specific Patent, at Arcturus' sole cost and expense using patent counsel of its choice, and Providence shall have the right, at its own expense, to be represented in any such action by counsel of its own choice. If Arcturus fails to bring any such action or proceeding within (A) one hundred and twenty (120) days following the notice of alleged infringement or (B) fifteen (15) days before the time limit, if any, set forth in the appropriate laws and regulations for the filing of such actions, whichever comes first, then Providence shall have the right to bring and control any such action at its own expense and by counsel of its own choice, and Arcturus shall have the right, at its own expense, to be represented in any such action by counsel of its own choice.

10.6.4 Cooperation. In the event a Party brings an infringement action in accordance with this Section 10.6, the other Party shall cooperate fully, including, if required to bring such action, the furnishing of a power of attorney or being named as a party. The Party bringing an infringement action under Section 10.6.1 or Section 10.6.3 shall keep the other Party regularly informed of the status and progress of such enforcement efforts and shall reasonably consider the other Party's comments on any such efforts.

10.6.5 Settlement. Without the prior written consent of the other Party, neither Party shall settle any claim, suit or action that it brought under this Section 10.6 that admits the invalidity or unenforceability of any Product-Specific Patent or Joint Patent, requires abandonment or limits the scope of any such Product-Specific Patent or Joint Patent, or would limit or restrict the ability of either Party to sell Products anywhere in the Territory or admits any liability of or imposes any other restrictions or obligations on the other Party, without the written consent of such other Party (which shall not be unreasonably withheld or delayed).

10.6.6 Expenses and Recoveries. Except as otherwise agreed to by the Parties as part of a cost-sharing arrangement, any recovery realized as a result of any action under this Section 10.6, whether by way of settlement or otherwise, after reimbursement of any litigation expenses of the Parties, shall be applied first to reimburse the documented out-of-pocket legal expenses of the Party that brought and controlled such action or proceeding incurred in connection with such action or proceeding, and second to reimburse the documented out-of-pocket legal expenses of the other Party incurred in connection with such action or proceeding

(to the extent not previously reimbursed by the first Party), and any remaining amounts shall be retained by the Party that brought and controlled such action; *provided, however*, that:

(a) any recovery realized by Providence as a result of any action or proceeding brought and controlled by Providence pursuant to Section 10.6.1 (after reimbursement of the Parties' documented out-of-pocket legal expenses relating to the action or proceeding) shall be treated as Product Revenue for purposes of Section 9.7 and **Exhibit B**;

(b) any recovery realized by Arcturus as a result of any action or proceeding brought and controlled by Arcturus pursuant to Section 10.6.2 (after reimbursement of the Parties' documented out-of-pocket legal expenses relating to the action or proceeding) shall be allocated as follows:

(i) to the extent the recovery is attributable to Product Infringement, 50% to Arcturus and 50% to Providence; and

(ii) any remaining portion, 100% to Arcturus;

(c) any recovery realized by Arcturus as a result of any action or proceeding brought and controlled by Arcturus pursuant to Section 10.6.3 (after reimbursement of the Parties' documented out-of-pocket legal expenses relating to the action or proceeding) shall be allocated as follows:

(i) to the extent the recovery is attributable to Product Infringement, it shall be treated as Product Revenue for purposes of Section 9.7 and **Exhibit B**; and

(ii) any remaining portion, 60% to Arcturus and 40% to Providence; and

(d) any recovery realized by Providence as a result of any action or proceeding brought and controlled by Providence pursuant to Section 10.6.3 (after reimbursement of the Parties' documented out-of-pocket legal expenses relating to the action or proceeding) shall be allocated as follows:

(i) to the extent the recovery is attributable to Product Infringement, it shall be treated as Product Revenue for purposes of Section 9.7 and **Exhibit B**; and

(ii) any remaining portion, 60% to Providence and 40% to Arcturus.

ARTICLE 11

REPRESENTATIONS AND WARRANTIES

11.1 Mutual Warranties. As of the Effective Date, each of Providence and Arcturus represent and warrant that:

(a) it is duly organized and validly existing under the Law of the jurisdiction of its incorporation, and has full corporate power and authority to enter into this Agreement and to carry out the provisions hereof;

(b) it is duly authorized to execute and deliver this Agreement and to perform its obligations hereunder, and the individual executing this Agreement on its behalf has been duly authorized to do so by all requisite corporate action; and

(c) this Agreement is legally binding upon it and enforceable in accordance with its terms. The execution, delivery and performance of this Agreement by it does not conflict with any agreement, instrument or understanding, oral or written, to which it is a party or by which it may be bound, nor violate any material applicable Law.

11.2 Additional Arcturus Warranties. As of the Effective Date, Arcturus warrants to Providence that:

(a) **Exhibit A** is a complete and accurate list of all Arcturus Patents existing as of the Effective Date;

(b) Arcturus is the sole owner, or where expressly noted on **Exhibit A** the joint owner, of the Arcturus Patents existing on the Effective Date;

(c) Arcturus has the right to license the Arcturus Technology to Providence for the purposes expressly set forth herein and has not granted, and during the Term will not grant, to any Third Party any license or other right with respect to any Arcturus Technology that conflicts with the option or licenses granted to Providence hereunder;

(d) Arcturus has not received any written communication from any Third Party asserting that: (i) a Third Party has any right or interest in or to Arcturus Patents listed on **Exhibit A**; (ii) the practice of the Arcturus Technology infringes any Patent Right or other intellectual property right of any Third Party; or (iii) any issued patent in the Arcturus Patents listed on **Exhibit A** is invalid or unenforceable;

(e) to Arcturus' knowledge, no reexamination, interference, invalidity, opposition, nullity or similar claim or proceeding is pending or threatened with respect to any Arcturus Patent listed on **Exhibit A**; and

(f) Arcturus (i) is not a party to any legal action, suit or proceeding relating to the Arcturus Technology; and (ii) has not received any written communication from any Third Party threatening any action, suit or proceeding relating to the Arcturus Technology.

11.3 Debarment. Each Party hereby represents, warrants and covenants to the other Party as of the Effective Date that no such Party nor any of its Affiliates has been debarred or is subject to debarment and neither such Party nor any of its Affiliates will use in any capacity, in connection with the activities to be performed under this Agreement any party who has been debarred pursuant to Section 306 of the Federal Food, Drug, and Cosmetic Act, as amended, or who is the subject of a conviction described in such section. Each Party will inform the other Party in writing immediately if it or any party who is performing activities hereunder is debarred

or is the subject of a conviction described in Section 306, or if any action, suit, claim, investigation or legal or administrative proceeding is pending or, to such Party's knowledge, is threatened, relating to the debarment or conviction of such Party or any party performing activities hereunder.

11.4 Disclaimer. Except as expressly set forth in this Agreement, THE ARCTURUS TECHNOLOGY IS PROVIDED "AS IS." EXCEPT AS OTHERWISE EXPRESSLY SET FORTH IN THIS AGREEMENT, NEITHER PARTY MAKES ANY REPRESENTATIONS OR EXTENDS ANY WARRANTIES OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY, QUALITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT OF THE INTELLECTUAL PROPERTY RIGHTS OF THIRD PARTIES, VALIDITY OR ENFORCEABILITY OF PATENT CLAIMS, OR ARISING FROM A COURSE OF DEALING, USAGE OR TRADE PRACTICES. NOTHING IN THIS AGREEMENT SHALL BE CONSTRUED AS A REPRESENTATION MADE OR WARRANTY GIVEN BY EITHER PARTY THAT EITHER PARTY WILL BE SUCCESSFUL IN OBTAINING ANY PATENT RIGHTS, OR THAT ANY PATENTS WILL ISSUE BASED ON A PENDING APPLICATION. WITHOUT LIMITING THE RESPECTIVE RIGHTS AND OBLIGATIONS OF THE PARTIES EXPRESSLY SET FORTH HEREIN, EACH PARTY SPECIFICALLY DISCLAIMS ANY GUARANTEE THAT THE PRODUCTS WILL BE SUCCESSFUL, IN WHOLE OR IN PART.

11.5 Limitation of Liability. EXCEPT FOR LIABILITY FOR BREACH OF ARTICLE 13, NEITHER PARTY SHALL BE ENTITLED TO RECOVER FROM THE OTHER PARTY ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES IN CONNECTION WITH THIS AGREEMENT OR ANY LICENSE GRANTED HEREUNDER; *provided, however*, that this Section 11.5 shall not be construed to limit either Party's indemnification obligations under Article 12.

ARTICLE 12

INDEMNIFICATION

12.1 Indemnity.

12.1.1 By Providence. Providence will indemnify, hold harmless and defend Arcturus, its Affiliates, and its and their respective, officers, directors, employees, subcontractors, consultants, and agents (collectively, the "**Arcturus Indemnified Parties**") from and against any and all losses, damages, liabilities, judgments, fines, amounts paid in settlement, expenses and costs of defense, including without limitation reasonable attorneys' fees and witness fees ("**Losses**"), to which any Arcturus Indemnified Party may become subject as a result of any claim, action or proceeding brought or initiated by a Third Party ("**Third Party Claim**") to the extent that such Losses arise out of: (a) the gross negligence or willful misconduct of any Providence Indemnified Party, (b) the breach by Providence of any representation, warranty, covenant or agreement made by Providence under this Agreement, or (c) the Development or Commercialization of any Collaboration Compound or Product by or on behalf of Providence, its Affiliates, or their respective Sublicensees (including product liability and intellectual property

infringement claims arising out of such Development or Commercialization); except, in each case, to the extent such Losses result from the gross negligence or willful misconduct of any Arcturus Indemnified Party or the breach by Arcturus of any warranty, representation, covenant or agreement made by Arcturus in this Agreement.

12.1.2

By Arcturus. Arcturus will indemnify, hold harmless and defend Providence, its Affiliates, and its and their respective, officers, directors, employees, subcontractors, consultants, and agents (collectively, the “**Providence Indemnified Parties**”) from and against any and all Losses to which any Providence Indemnified Party may become subject as a result of any Third Party Claim to the extent that such Losses arise out of: (a) the gross negligence or willful misconduct of any Arcturus Indemnified Party, (b) the breach by Arcturus of any warranty, representation, covenant or agreement made by Arcturus in this Agreement, (c) the exercise of any license granted by Providence to Arcturus pursuant to Section 14.4.1(c), or (d) the development and commercialization of Arcturus Technology, Arcturus Platform Technology, or Arcturus Platform Improvements outside of this Agreement by or on behalf of Arcturus or its Affiliates, licensees or sublicensees; except, in each case, to the extent such Losses result from the gross negligence or willful misconduct of any Providence Indemnified Party or the breach by Providence of any warranty, representation, covenant or agreement made by Providence in this Agreement.

12.1.3

Procedure. Promptly after receipt by any of the Providence Indemnified Parties or the Arcturus Indemnified Parties (together or individually, an “**Indemnified Party**”) of notice of any pending or threatened Third Party Claim for which the Indemnified Party intends to seek indemnity hereunder (an “**Indemnity Claim**”), such Indemnified Party shall give written notice of the same to the other Party (the “**Indemnifying Party**”). The Indemnifying Party shall be entitled to assume the defense thereof, with counsel selected by the Indemnifying Party and reasonably satisfactory to the Indemnified Party. The Indemnifying Party shall not be liable for any damages with respect to any Indemnity Claim that is settled or compromised by the Indemnified Party without the Indemnifying Party’s prior written consent. No offer of settlement, compromise or settlement by the Indemnifying Party shall be binding on an Indemnified Party without the Indemnified Party’s prior written consent, unless such settlement or compromise (a) fully releases the Indemnified Party without any liability, loss, cost or obligation, and (b) admits no liability, wrongdoing or other admission against interest on the part of the Indemnified Party. In the event that the Parties cannot agree as to the application of Sections 12.1.1 and 12.1.2 to any Loss or Third Party Claim, the Parties may conduct separate defenses of such Third Party Claim. In such case, each Party further reserves the right to claim indemnity from the other in accordance with Sections 12.1.1 and 12.1.2 upon resolution of such underlying Third Party Claim.

12.2

Insurance. Each of the Parties will, at their own respective expense (and not subject to cost sharing hereunder) procure and maintain during the Term, insurance policies in commercially reasonable amounts in light of their obligations hereunder and consistent with the normal business practices of prudent biopharmaceutical companies of similar size and scope (or reasonable self-insurance sufficient to provide materially the same level and type of protection). Such insurance will not create a limit to or increase either Party’s liability hereunder. Each Party shall provide the other with written notice at least thirty (30) days prior to the cancellation,

non-renewal or material change in such insurance or self-insurance which materially adversely affects the rights of the other Party hereunder.

ARTICLE 13

CONFIDENTIALITY

13.1 Confidential Information.

13.1.1 Confidential Information. “*Confidential Information*” of a Party shall mean, subject to the exceptions set forth in Section 13.1.3, any confidential or proprietary information, including all Know-How, that is disclosed or made available by or on behalf of such Party (the “*Disclosing Party*”) to the other Party (the “*Receiving Party*”) or any of the Receiving Party’s or its Affiliates’ Representatives in connection with this Agreement, whether in writing, orally, visually or otherwise, including, without limitation, all “Confidential Information” (as such term is defined in the Confidentiality Agreement) disclosed or made available by or on behalf of such Party to the other Party or any of its Representatives pursuant to the Confidentiality Agreement. Notwithstanding the foregoing, the Parties agree that: (a) all Arcturus Platform Improvements shall be considered the Confidential Information of Arcturus for purposes of this Agreement, and Arcturus and Providence shall be considered the Disclosing Party and the Receiving Party, respectively, with respect thereto; and (b) all Joint Inventions shall be considered the Confidential Information of both Parties for purposes of this Agreement, and each Party shall be considered both a Disclosing Party and a Receiving Party with respect thereto.

13.1.2 Restrictions. Except to the extent expressly authorized by this Agreement, during the Term and for seven (7) years thereafter (or, in the case of any trade secrets, for so long as they remain secret), Receiving Party will keep all Disclosing Party’s Confidential Information in confidence and will not use any of Disclosing Party’s Confidential Information for any purpose other than as expressly permitted by this Agreement. Receiving Party shall use at least the same standard of care as it uses to protect proprietary or confidential information of its own (but in no event less than reasonable care) to ensure that its and its Affiliates’ Representatives do not disclose or make any unauthorized use of Disclosing Party’s Confidential Information. Receiving Party shall promptly notify Disclosing Party upon discovery of any loss, unauthorized use or unauthorized disclosure of Disclosing Party’s Confidential Information. Receiving Party will use diligent efforts to cause its Affiliates, and its and their respective Representatives, to comply with this Article 13. The failure of any Representative of Receiving Party or its Affiliates to comply with the terms and conditions of this Article 13 shall be considered a breach of this Agreement by Receiving Party.

13.1.3 Exceptions. Disclosing Party’s Confidential Information shall not include information that Receiving Party can demonstrate by competent evidence: (a) was known to Receiving Party or any of its Affiliates prior to the time of disclosure (provided that the exception in this clause (a) shall not apply to Arcturus Platform Improvements or Joint Inventions); (b) is or becomes public knowledge through no breach of this Agreement by Receiving Party, any of its Affiliates or any of its or their respective Representatives; (c) is obtained by Receiving Party or any of its Affiliates, without restriction on disclosure, from a

Third Party under no obligation of confidentiality to Disclosing Party; or (d) has been independently developed by Representatives of Receiving Party or any of its Affiliates without the use of, reference to, or reliance upon Disclosing Party's Confidential Information and without any breach of this Agreement, as evidenced by Receiving Party's contemporaneously-maintained written records.

13.1.4

Permitted Disclosures. Receiving Party may disclose Disclosing Party's Confidential Information as expressly permitted by this Agreement (including as reasonably necessary for the Receiving Party's performance of its obligations under this Agreement), or to the extent (and only to the extent) such disclosure is reasonably necessary in the following instances:

- (a) complying with applicable court orders, applicable laws, rules or regulations, or the listing rules of any exchange on which the Receiving Party's or its Affiliate's securities are traded;
- (b) prosecuting or defending litigation as permitted by this Agreement;
- (c) enforcing Receiving Party's rights under this Agreement;
- (d) filing or prosecuting Patent Rights as permitted by this Agreement;
- (e) disclosure in Regulatory Submissions with respect to a Collaboration Compound or Product that Receiving Party has the right to make under this Agreement;
- (f) disclosure to the Receiving Party's Affiliates, to actual and potential licensees and sublicensees, and to the Receiving Party's and its Affiliates' Representatives who have a need to know such information in order for the Receiving Party to exercise its rights or fulfill its obligations under this Agreement, provided, in each case, that any such Affiliate, actual or potential licensee or sublicensee or Representative agrees to be bound by terms of confidentiality and non-use at least as stringent as those set forth in this Article 13; and
- (g) disclosure to Third Parties in connection with due diligence or similar investigations by such Third Parties, and disclosure to potential Third-Party investors in confidential financing documents, provided, in each case, that any such Third Party agrees to be bound by reasonable obligations of confidentiality and non-use.

Notwithstanding the foregoing, in the event Receiving Party is required to make a disclosure of Disclosing Party's Confidential Information pursuant to Section 13.1.4(a) or Section 13.1.4(b), Receiving Party will, where reasonably possible, notify Disclosing Party of Receiving Party's intent to make any disclosure pursuant thereto sufficiently prior to making such disclosure so as to allow Disclosing Party adequate time to take whatever action it may deem appropriate to protect the confidentiality of the information to be disclosed, and, at Disclosing Party's request and expense, Receiving Party will cooperate with Disclosing Party's efforts to secure confidential treatment of such Confidential Information.

13.2 Confidentiality of Terms of Agreement. The terms of this Agreement shall be considered the Confidential Information of both Parties (*i.e.*, each Party shall be considered both the Disclosing Party and the Receiving with respect thereto) for purposes of this Article 13.

13.3 Publicity.

13.3.1 Press Releases. It is acknowledged that each Party may desire or be required to issue subsequent press releases relating to this Agreement or activities hereunder. The Parties agree to consult with each other reasonably and in good faith with respect to the text and timing of subsequent press releases prior to the issuance thereof, provided that a Party may not withhold consent to such releases that the other Party may determine, based on advice of counsel, are reasonably necessary to comply with applicable Laws, including disclosure requirements of the U.S. Securities and Exchange Commission, or with the requirements of any stock exchange on which securities issued by a Party or its Affiliates are traded. In the event of a required public announcement, to the extent there is sufficient time while still being able to comply with applicable Laws, including disclosure requirements of the U.S. Securities and Exchange Commission, or with the requirements of any stock exchange on which securities issued by a Party or its Affiliates are traded, the Party making such announcement shall provide the other Party with a copy of the proposed text of such announcement sufficiently in advance of the scheduled release to afford such other Party a reasonable opportunity to review and comment upon the proposed text. Each Party may make public statements regarding this Agreement in response to questions by the press, analysts, investors or those attending industry conferences or financial analyst calls, or issue press releases, so long as the contents of any such public statement or press release are contained in a prior public disclosure or public statement approved by the other Party pursuant to this Section 13.3.1 or permitted by Section 13.1.4 and do not reveal non-public information about the other Party.

13.3.2 Filing of this Agreement. The Parties shall coordinate in advance with each other in connection with the filing of this Agreement (including redaction of certain provisions of this Agreement) with any securities authority or with any stock exchange on which securities issued by a Party or its Affiliate are traded, and each Party will use reasonable efforts to seek and obtain confidential treatment for the terms proposed to be redacted; provided that each Party will ultimately retain control over what terms are disclosed to any securities authority or stock exchange, as the case may be, to the extent such Party determines, on the advice of legal counsel, that disclosure is reasonably necessary to comply with applicable Laws, including disclosure requirements of the U.S. Securities and Exchange Commission, or with the requirements of any stock exchange on which securities issued by a Party or its Affiliates are traded, and provided further that the Parties will use their reasonable efforts to file redacted versions with any governing bodies which are consistent with redacted versions previously filed with any other governing bodies.

13.4 Publications.

13.4.1 Publication. For purposes of this Section 13.4, the terms “publish” and “scientific presentation” (including variations such as “publication” and “presentation”) shall mean any public disclosure in the nature of a published paper, article, manuscript, report, poster,

internet posting, presentation slides, abstract, outline, video, instructional material, presentation, or the like, in printed, electronic, or oral form.

13.4.2

Publication of Results. On a Licensed Collaboration Tumor Type-by-Licensed Collaboration Tumor Type basis and for so long as the license granted to Providence under Section 4.1 for such Collaboration Tumor Type remains in effect, Providence shall have the sole right to publish and make scientific presentations with respect to the results of Development and Commercialization activities, including clinical trials, of Collaboration Compounds for such Licensed Collaboration Tumor Type and Products containing such Collaboration Compounds. Arcturus shall have the right to review and comment on any material proposed for publication by Providence (such as by oral presentation, manuscript or abstract) that includes results of Development of any such Collaboration Compound or Product. Providence shall deliver to Arcturus a copy of any proposed written publication or outline of presentation to be made by Providence at least thirty (30) days in advance of submission for publication or presentation (or, where a copy of such publication or presentation is not available at such time, a draft or outline of such publication or a description of such presentation), and Arcturus will have the right to: (i) require a delay in submission of not more than sixty (60) days to enable patent applications protecting any Collaboration Compound or Product; and (ii) require Providence to delete any disclosure of Arcturus' Confidential Information from any such proposed publication or presentation prior to submission for publication or presentation.

ARTICLE 14

TERM & TERMINATION

14.1 Term. The term of this Agreement (the "**Term**") shall commence on the Effective Date, and unless terminated earlier as provided in this Article 14, shall continue in full force and effect until either, as applicable:

14.1.1 such time as there is no longer any Collaboration Compound and/or Product being Developed or Commercialized hereunder by Providence, its Affiliates and/or Sublicensees.

14.2 Termination for Breach.

14.2.1 Subject to Section 14.2.2, each Party shall have the right, in the event of material breach of this Agreement by the other Party, to terminate this Agreement upon written notice to the other Party if such other Party is in material breach of this Agreement and has not cured such breach within ninety (90) days after notice from the terminating Party requesting cure of the breach. Any such termination shall become effective at the end of such 90-day period unless the breaching Party has cured such breach prior to the end of such period. Notwithstanding the foregoing, in the event of any such uncured material breach affecting only a particular Collaboration Tumor Type or Collaboration Compounds or Products directed to such Collaboration Tumor Type (collectively, a "**Collaboration Program**"), such termination shall apply only to the affected Collaboration Program, and this Agreement shall otherwise remain in full force and effect.

14.2.2 Any right to terminate this Agreement, in its entirety or with respect to a particular Collaboration Program, as applicable, under Section 14.2.1 shall be stayed and the cure period tolled in the event that, during the applicable cure period, the Party alleged to have been in material breach shall have initiated dispute resolution in accordance with Section 15.1 with respect to the alleged breach, which stay and tolling shall continue until such dispute has been resolved in accordance with Section 15.1. It is understood and agreed that during the pendency of such 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.

14.3 Providence Discretionary Termination. Providence shall have the right to terminate this Agreement either in its entirety or with respect to a particular Collaboration Program upon sixty (60) days' written notice to Arcturus.

14.4 Effect of Termination.

14.4.1 Termination of this Agreement. In the event of any termination of this Agreement in its entirety, or termination of this Agreement as to any Collaboration Program, then, in each case:

(a) all rights and licenses granted by Arcturus to Providence (including the license granted under Section 4.1) with respect to any such Collaboration Program (a "**Terminated Program**") under this Agreement shall automatically terminate and revert to Arcturus;

(b) solely in the event of termination of this Agreement with respect to a particular Collaboration Program, but not this Agreement in its entirety, if Providence's license under Section 4.1 was in effect with respect to any Collaboration Program that is not a Terminated Program immediately prior to such termination (a "**Non-Terminated Program**"), this Agreement shall continue in full force and effect with respect to such Non-Terminated Program, subject to all terms and conditions hereof; *provided, however*, that if there is no Non-Terminated Program immediately prior to termination with respect to a Terminated Program, this Agreement will be deemed to have been terminated in its entirety;

(c) Providence shall, and it hereby does, grant to Arcturus a non-exclusive, perpetual, royalty-free, non-transferable (except as provided in Section 15.4) license, including the right to sublicense through multiple tiers, under Patent Rights and Know-How that in each case are Controlled by Providence and that are necessary or useful for the Development and Commercialization of Collaboration Compounds and Products for any Terminated Program ("**Providence Technology**"), solely to Develop, make, have made, use, sell, have sold, offer for sale and import Collaboration Compounds and Products for such Terminated Program in the Territory. Notwithstanding the foregoing, to the extent the Providence Technology includes Patent Rights or other intellectual property rights licensed to Providence by a Third Party that are subject to royalty or milestone payment obligations to such Third Party with respect to Collaboration Compounds and Products for any Terminated Program, then Providence shall so notify Arcturus, together with a true, complete and correct description of such royalty and milestone payment obligations, and the inclusion of such Patent Rights or other intellectual property rights in the license granted to Arcturus under this Section 14.4.1(c) for such

Terminated Program shall be subject to Arcturus' agreeing in writing to pay, and promptly paying, all royalty and milestone payments that become due to such Third Party by reason of the Development or Commercialization of such Collaboration Compounds and Products by or on behalf of Arcturus or any of its Affiliates or Sublicensees in the Territory;

(d) Right of First Negotiation and Right

(i) Providence shall, and it hereby does, grant to Arcturus a right of first negotiation, during the applicable ninety (90) day period (each, a "**Negotiation Period**") after termination of this Agreement (with respect to each Terminated Program), to obtain an exclusive, royalty-bearing license, including the right to sublicense through multiple tiers, under Providence Technology associated with such Terminated Program, solely to Develop, make, have made, use, sell, have sold, offer for sale and import Collaboration Compounds and Products for such Terminated Program in the Territory, upon commercially reasonable terms and conditions to be negotiated in good faith by the Parties;

(ii) if Providence and Arcturus are unable to negotiate reasonable terms and conditions during any applicable Negotiation Period with respect to Providence Technology associated with a Terminated Program, Providence hereby agrees that if Providence thereafter intends to accept any offer from a Third Party with respect to Providence Technology associated with the applicable Terminated Program, Providence shall promptly notify Arcturus in writing of the proposed terms and conditions of such proposed license, and Arcturus shall have the right, exercisable within thirty (30) days, to enter into an exclusive, royalty-bearing license agreement (including the right to sublicense through multiple tiers) with Providence with respect to the Providence Technology associated with a Terminated Program on materially the same terms and conditions of such Third Party offer;

(e) Providence shall at Providence's expense (unless such termination is by Providence for uncured material breach by Arcturus pursuant to Section 14.2, in which case at Arcturus' request and at its expense): (i) disclose to Arcturus as soon as reasonably practicable such Providence Technology (including all preclinical and clinical data) with respect to any Terminated Program as may be necessary or useful to enable Arcturus to practice the license granted under Section 14.4.1(c); (ii) deliver to Arcturus true, correct and complete copies of all Regulatory Filings and associated correspondence with Regulatory Authorities with respect to Collaboration Compounds and Products for such Terminated Program in the Territory, whether held in the name of Providence or its Affiliate; (iii) as promptly as reasonably practicable, transfer and assign to Arcturus all of its and its Affiliates' right, title and interest in and to all Regulatory Filings and associated correspondence with Regulatory Authorities with respect to Collaboration Compounds and Products for such Terminated Program in the Territory (or, if applicable Law prevents or delays the transfer of ownership of any such Regulatory Filing to Arcturus, Providence shall grant, and does hereby grant, to Arcturus an exclusive and irrevocable right of access and reference to such Regulatory Filing for Collaboration Compounds and Products for such Terminated Program, and shall cooperate fully to make the benefits of such Regulatory Filings available to Arcturus or its designee); and (iv) take such other actions and execute such other instruments, assignments and documents as may be necessary to effect, evidence, register and record the transfer, assignment or other conveyance of rights under this Section 14.4.1(e) to Arcturus;

(f) any sublicense granted by Providence to any Sublicensee with respect to any Terminated Program that was in effect prior to such termination shall continue in full force and effect and shall automatically be deemed a direct license by Arcturus to such Sublicensee under this Agreement effective as of the date of termination, provided that such Sublicensee (i) is not in material breach of its sublicense and (ii) agrees in writing to comply with all of the terms of this Agreement to the extent applicable to the rights originally sublicensed to it by Providence. Any such sublicense that survives as a direct license by Arcturus pursuant to the preceding sentence shall be subject to the terms and conditions of this Agreement, except that the scope of the direct license shall be the same as that of the sublicense granted by Providence to such Sublicensee;

(g) at Providence's expense (unless such termination is by Providence for uncured material breach by Arcturus pursuant to Section 14.2, in which case at Arcturus' request and at its expense), Providence shall either promptly and diligently wind down, according to good clinical practice, any clinical trials that are ongoing with respect to any Terminated Program at the time of notice of such termination, or reasonably cooperate with Arcturus and its designees to facilitate a smooth, orderly and prompt transition of such clinical trials to Arcturus or its designees; and

(h) Providence shall, and, effective as of such termination, hereby does, assign to Arcturus all of Providence's right, title and interest in and to any and all Product-specific trademarks used by Providence and its Affiliates in the Territory with respect to Products for any Terminated Program, including all goodwill therein, and Providence shall promptly take such actions and execute such instruments, assignments and documents as may be necessary to effect, evidence, register and record such assignment, at Arcturus' cost.

14.4.2 Return of Confidential Information. In the event of termination of this Agreement in its entirety or with respect to a particular Collaboration Program, each Party shall return (or destroy, as directed by the other Party) all data, files, records and other materials containing or comprising the other Party's Confidential Information, except to the extent such Confidential Information is necessary or useful for the practice of any license granted to Providence under Section 4.1 that remains in effect with respect to any Non-Terminated Program (if applicable) or of any license granted to Arcturus pursuant to Section 14.4.1(c). Notwithstanding the foregoing, each Party will be permitted to retain one copy of Confidential Information of the other Party as necessary to comply with applicable Law and for the purpose of determining any continuing obligations hereunder.

14.4.3 Accrued Rights and Obligations: Survival. Neither expiration nor any termination of this Agreement shall relieve either Party of any obligation or liability accruing prior to such expiration or termination, nor shall expiration or any termination of this Agreement preclude either Party from pursuing all rights and remedies it may have under this Agreement, at law or in equity, with respect to breach of this Agreement. The provisions of Article 1 (to the extent defined terms are contained in the following surviving Articles and Sections), Article 12 and Article 15 and Sections 9.11, 9.12, 9.13, 10.1, 11.4, 11.5, 13.1, 13.2, and 14.4 shall survive expiration or termination of this Agreement for any reason.

ARTICLE 15

MISCELLANEOUS

15.1 Dispute Resolution. It is the objective of the Parties to establish procedures to facilitate the resolution of disputes arising under this Agreement in an expedient manner by mutual cooperation and without resort to litigation. In the event of any disputes, controversies or differences which may arise between the Parties out of or in relation to or in connection with this Agreement, including, without limitation, any alleged failure to perform, or breach, of this Agreement, or any issue relating to the interpretation, application, enforcement, termination or validity of this Agreement (each, a “**Dispute**”), then upon the request of either Party by written notice, the Parties agree to first meet and discuss in good faith a possible resolution thereof, which good faith efforts shall include at least one in-person meeting between the Parties’ respective Designated Executive Officers. If the matter is not resolved within thirty (30) days following the written request for discussions, either Party may refer the Dispute to be resolved by arbitration in accordance with the International Arbitration Rules (the “**Rules**”) of the International Centre for Dispute Resolution. The arbitration shall be conducted in San Diego, California by one (1) arbitrator appointed in accordance with the Rules. Notwithstanding the foregoing, either Party will have the right to apply to any court of competent jurisdiction for a temporary restraining order, a preliminary injunction or other equitable relief to preserve the status quo or prevent irreparable harm.

15.2 Governing Law. This Agreement and its effect are subject to and shall be construed and enforced in accordance with the law of the State of California, without regard to its conflicts of laws. The United Nations Convention on Contracts for the International Sale of Goods will not apply in any way to this Agreement or to the transactions contemplated by this Agreement or otherwise to create any rights or to impose any duties or obligations on any Party to this Agreement.

15.3 Entire Agreement; Amendment. This Agreement and all Exhibits attached to this Agreement constitute the entire agreement between the Parties as to the subject matter hereof. All prior and contemporaneous negotiations, representations, warranties, agreements, statements, promises and understandings with respect to the subject matter of this Agreement are hereby superseded and merged into, extinguished by and completely expressed by this Agreement, including the Confidentiality Agreement (it being understood that information disclosed thereunder shall be subject to the terms of this Agreement). Neither Party shall be bound by or charged with any written or oral agreements, representations, warranties, statements, promises or understandings not specifically set forth in this Agreement. No amendment, supplement or other modification to any provision of this Agreement shall be binding unless in writing and signed by the Parties.

15.4 Successors and Assigns. Neither this Agreement nor any of the rights or obligations created herein may be assigned by either Party, in whole or in part, without the prior written consent of the other Party, not to be unreasonably withheld or delayed; *provided, however*, that either Party shall be free to assign this Agreement and its rights and obligations hereunder without the other Party’s consent:

(a) to an Affiliate of such Party, provided that such Party shall remain liable and responsible to the other Party for the performance and observance of all such duties and obligations by such Affiliate; or

(b) to a successor of such Party pursuant to a *bona fide* business reorganization if such Party changes its corporate domicile or jurisdiction of incorporation, or performs a continuation to continue its corporate existence under the laws of another jurisdiction as if it had been incorporated under the laws of that other jurisdiction, provided that such successor assumes all obligations from such Party under this Agreement; or

(c) in connection with the transfer or sale of all or substantially all of the business of such Party to which this Agreement relates to a Third Party ("**Third Party Acquirer**"), whether by sale of stock, sale of assets, merger, reorganization, amalgamation or other combination (whether by plan of arrangement or by other means whatsoever) or otherwise (each, a "**Sale Transaction**"), provided that in the event of a Sale Transaction (whether this Agreement is actually assigned or is assumed by the Third Party Acquirer or the surviving corporation resulting from such Sale Transaction by operation of law (*e.g.*, in the context of a reverse triangular merger)) intellectual property rights of the Third-Party Acquirer (i) existing prior to the Sale Transaction, or (ii) developed after the Sale Transaction without use of such Party's intellectual property, shall not be included in the technology licensed hereunder or otherwise subject to this Agreement.

This Agreement shall bind and inure to the benefit of the successors and permitted assigns of the Parties hereto, and the name of a Party appearing herein will be deemed to include the name of such Party's successors and permitted assigns to the extent necessary to carry out the intent of this section. Any assignment of this Agreement in contravention of this Section 15.4 shall be null and void.

15.5 Rights Upon Bankruptcy. All rights and licenses granted under or pursuant to any section of this Agreement are, and shall otherwise be deemed to be, for purposes of Section 365(n) of the U.S. Bankruptcy Code and other similar laws in any jurisdiction outside the U.S. including Section 65.11(7) of the *Bankruptcy and Insolvency Act* (Canada), and Section 32(6) of the *Companies Creditors Arrangement Act* (Canada) (collectively, the "**Bankruptcy Laws**"), licenses of rights to "intellectual property" as defined under the Bankruptcy Laws. The Parties shall retain and may fully exercise all of their respective rights and elections under the Bankruptcy Laws. Upon the bankruptcy of any Party, the non-bankrupt Party shall further be entitled to a complete duplicate of (or complete access to, as appropriate) any such intellectual property, and such, if not already in its possession, shall be promptly delivered to the non-bankrupt Party, unless the bankrupt Party elects to continue, and continues, to perform all of its obligations under this Agreement.

15.6 Independent Contractors. The relationship between Arcturus and Providence created by this Agreement is solely that of independent contractors. This Agreement does not create any agency, distributorship, employee-employer, partnership, joint venture or similar business relationship between the Parties. Neither Party is a legal representative of the other Party, and neither Party can assume or create any obligation, representation, warranty or guarantee, express or implied, on behalf of the other Party for any purpose whatsoever. Each

Party shall use its own discretion and shall have complete and authoritative control over its employees and the details of performing its obligations under this Agreement.

15.7 Notice. All notices or communication required or permitted to be given by either Party hereunder shall be deemed sufficiently given if delivered in person, mailed by registered mail or certified mail, return receipt requested, or sent by overnight courier, such as Federal Express, to the other Party at its respective address set forth below or to such other address as one Party shall give notice of to the other from time to time hereunder. Mailed notices shall be deemed to be received on the sixth (6th) business day following the date of mailing. Notices sent by overnight courier shall be deemed received the day delivered by the courier (provided it maintains a record tracking the date of delivery). Notices delivered in person shall be deemed received as of the date of delivery.

If to Providence: Providence Therapeutics Inc.
c/o 1600, 421 – 7th Avenue SW
Calgary, Alberta T2P 4K9
Canada
Attn: Bradley T. Sorenson, President & CEO

If to Arcturus: Arcturus Therapeutics, Inc.
10628 Science Center Drive, Suite 250
San Diego, CA 92121
USA
Attn: Joseph E. Payne, President & CEO

15.8 Compliance With Law; Severability. Nothing in this Agreement shall be construed to require the commission of any act contrary to Law. If any one or more provisions of this Agreement is held to be invalid, illegal or unenforceable, the affected provisions of this Agreement shall be curtailed and limited only to the extent necessary to bring it within the applicable legal requirements and the validity, legality and enforceability of the remaining provisions of this Agreement shall not in any way be affected or impaired thereby.

15.9 Non-Use of Names. Providence shall not use the name, trademark, logo, or physical likeness of Arcturus or any of its officers, directors or employees, or any adaptation of any of them, in any advertising, promotional or sales literature, without such Arcturus' prior written consent. Providence shall require its Affiliates to comply with the foregoing. Arcturus shall not use the name, trademark, logo, or physical likeness of Providence or any of its officers, directors or employees, or any adaptation of any of them, in any advertising, promotional or sales literature, without Providence's prior written consent. Arcturus shall require its Affiliates to comply with the foregoing.

15.10 Waivers. A Party's consent to or waiver, express or implied, of any other Party's breach of its obligations hereunder shall not be deemed to be or construed as a consent to or waiver of any other breach of the same or any other obligations of such breaching Party. A Party's failure to complain of any act, or failure to act, by the other Party, to declare the other Party in default, to insist upon the strict performance of any obligation or condition of this Agreement or to exercise any right or remedy consequent upon a breach thereof, no matter how

long such failure continues, shall not constitute a waiver by such Party of its rights hereunder, of any such breach, or of any other obligation or condition. A Party's consent in any one instance shall not limit or waive the necessity to obtain such Party's consent in any future instance. In any event no consent or waiver shall be effective for any purpose hereunder unless such consent or waiver is in writing and signed by the Party granting such consent or waiver.

15.11 Remedies not Exclusive. The remedies provided to the Parties under this Agreement are cumulative and not exclusive to each other, and any such remedy will not be deemed or construed to affect any right which any of the Parties is entitled to seek at law, in equity or by statute (other than as provided in Section 15.1).

15.12 Force Majeure. Each Party shall be excused from liability for the failure or delay in performance of any obligation under this Agreement by reason of any event beyond such Party's reasonable control including but not limited to Acts of God, fire, flood, explosion, earthquake, or other natural forces, war, civil unrest, acts of terrorism, accident, destruction or other casualty, any lack or failure of transportation facilities, any lack or failure of supply of raw materials, any strike or labor disturbance, or any other event similar to those enumerated above. Such excuse from liability shall be effective only to the extent and duration of the event(s) causing the failure or delay in performance and provided that the Party has not caused such event(s) to occur. Notice of a Party's failure or delay in performance due to force majeure must be given to the other Party within ten (10) days after its occurrence. All delivery dates under this Agreement that have been affected by force majeure shall be tolled for the duration of such force majeure. In no event shall any Party be required to prevent or settle any labor disturbance or dispute.

15.13 Headings; Exhibits. Article and Section headings used herein are for convenient reference only and are not a part of this Agreement. All Exhibits are incorporated herein by this reference.

15.14 Interpretation. Except where the context otherwise requires, wherever used, the singular shall include the plural, the plural the singular, the use of any gender shall be applicable to all genders and the word "**or**" is used in the inclusive sense (and/or). The term "**including**" as used herein shall mean including, without limiting the generality of any description preceding such term. All references to a "**business day**" or "**business days**" in this Agreement means any day other than a day which is a Saturday, a Sunday or any day banks are authorized or required to be closed in the United States or Canada. All references to a "**quarter**" or "**quarterly**" in this Agreement means a period of three (3) calendar months ending on each of March 31, June 30, September 30, and December 31. The language in all parts of this Agreement shall be deemed to be the language mutually chosen by the Parties. The Parties and their counsel have cooperated in the drafting and preparation of this Agreement, and this Agreement therefore shall not be construed against any Party by virtue of its role as the drafter thereof. This Agreement has been prepared in the English language, and the English language shall control its interpretation. In addition, all notices required or permitted to be given hereunder, and all written, electronic, oral or other communications between the Parties regarding this Agreement shall be in the English language.

15.15 Counterparts. This Agreement may be executed in counterparts by a single Party, each of which when taken together shall constitute one and the same agreement and may be executed through the use of facsimiles or .pdf documents.

[Signature page follows]

IN WITNESS WHEREOF, the Parties have executed this Agreement as of the Restatement Date.

PROVIDENCE THERAPEUTICS INC. ARCTURUS THERAPEUTICS, INC.

By: _____ By: _____
Name: Bradley T. Sorenson Name: Joseph E. Payne
Title: Chief Executive Officer Title: Chief Executive Officer

EXHIBIT A
ARCTURUS PATENTS

[...***...] ²⁷

²⁷ Confidential treatment requested

EXHIBIT B
FINANCIAL DEFINITIONS

1. “**Net Sales**” means the gross amounts invoiced for sales or other dispositions of Product by or on behalf of Providence, any of its Affiliates or any Sublicensee (each, a “**Selling Party**”) to Third Parties (other than to a Sublicensee for resale), less the following deductions, to the extent specifically and solely allocable to such Product and actually incurred, taken, paid, accrued or allowed by the Selling Party (if not previously deducted in calculating the amount invoiced):

- (a) normal and customary trade discounts, including trade, cash and quantity discounts, rebates or credits, actually allowed or taken;
- (b) credits, refunds or allowances actually granted or made for rejection or return of previously sold Product, including recalls, or for retroactive price reductions and billing errors;
- (c) compulsory payments and cash rebates related to the sales of Product paid to a Governmental Authority (or agent thereof) pursuant to governmental regulations, including government levied fees as a result of healthcare reform policies;
- (d) rebates, chargebacks, and discounts (or the equivalent thereof) to managed health care organizations, pharmacy benefit managers (or the equivalent thereof), federal, state, provincial, local or other governments, or their agencies or purchasers, reimbursers, or trade customers;
- (e) charges separately invoiced to customers for outbound freight, insurance, transportation, postage and handling;
- (f) non-recoverable sales taxes, excise taxes, use taxes, value-added taxes, custom duties and other equivalent governmental charges levied on or measured by the billing amount for Product, as adjusted for rebates and refunds, to the extent separately itemized on the invoice (but specifically excluding, for clarity, any income taxes assessed against the income arising from such sale);
- (g) wholesaler inventory management fees; and
- (h) any other similar and customary deductions which are in accordance with Accounting Standards.

In no event shall any particular amount identified above be deducted more than once in calculating Net Sales (*i.e.*, no “double counting” of deductions). Net Sales will be determined from books and records of the Selling Party maintained in accordance with applicable Accounting Standards.

For clarification, sale of Product by a Selling Party to another Selling Party for resale by such entity to a Third Party (other than a Selling Party) shall not be deemed a sale for purposes

of this definition of “Net Sales,” provided that the subsequent resale is included in the computation of Net Sales. Further, transfers or dispositions of Product, without consideration: (A) in connection with patient assistance programs; (B) for charitable or promotional purposes; (C) for preclinical, clinical, regulatory or governmental purposes or under so-called “named patient” or other limited access programs; or (D) for use in any tests or studies reasonably necessary to comply with Applicable Law, regulation or request by a Regulatory Authority, shall not be deemed sales of such Product for purposes of this definition of “Net Sales.”

1A. Calculation of Net Sales of Combination Products. On a country-by-country basis, if a Product under this Agreement is sold in the form of a Combination Product in a country, Net Sales for the purpose of determining any payment hereunder shall be calculated as follows:

(a) Where both Product containing the Collaboration Compound as its sole active pharmaceutical ingredient (“**Single-Agent Product**”) and all Other Active(s) in such Combination Product are sold separately in such country, Net Sales shall be calculated by multiplying actual Net Sales of such Combination Product in such country (as determined in accordance with paragraph 1 of this **Exhibit B**) by the fraction $A/(A+B)$, where A is the net invoice price of Single-Agent Product in such country, and B is the sum of the net invoice prices of the Other Active(s) in the combination when sold separately in such country.

(b) If a Single-Agent Product is sold in such country, but none of the Other Active(s) is sold separately in such country, Net Sales shall be calculated by multiplying actual Net Sales of such Combination Product in such country (as determined in accordance with paragraph 1 of this **Exhibit B**) by the fraction A/C , where A is the net invoice price of such Single-Agent Product in such country, and C is the net invoice price of the Combination Product in such country.

(c) If no Single-Agent Product is sold separately in such country, but the Other Active(s) are sold separately in such country, Net Sales shall be calculated by multiplying actual Net Sales of such Combination Product in such country (as determined in accordance with paragraph 1 of this **Exhibit B**) by the fraction $(C-D)/C$, where C is the net invoice price of the Combination Product in such country, and D is the sum of the net invoice prices charged for the Other Active(s) in the Combination Product when sold separately in such country.

(d) If neither Single-Agent Product nor the Other Active(s) are sold separately in such country, Net Sales for the Combination Product shall be determined by mutual agreement of the Parties in good faith taking into account the relative value contributions of the Collaboration Compound portion of the Combination Product and the Other Active(s) in the Combination Product; *provided, however*, that in no event shall the relative value contribution of the Collaboration Compound portion of the Combination Product be less than 50%. In case of disagreement, an independent expert agreed upon by both Parties or, failing such agreement, designated by the International Centre for Dispute Resolution located in New York City, NY, shall determine such relative value contributions and such determination shall be final and binding upon the Parties.

2. “Product Revenue” means, with respect to any Product: (a) the sum of (x) Net Sales of such Product by Providence or its Affiliates (but excluding Net Sales by Providence’s

Sublicensees) and (y) Other Product Revenue with respect to such Product; less (b) royalties and milestone payments actually paid by a Party or its Affiliates to a Third Party under a Third Party License with respect to a Sublicensee's Development or Commercialization of Product, except to the extent such Sublicensee is obligated to reimburse a Party or its Affiliates for such milestone or royalty payments. Product Revenue will be determined from books and records maintained by a Party or its Affiliate in accordance with applicable Accounting Standards, consistently applied throughout the organization and across all products of such Party or its Affiliate.

3. "**Commercialization Expenses**" means the following costs of Commercialization activities actually performed by Providence or its Affiliates or their Third-Party subcontractors (but not by or on behalf of Sublicensees) with respect to a Product (to the extent not already deducted in calculating Net Sales), as approved by the JSC in the applicable Product Budget. Commercialization Expenses will be determined from books and records maintained in accordance with applicable Accounting Standards, consistently applied throughout the organization and across all products of the entity whose sales of Products are giving rise to Commercialization Expenses.

(a) "**Costs of Sales**": (i) the supply price paid by Providence or its Affiliates for Product for commercial distribution by or on behalf of Providence or its Affiliates; and (ii) to the extent not included in such supply price or reimbursed by a Third Party: (A) any other direct costs and expenses incurred by Providence or its Affiliates of Manufacturing, or having Manufactured, a Product, including costs of freight, customs, duty and shipping insurance for inbound Product for commercial distribution by or on behalf of Providence or its Affiliates; (B) actual inventory write-offs with respect to Product for commercial distribution by or on behalf of Providence or its Affiliates; and (C) in the event that the Parties mutually agree in writing that a license under Patent Rights of a Third Party is reasonably necessary for the manufacture, use or sale of a Product in a country (a "**Third Party License**"), such royalties and milestone payments that are mutually agreed by the Parties to be included in "Costs of Sales" and that are actually paid to such Third Party under such Third Party License by a Party or its Affiliates with respect to Providence's or its Affiliates' (but not a Sublicensee's) Development or Commercialization of such Product in such country.

Notwithstanding the foregoing definition or any other provision of this Agreement (including this **Exhibit B**) to the contrary, Commercialization Expenses (including, but not limited to, Costs of Sales) shall in all events exclude: (1) any and all amounts paid or payable by Providence or its Affiliate to a Third Party pursuant to a license agreement entered into by Providence or its Affiliate in settlement or compromise of any claim that the development, manufacture, production, use, importation, offer for sale, or sale of Products by or on behalf of Providence or its Affiliates or Sublicensees infringes the intellectual property rights of such Third Party; (2) any and all damages awarded to a Third Party against Providence or its Affiliates (or against a Sublicensee and paid, reimbursed or indemnified by Providence or its Affiliate) in any infringement action or claim brought by or on behalf of such Third Party with respect to development, manufacture, production, use, importation, offer for sale, or sale of Products by or on behalf of Providence or its Affiliates or Sublicensees; and (3) any and all Losses to which any Arcturus Indemnified Party may become subject as a result of a Third Party Claim and against which Providence is obligated to indemnify Arcturus under Section 12.1.1.

(b) **“Distribution Costs”**: the direct costs and expenses incurred by Providence or its Affiliates that are specifically identifiable to the distribution of a Product by Providence or its Affiliates, including customer services, collection of data about sales to hospitals and other end users, order entry, billing, shipping, credit and collection and other such activities, but in any case, not including any costs or expenses which are (i) reimbursed by any Third Party or (ii) deducted in calculating Net Sales of such Product by Providence and its Affiliates.

(c) **“Marketing Costs”**: with respect to a Product, the direct costs and expenses incurred by Providence or its Affiliates for marketing, promotion, advertising, promotional materials, professional education, product-related public relations, relationships with opinion leaders and professional societies, market research (before and after Regulatory Approval of a Product), healthcare economics studies, post-marketing studies required to maintain or expand Regulatory Approvals of such Product and other similar activities related to such Product and approved by the JSC. Such costs and expenses will include both internal costs (e.g., salaries, benefits, supplies and materials) and costs of outside services and expenses (e.g., consultants, agency fees and meeting costs). Marketing Costs shall also include costs and expenses incurred by Providence or its Affiliates that are directly related to obtaining reimbursement from payers and the cost of obtaining sales and marketing data (to the extent allocable to such Product and to the extent not included in the Distribution Costs or Sales Costs or deducted in calculating Net Sales). Notwithstanding anything to the contrary in the foregoing, Marketing Costs shall specifically exclude the cost and expense of activities that promote Providence’s or its Affiliates’ business as a whole without being specific to a Product (e.g., corporate image advertising).

(d) **“Sales Costs”**: with respect to a Product, direct costs and expenses incurred by Providence or its Affiliates for its account and specifically identifiable to the sales efforts for such Product in all markets in the Territory including the managed care market. Sales Costs shall include costs and expenses associated with sales representatives for a Product, including the cost of compensation, benefits, travel, supervision, training, sales meetings, and other sales expenses for such sales representatives. Notwithstanding anything to the contrary in the foregoing, Sales Costs shall exclude costs and expenses associated with the start-up of a Party’s sales force, including recruiting, relocation and other similar costs and expenses.

(e) **“Other Approved Operating Expenses”**: as may be approved by the JSC pursuant to Section 9.6.1.

4. **“Other Product Revenue”** means all payments and other consideration (including the fair market value of any non-cash consideration) received by Providence or its Affiliates from Third Parties, including Sublicensees, with respect to the commercialization of a Product, including any license fees, milestone payments, royalties (including on sales of Products by Sublicensees and other Third Parties) and other payments in connection with the grant of a license, sublicense, or option to license or sublicense, or the assignment or transfer, of rights with respect to such Product, but excluding: (i) payments for equity or debt securities of Providence or its Affiliate that are at or below the fair market value of such securities on the date of receipt, as determined in good faith by Providence’s or its Affiliates (as applicable) Board of Directors, if such securities are not then traded on a public securities exchange, or as determined by the closing

price of such securities of Providence or its Affiliate (as applicable) on the date of receipt, if such securities are then traded on a public securities exchange; (ii) *bona fide* research and development funding received by Providence or its Affiliate from a Sublicensee for Providence's or its Affiliate's employees' performance of specified research and development work with respect to such Product (*e.g.*, FTE funding) after the date of the applicable sublicense, and reimbursement by such Sublicensee of documented external costs incurred by Providence or its Affiliate after the date of the sublicense for specified research and development work with respect to such Product contracted by Providence or its Affiliate to Third Party service providers, in each case, specifically for such specified research and development work; *provided, however*, that any such research and development funding received by Providence or its Affiliate for Post-Phase 2 Development Costs that are included in the Post-Phase 2 Development Expenses shared by Parties in accordance with Section 9.4 and Section 9.6 of this Agreement shall be treated as "Other Product Revenue"; and (iii) payments and reimbursements by any Sublicensee of patent prosecution and maintenance costs actually incurred by Providence or its Affiliate after the date of the sublicense in the prosecution and maintenance of Providence-Controlled Patent Rights (for the avoidance of doubt, specifically excluding Product-Specific Patents) covering such Product that are licensed or sublicensed by Providence or its Affiliate to such Sublicensee.

*****Text Omitted and Filed Separately
with the Securities and Exchange Commission.
Confidential Treatment Requested
Under 17 C.F.R. Sections 200.80(b)(4) and Rule 24b-2**

RESEARCH COLLABORATION AGREEMENT

THIS RESEARCH COLLABORATION AGREEMENT is entered into and effective as of March 8, 2019 (the “**Effective Date**”), by and between **ARCTURUS THERAPEUTICS, INC. (“Arcturus”)**, a Delaware corporation, having offices at 10628 Science Center Drive, Suite 250, San Diego, CA 92121 and **MILLENNIUM PHARMACEUTICALS, INC. (“Takeda”)**, a wholly owned subsidiary of Takeda Pharmaceutical Company Limited and a Delaware corporation organized under the laws of Delaware, having offices at 40 Landsdowne Street, Cambridge, MA 02139, collectively the “**Parties**” and respectively the “**Party**”.

WHEREAS, Arcturus (i) owns a proprietary lipid nanoparticle technology referred to as LUNAR technology (the “**LUNAR Technology**”) which is useful in delivering therapeutic nucleic acid molecules to various cells in vivo, including hepatocytes, (ii) possesses expertise in producing lipid nanoparticle formulated therapeutic nucleic acid molecules, including mRNA, and (iii) has developed proprietary protein modification expertise, mRNA designs and processes to produce therapeutic mRNA molecules [...***...] ¹ and any data pertaining thereto), (the “**Arcturus mRNA Technology**”).

WHEREAS, Takeda possesses expertise in the pre-clinical and clinical development of therapeutic compounds to treat various conditions, including non-alcoholic steatohepatitis (NASH).

WHEREAS, the Parties have completed the Research Program to discover siRNA medicines under the Research Agreement executed by the Parties as of December 6, 2016, as amended (the “**2016 Research Agreement**”) with US \$[...***...] ² of the research funding which was paid by Takeda to Arcturus and remains unspent or uncommitted by Arcturus at the time of completion (the “**Remaining Funds**”).

WHEREAS, notwithstanding Section 3.2 of the 2016 Research Agreement providing Arcturus’ obligation to reimburse the Remaining Funds to Takeda, the Parties desire to collaboratively conduct the research set forth in **Exhibit A** hereto (the “**Research Plan**”), by using the Remaining Funds for the purpose of generating, producing and/or optimizing therapeutic mRNA molecules [...***...] ³ (collectively, the “**Materials**”) for their evaluation in [...***...] ⁴ (the “**Studies**”) to inform the Parties as to whether or not to further develop the Materials for the treatment of [...***...] ⁵.

¹ Confidential treatment requested

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Now, THEREFORE, in consideration of the foregoing premises and the mutual covenants set forth herein, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereby agree as follows:

1. **Conduct of the Studies.** The Studies will be carried out as agreed to in the Research Plan as set forth in Exhibit A and managed by the Parties. During the term of the Studies, Arcturus hereby grants a non-exclusive and worldwide license to Takeda, with a right to sublicense to Takeda's Affiliates and/or bona fide collaborators, to use Arcturus LUNAR Technology and Arcturus mRNA Technology solely for the purpose of conducting the Studies. If either Party desires to change the scope, duration or costs associated with the Studies under this Agreement that differs from the scope delineated in the Research Plan, such change must be agreed to by the Parties in writing.

2. **Research Funding.** The Parties agree to transfer all the Remaining Funds to cover the research funding under this Agreement. The Remaining Funds will cover all costs for Arcturus support and activities under the Research Plan and Arcturus shall use the Remaining Funds solely for the purpose of the Studies hereunder until the completion of the Studies. Except for a case of termination by Takeda of the Agreement pursuant to Section 18, the Parties agree that if part of the Remaining Funds are unspent or uncommitted for expenditure upon completion of the Studies, the Remaining Funds upon completion of the Studies are non-refundable.

3. **Takeda-Proposed [...***...]** 6. After the Effective Date, Takeda may disclose [...***...] 7 the focus of the Research Plan. Promptly after the disclosure [...***...] 8 by Takeda, Arcturus shall notify Takeda in writing whether the Takeda-Proposed [...***...] 9 is one of the Arcturus [...***...] 10, with reasonably competent evidence. If [...***...] 11 is not one of the Arcturus [...***...] 12, such [...***...] 13 is referred to as "**Takeda-Proposed [...***...] 14**" and is to be incorporated into the focus of the Research Plan.

4. **Inventions.** The term "**Inventions**" shall mean all ideas, inventions, techniques and other technology, whether or not patentable, that are generated, developed or discovered in the performance of the Studies hereunder (whether by or on behalf of either Party or both Parties), and all intellectual property rights, titles and interests in and to any of the foregoing. The Parties agree that all Inventions related to the Takeda-Proposed [...***...] 15 (including, without limitation, mRNA encoding the Takeda-Proposed [...***...] 16) (the "**Takeda Invention**") shall be owned solely by Takeda, and Arcturus hereby assigns to Takeda all right, title and interest in and to the Takeda Invention. The Parties agree that all Inventions other than Takeda Inventions (including,

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without limitation, improvements to the LUNAR Technology and, Arcturus mRNA Technology, and the Arcturus [...] 17) (the “*Arcturus Inventions*”) shall be owned solely by Arcturus, and Takeda hereby assigns to Arcturus all right, title and interest in and to all Arcturus Inventions. Each Party agrees promptly to disclose all Inventions that it generates, develops or discovers in the performance of the Studies to the other Party and with respect to the Inventions owned by the other Party pursuant to the immediate foregoing two sentences to execute such documents and perform such other acts as the other Party may reasonably request to obtain, perfect and enforce such rights to the Arcturus Inventions or Takeda Inventions, as applicable, and the assignment thereof. Each Party also shall require that any of its employee, officer or affiliate of it that engage in the Studies shall agree to assign, and shall assign, to it any Inventions made by such employee, officer or affiliate. For the purpose of Section 11, all information regarding Arcturus Inventions shall be Confidential Information of Arcturus and all information regarding Takeda Inventions shall be Confidential Information of Takeda.

5. **Exclusivity of Research Collaboration.** During the Term (as defined in Section 18), the Parties will not participate in, inform or perform any other research on therapeutic mRNA molecules designed to express [...] 18 outside of this Agreement either internally or with or for a third party.

6. **Results of the Research Plan.**

(a) **Report.** Upon the completion of each Party’s responsibilities under the Research Plan, to the extent applicable, each Party will provide the other Party with a written report of the following items:

(i) Descriptions of the work completed in the Studies;

(ii) Any Inventions; and

(iii) The data and other results generated in the performance of the Studies, the characterization of the Materials, and the methods by which the Materials and/or data and other results were generated (collectively, the “*Research Results*”).

Notwithstanding the foregoing, Arcturus has no obligation to disclose to Takeda the sequences of the mRNA constructs designed by Arcturus until the collaboration and/or license agreement is executed between the Parties as contemplated in Section 7. For clarification, the Research Results do not include any Inventions.

(b) **Takeda Research Results.** All Research Results that are related to the Takeda Proposed [...] 19 and not an Arcturus [...] 20 (the “*Takeda Research Results*”) shall be owned solely by Takeda. Arcturus shall treat the Takeda Research Results as the

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(c) **Joint Research Results.** The Research Results other than the Takeda Research Results (the “**Joint Research Results**”) shall be owned jointly by the Parties.

(i) **Use and Confidentiality During the Term.** During the Term, Arcturus shall treat the Joint Research Results as the Confidential Information of Takeda as if they were disclosed by Takeda to Arcturus hereunder and Takeda shall treat the Joint Research Results as the Confidential Information of Arcturus as if they were disclosed by Arcturus to Takeda hereunder, in each case in accordance with the terms and conditions of Section 11.

(ii) **Use and Confidentiality After the Term.** After the end of Term, unless otherwise agreed between the Parties in the collaboration and/or license agreement that Section 7 contemplates, Arcturus and Takeda may use, and may have a third party use, the Joint Research Results for any purposes without paying consideration to the other party; *provided*, during [...] 21 after the Term, each Party shall maintain all Joint Research Results in confidence and shall ensure that a third party to whom the Party discloses the Joint Research Results is bound by the substantially comparable confidentiality obligation. The foregoing confidentiality obligation shall not apply to any information that either Party can establish by competent written proof falls becomes to fall under any of the exceptions provided in Section 12.

7. **Exclusive Option.** Arcturus hereby grants Takeda an exclusive option to negotiate an exclusive research collaboration and/or an exclusive or non-exclusive license to LUNAR Technology, Arcturus mRNA Technology, the Arcturus Inventions and Arcturus’ rights in the Joint Research Results, for the further research, development and commercialization of mRNA therapeutics designed [...] 22, and Takeda will have [...] 23 to exercise such option (the “**Exclusive Option Period**”) by delivering to Arcturus a written notice of option exercise (the “**Option Exercise Notice**”). Arcturus shall negotiate the terms and conditions of such collaboration and/or licenses [...] 24 (the “**Exclusive [...] 25 Period**”). Upon execution of the collaboration and/or license agreement pursuant to this Section 7, Arcturus shall disclose the [...] 26 designed by Arcturus to Takeda. [...] 27, the Parties are unable to agree to the terms and conditions of the collaboration and/or license agreement, Arcturus may enter into an agreement relating to a research collaboration and/or an exclusive or non-exclusive license to LUNAR Technology, Arcturus mRNA Technology, the Arcturus Inventions and Arcturus’ rights in the Joint Research Results, for the further research, development and commercialization of mRNA therapeutics designed [...] 28 with any third party, *provided*,

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that for [...***...] 29 after expiration of the Exclusive [...***...] 30 Period, the terms [...***...] 31.

8. Transfer of Materials; Use of Materials. In accordance with the Research Plan, Arcturus shall transfer the Materials to Takeda [...***...] 32. Takeda shall use the Materials solely for conducting the Studies under this Agreement and for no other purpose, including without limitation any commercial purpose or any research other than the Studies. Unless otherwise permitted in the Research Plan or authorized by Arcturus in writing, Takeda shall not modify or create derivatives of the Materials, combine or mix the Materials with any other compound or ingredient or otherwise use the Materials in combination with any other compound or ingredient, or attempt to reverse engineer, deconstruct or in any way determine the structure or composition of the Materials. Takeda shall not sell, transfer, disclose or otherwise provide access to the Materials, any derivative thereof, or any material resulting from the use of the Materials or any derivative thereof, to any person or entity without the express prior written consent of Arcturus (which Arcturus may withhold in its sole discretion), except that Takeda may allow access to the Materials to those employees of Takeda, its affiliates or its third party contractors who require such access in order to conduct the Studies on behalf of Takeda and for the Purpose; provided that such employees, affiliates and contractors are bound by written agreement to retain and use the Materials in a manner that is substantially consistent with the terms of this Agreement. When the Studies are completed in accordance with the Research Plan, Takeda shall return any remaining Materials to Arcturus, or otherwise dispose of the Materials as instructed by Arcturus.

9. Restrictions on Use. Takeda understands and agrees that the Materials may have unpredictable and unknown properties, that they are to be used with caution, and that they are not to be used for testing in or treatment of humans; provided, to its knowledge, Arcturus shall notify Takeda of information on the properties of the Materials reasonably necessary for Takeda to handle the Materials safely and in compliance with the following sentence. Takeda shall use the Materials in compliance with all applicable laws and regulations, including, but not limited to, any laws or regulations relating to the research, testing, production, storage, transportation, export, packaging, labeling or other authorized use of the Materials.

10. Records; Results. Each Party shall keep complete and accurate records of the results of the Studies performed under this Agreement and all Inventions and shall promptly and fully disclose to each other such results and Inventions. The Parties may discuss, in person or otherwise, the Studies and the results thereof from time to time with each other. During the Term, neither Party shall publish or present any information or data related to the Studies or the results thereof or any Inventions without the prior written consent of the other Party.

11. Confidentiality. For purposes of this Agreement, “**Confidential Information**” shall mean (a) any and all knowledge, know-how, practices, processes, inventions, ideas and other information disclosed or made available by one Party (the “**Disclosing Party**”) to the other (the “**Receiving Party**”), whether in written, oral, graphic, electronic or other form, and (b) information

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regarding all Research Results, including Inventions, that are owned by the other Party. During the Term and [...] 33 thereafter, each Party shall maintain all Confidential Information of the other Party in strict confidence and not to disclose any Confidential Information to any third party without obtaining a prior written consent of the other Party. Each Party shall use the Confidential Information only for the purpose of carrying out the Studies and for the Purpose, and for no other purpose without obtaining a prior written consent of the other Party. Each Party may disclose Confidential Information to its employees, officers, directors and consultants (and those of its affiliate or its third party contractors) requiring access thereto for conducting the Studies and for the Purpose; provided that each such employee, officer, director or consultant is bound by a written agreement to maintain the Confidential Information in confidence and to use Confidential Information solely to perform the Studies and for the Purpose. A Party who discloses Confidential Information pursuant to the immediate foregoing sentence shall take all steps reasonably necessary to ensure that its employees, officers, directors, consultants and other representatives comply with the terms and conditions of this Agreement.

12. Exceptions. The obligations of Section 11 shall not apply to any information that the Receiving Party can establish by competent written proof:

(a) at the time of disclosure to the Receiving Party hereunder is in the public domain or otherwise available to the public;

(b) [...] 34

For purposes of clause (a) of this Section 12, no combination of elements within the Confidential Information shall be deemed to be part of the public domain merely because the individual elements of such combination are part of the public domain, unless the entire combination itself, or the entire principle of use or operation of such combination (if any), is part of the public domain. In addition, no element within the Confidential Information shall be deemed to be a part of the public domain merely because it is embraced by more general information or data that is part of the public domain.

13. Authorized Disclosure. Notwithstanding the provisions of Section 11, each Party may disclose Confidential Information, without violating its obligations under this Agreement, to the extent the disclosure is required by a valid order of a court or other governmental body of competent jurisdiction or is otherwise required by law or regulation, *provided* that the Party shall give reasonable prior written notice to the other Party of such required disclosure and, at the other Party's request and expense, shall cooperate with the other Party's efforts to contest such requirement, to obtain a protective order requiring that the Confidential Information so disclosed be used only for the purposes for which the order was issued or the law or regulation required, and/or to obtain other confidential treatment of such Confidential Information.

14. Compliance of Personnel of Each Party. [...] 35

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15. **Ownership; No License.** The LUNAR Technology and Arcturus mRNA Technology shall at all times remain the sole and exclusive property of Arcturus, and, except for the license granted in Section 1, Takeda shall not obtain any right, license or ownership interest in or to any LUNAR Technology or Arcturus mRNA Technology as a result of its receipt or use of the Materials (including, but not limited to, use of Materials in the performance of the Studies) pursuant to this Agreement. Nothing in this Agreement shall be construed as conferring on Takeda, expressly or by implication, any license, option to license or other right with respect to any patent, patent application or other intellectual property owned or controlled by Arcturus, except for the license granted in Section 1. Nothing in this Agreement grants Takeda the right to retain, distribute or commercialize the Materials (including derivatives thereof) under LUNAR Technology and Arcturus mRNA Technology or any other Confidential Information of Arcturus, or to use any of the foregoing in any manner other than as expressly permitted by this Agreement. In addition, nothing in this Agreement shall impose any obligation upon either Party to negotiate or consummate a transaction or other business relationship with the other Party, to continue discussions with the other Party, or to prevent either Party from pursuing similar discussions, negotiations and business relationships with third parties unless otherwise restricted herein.

16. **Disclaimer.** THE MATERIALS ARE SUPPLIED TO TAKEDA WITH NO WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, AND ARCTURUS HEREBY DISCLAIMS ALL WARRANTIES, INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT.

17. [...***...] 36

18. **Term.** The term of this Agreement (“*Term*”) shall begin on the Effective Date and, subject to earlier termination of this Agreement in accordance with this Section 18, shall terminate upon the expiration of the Exclusive Option Period (or the expiration of the Exclusive [...***...] 37 Period if Takeda provides the Option Exercise Notice within the Exclusive Option Period). [...***...] 38 In addition, either Party shall have the right to terminate this Agreement for material breach of this Agreement by the other Party upon [...***...] 39 days’ written notice specifying the nature of the breach, unless such breach is cured to the non-breaching Party’s reasonable satisfaction within such 15-day period. Neither expiration nor termination shall relieve either Party of any obligation accruing prior to such expiration or termination. Sections [...***...] 40 shall survive the expiration or any termination of this Agreement.

19. **Independent Contractors.** The Parties shall perform their obligations under this Agreement as independent contractors and nothing contained in this Agreement shall be construed to be inconsistent with such relationship or status. This Agreement shall not constitute, create or in any way be interpreted as a joint venture or a partnership of any kind.

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20. Notices. Any notices required or permitted to be given by a Party hereunder shall be given to the other Party at the address specified below or at such other address as the other Party shall specify in writing. Such notices shall be in writing and shall be deemed given (i) upon personal delivery to the appropriate address, (ii) upon acknowledgment of receipt if delivered by electronic mail, or (iii) if sent by overnight courier, the next business day such courier regularly makes deliveries.

21. Governing Law. This Agreement will be governed by and construed according to the laws of the State of New York, USA, excluding its conflicts of laws principles.

22. Injunctive Relief. Takeda hereby acknowledges and agrees that in the event of any breach of this Agreement by Takeda, including, without limitation, the actual or threatened unauthorized disclosure or use of the Materials or Confidential Information without the prior express written consent of Arcturus, Arcturus may suffer an irreparable injury such that no remedy at law would adequately protect or appropriately compensate Arcturus for such injury. Accordingly, Takeda agrees that Arcturus shall have the right to enforce this Agreement and any of its provisions by injunction, specific performance or other equitable relief, without bond and without prejudice to any other rights and remedies that Arcturus may have for a breach of this Agreement.

23. Entire Agreement; Amendment. This Agreement (including the Exhibit hereto) contains the final, complete and exclusive agreement of the Parties relative to the subject matter hereof and supersedes all prior and contemporaneous understandings and agreements relating to said subject matter. This Agreement may not be changed, modified, amended or supplemented except by a written instrument signed by duly authorize representatives of both Parties.

24. Severability. If any provision of this Agreement shall be declared invalid, illegal or unenforceable, such provision shall be severed and all remaining provisions shall continue in full force and effect.

25. Assignment. The Parties' rights and obligations under this Agreement will bind and inure to the benefit of their respective successors and permitted assigns. Neither Party shall have the right to assign or otherwise transfer this Agreement or any of its rights or obligations hereunder without the prior written consent of the other Party. Any attempted assignment or transfer not in accordance with this Agreement shall be void.

26. Non-Waiver. Neither the waiver by Arcturus of any of its rights under this Agreement, nor Arcturus's failure to enforce any provision of this Agreement or exercise any remedy hereunder, shall operate or be construed as a continuing waiver of same or of any other of Arcturus's rights or remedies provided in this Agreement. Any waiver by Arcturus of any right under this Agreement shall be specific as to a particular matter and shall not be effective unless in writing and signed by Arcturus. Neither the waiver by Takeda of any of its rights under this Agreement, nor Takeda's failure to enforce any provision of this Agreement or exercise any remedy hereunder, shall operate or be construed as a continuing waiver of same or of any other of Takeda's rights or remedies provided in this Agreement. Any waiver by Takeda of any right under this Agreement shall be specific as to a particular matter and shall not be effective unless in writing and signed by Takeda.

27. **Interpretation.** The headings of clauses contained in this Agreement preceding the text of the sections, subsections and paragraphs hereof are inserted solely for convenience and ease of reference only and shall not constitute any part of this Agreement, or have any effect on its interpretation or construction. All references in this Agreement to the singular shall include the plural where applicable. Ambiguities and uncertainties in this Agreement, if any, shall not be interpreted against either Party, irrespective of which Party may be deemed to have caused the ambiguity or uncertainty to exist. This Agreement has been prepared in the English language, and the English language shall control its interpretation. In addition, all notices required or permitted to be given hereunder, and all written, electronic, oral or other communications between the Parties regarding this Agreement, shall be in the English language.

28. **Counterparts.** This Agreement may be executed in counterparts, each of which shall be deemed an original document, and all of which, together with this writing, shall be deemed one instrument. This Agreement may be executed and delivered by facsimile signature, PDF, or any electronic signature complying with the U.S. federal ESIGN Act of 2000 (e.g., www.docusign.com), any of which signatures shall have the same force and effect as original signatures.

[Signature page follows]

IN WITNESS WHEREOF, the Parties have, by duly authorized persons, executed this Agreement as of the Effective Date.

ARCTURUS THERAPEUTICS, INC.

MILLENNIUM PHARMACEUTICALS, INC.

By: /s/ Joseph Payne

By: /s/ Colm White

Name: Joseph Payne

Name: Colm White

Title: President & CEO

Title: VP of Operations

Address:

Address:

Arcturus Therapeutics, Inc.
10628 Science Center Drive, Suite 250
San Diego, CA 92121
[...***...]41

Millennium Pharmaceuticals, Inc.
40 Landsdowne Street, Cambridge,
MA, 02111
[...***...] 42

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EXHIBIT A
DESCRIPTION OF MATERIALS AND STUDIES

[...***...]43

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Code of Business Conduct and Ethics

Introduction

Ethics are important to Arcturus Therapeutics Ltd. (together with its subsidiaries, “Arcturus”) and its directors, officers and employees (each an “Associate”). Arcturus is committed to the highest ethical standards and to conducting its business with the highest level of integrity.

The Arcturus Code of Business Conduct and Ethics (the “Code”) has four primary functions:

- To establish and clearly communicate our standards of business conduct, our ethical principles and our expectations;
- To ensure that business policies and practices continue to be aligned with those standards and principles;
- To establish responsibility for monitoring compliance; and
- To set forth the manner in which perceived violations of ethical principles are to be reported.

The Code applies to all Associates.

Ethics

Arcturus is committed to the ideals of uncompromising honesty and integrity. As an Arcturus Associate you are expected to adhere to the highest standards of ethics; to be honest and ethical in dealing with each other, with shareholders and with customers, vendors and all other third parties.

You also must respect the rights of your fellow Associates and third parties. Your actions must be free from discrimination, libel, slander or harassment. Each person must be accorded equal opportunity, regardless of age, race, sex, sexual preference, color, creed, religion, national origin, marital status, veteran’s status, handicap or disability.

Misconduct (any violation of this Code) will be addressed as it is identified with appropriate disciplinary action. Misconduct cannot be excused because it was directed or requested by another. You are expected to alert management whenever an unethical, dishonest or illegal act is discovered or suspected, as further provided for in this Policy.

The following areas frequently give rise to ethical concerns. A violation of the standards contained in this Code will result in corrective action, including possible dismissal.

Should you have any questions concerning this Policy, please direct them to the Chief Financial Officer of Arcturus (the “CFO”). The CFO may consult outside counsel with respect to any issue relating to this Policy.

Conflicts of Interest

Conflicts of interest arise whenever actions are based on interests other than those of Arcturus. You must avoid any personal activity, investment or association that may interfere with using good judgment concerning Arcturus's best interests. You may not exploit your position or relationship with Arcturus for personal gain. You should avoid even the appearance of such a conflict. For example, a conflict of interest may arise if you:

- Cause Arcturus to engage in business transactions with relatives or friends;
- Use information of Arcturus, a customer or supplier for your own personal gain, or the personal gain of relatives or friends;
- Have a financial interest in Arcturus's customers, suppliers or competitors;
- Receive a loan or guarantee of obligations, from Arcturus or from a third party, as a result of your position at Arcturus; or
- Compete, or prepare to compete, with Arcturus while still employed by it.

Employees who are involved in or are aware of a transaction involving any of the relationships described above, must report the transaction to the CFO. Directors and officers shall report such transactions to the Chairman of Arcturus's Audit Committee. All transactions between Arcturus and any employee or member of the Associate's immediate family, or any entity in which such employee or a member of his or her immediate family has a significant financial interest, must be approved by the CFO.

Transactions described in the previous sentence between Arcturus and any director or officer or member of such person's immediate family, or any entity in which such person or member of his or her immediate family has a significant financial interest, must be approved by the Board of Directors.

There may be other situations in which a conflict of interest may arise. If you have any questions or concerns about any situation, follow the guidance outlined in the section below on Reporting Ethical Violations.

Public Reporting of Financial and Non-financial Information

Arcturus is, or about to become, a publicly traded company in the U.S. and thus, subject to the Securities Act of 1933, the Securities Exchange Act of 1934 and numerous other laws, rules and regulations promulgated thereunder (the "Securities Laws"). The U.S. Securities and Exchange Commission (the "SEC") requires companies to maintain disclosure controls and procedures designed to ensure that information required by the Securities Laws to be disclosed by publicly held companies is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms. It is, therefore, imperative that all disclosures contained in Arcturus's public filings and other public communications are full, fair, accurate, timely and understandable.

Every Associate who participates in the information gathering process for Arcturus's public filings and other public communications is responsible for the timeliness and accuracy of the information contained therein. Those persons having responsibility for particular areas of Arcturus's periodic reports such as the Annual Report on Form 10-K, Quarterly Reports on Form 10-Q and Current Reports on Form 8-K must report to the Board on an ongoing basis the following matters which come to their attention:

- Deviations from or changes to the current public information available for Arcturus;
- Changes in risks, or new risks, to Arcturus as they are identified; and
- Changes that may affect Arcturus's financial results.

Arcturus may establish a separate Disclosure Policy that may provide who may communicate information to the press and the financial analyst community. You should review Arcturus's Disclosure Policy and discuss all questions that you may have with the CFO.

Our employees who work in the Financial Department hold an important and elevated role in corporate governance. They are empowered to ensure that shareholder interests are appropriately balanced, protected and preserved. Accordingly, all financial managers are expected to uphold the following standards:

- To provide information that is accurate, complete, objective, relevant, timely and understandable;
- To comply with laws, rules and regulations of federal, state, provincial and local governments, and appropriate regulatory agencies;
- To act in good faith, responsibly, with due care, competence and diligence, without misrepresenting facts or allowing their independent judgment to be subordinated;
- To respect the confidentiality of information acquired in connection with their activities for Arcturus, except when authorized or otherwise legally obligated to disclose;
- To share knowledge and to maintain skills needed to perform their jobs;
- To proactively promote ethical behavior as a responsible partner among peers in the workplace and community; and
- To achieve responsible use of and control over all assets and resources employed by or entrusted to them.

Compliance with all governmental laws, rules and regulations applicable to Arcturus is mandatory and any violations thereof are considered violations of this Code. Mistakes should never be covered up, but should be immediately fully disclosed and corrected, if possible.

If you have any questions about your duties with regard to public reporting, please ask the CFO.

Bribes and Kickbacks

A kickback or bribe includes any item intended to improperly obtain favorable treatment. Other than for modest gifts given or received in the normal course of business (e.g., coffee mugs, pens and other logoed promotional materials or business lunches), neither you nor your relatives may give gifts to, or receive gifts from, Arcturus's customers and suppliers. Other gifts may be given or accepted only with prior approval of the CFO. In no event should you put Arcturus or yourself in a position that would be uncomfortable if knowledge of the gift was made public. Dealing with government employees is often different than dealing with private persons. Many governmental bodies strictly prohibit the receipt of any gratuities by their employees, including meals and entertainment. You must be aware of and strictly follow these prohibitions.

Conducting Business Outside of the United States and the Foreign Corrupt Practices Act

Arcturus has an international presence and thus, certain Associates or other affiliates of the company may find it necessary to interact with foreign governments or officials in the furtherance of Arcturus's business activities. In any dealings with foreign officials, candidates, or political parties, Arcturus and its Associates, consultants, agents, subsidiaries, distributors, resellers, and representatives, must comply with the following policy.

Generally, Arcturus policies, the U.S. Foreign Corrupt Practices Act (“FCPA”), and applicable foreign laws prohibit payments to, and business relationships with, government officials (“government officials” may include employees of entities that are state-owned, in whole or part, public international organizations and political parties or political candidates) that could be construed as bribes or attempts to influence government behavior.

You may not give, offer, promise, or authorize direct or indirect payments to foreign officials for the purpose of obtaining or retaining business for Arcturus. Payments include money, gifts, or anything of value, and need not actually be delivered, but merely have been intended for a corrupt purpose, to violate the FCPA. It is therefore illegal and against Arcturus policy for any Associate or other Arcturus representative to offer or give anything of value that is intended to:

- influence any act or decision of a foreign official in his or her official capacity;
- induce the official violate a lawful duty of his position or to use his influence improperly; or
- obtain an improper advantage for Arcturus.

Arcturus and individuals may face significant civil and criminal punishment in both the United States and in other countries, including imprisonment, for violating the FCPA and local laws.

Acknowledging that in certain foreign localities, payments to local government officials may be customary to expedite processes such as the granting of a business license or similarly routine governmental action, the FCPA contains a narrow exception for such payments. In every case, prior to making, promising, or offering any such payment, any Associate or affiliate of Arcturus must consult with the CFO should uncertainties arise. Furthermore, if it is determined that a payment meets this narrow exception, it must be recorded accurately by the accounting department, as it is an independent violation of the FCPA to mischaracterize any such payment in the financial records. Both the consultation with the CFO and the accounting treatment of the payment must be documented in writing.

Quality and Regulatory Compliance

Arcturus is subject to numerous international, federal and state laws concerning the design, clinical development, manufacture, distribution and promotion of its products. The Federal Food, Drug, and Cosmetic Act (the “FDC Act”) is the primary regulatory statute governing Arcturus’s activities. The FDC Act is implemented by the U.S. Food and Drug Administration (the “FDA”) through the promulgation of regulations and by the issuance of guidelines and other informal notices regarding compliance requirements. FDA regulations applicable to medical devices, biologics and pharmaceuticals encompass a wide variety of activities including: product clearance; labeling, advertising, and promotion; reporting requirements; establishment registration and product listing; current good manufacturing practices; and preclinical studies and clinical studies. Other federal agencies also have applicable laws, regulations and guidelines, as do individual state governments. Arcturus has established policies and procedures to ensure that our activities are conducted in compliance with the federal and state laws and regulations pertaining to FDA-regulated products.

In addition to legal compliance, you are required to maintain the highest ethical and scientific standards in researching and developing Arcturus’s products. Associates are further required to be scrupulously accurate in data submitted to FDA, publications, or any other party. You will adhere to all standards and procedures necessary to ensure rigorous scientific inquiry and will interact with federal and state agencies in a forthright manner designed to ensure the safe and effective use of its products. Additionally, in accordance with Arcturus’s objective, Associates are required to manufacture Arcturus’s products in a manner designed to ensure their safety, integrity, and suitability for patients, and to market and sell its products in an honest and balanced manner that provides health professionals with the information necessary to use its products appropriately. Clinical studies will be conducted in such a fashion as to safeguard the welfare of subjects and ensure the scientific integrity of the research.

Associates will maintain accurate and complete records of all data related to FDA-regulated products in order to comply with FDA regulations. This work includes research and development, preclinical and clinical studies, manufacturing, marketing, quality control and quality assurance, regulatory and other activities as determined by our Chief Executive Officer (“CEO”). As part of Arcturus’s quality system, Associates are required to maintain reliable documentation. The accuracy of data in our records, including full disclosure, lack of material omission, and integrity of the data is your priority.

Any Associate who alters or falsifies data, destroys or fails to maintain product related data, or omits data from records that are needed to provide full information regarding a commercial or development stage product is acting in violation of this Code. If you have questions related to quality and regulatory compliance, you should consult with your supervisor, or the CEO.

Improper Use or Theft of Arcturus Property

Every Associate must safeguard Arcturus property from loss or theft, and may not take such property for personal use. Arcturus property includes such items as biological materials, chemicals, laboratory equipment and machinery, inventory, vehicles, software, computers, office equipment, and supplies as well as confidential information such as non-public personal information about customers, customer lists, and proprietary product information, to name a few. You must appropriately secure all Arcturus property within your control to prevent its unauthorized use.

Fair Dealing

No Arcturus Associate should take unfair advantage of anyone through manipulation, abuse of privileged information, misrepresentation of facts, or any other unfair-dealing practice.

Fair Competition and Antitrust Laws

Arcturus must comply with all applicable fair competition and antitrust laws. These laws attempt to ensure that businesses compete fairly and honestly and prohibit conduct seeking to reduce or restrain competition. If you are uncertain whether a contemplated action raises unfair competition or antitrust issues, you should raise the issue with the CFO.

Insider Trading

If an Associate has material non-public information relating to Arcturus, it is our policy that neither that person (nor any of his/her relatives) may buy or sell any Arcturus securities or engage in any other action to take advantage of, or pass on to others, that information. This policy also applies to information relating to any other company, including our customers, partners or suppliers, obtained in the course of employment. Officers, directors and employees should carefully review and comply with Arcturus’s separate Insider Trading Policy, if and when such policy is adopted. Questions regarding insider trading should be addressed to the CFO.

Waivers and Amendments of the Code

Any waiver of any provision of this Code for any of our directors or executive officers, or any amendment of this Code, must be approved in writing by our Audit Committee (or Board of Directors if an Audit Committee has not been formed) and must be disclosed to shareholders and to others, along with the reasons for such waiver, as required by applicable laws and regulations in the manner or manners required thereby. Any waiver of any provision of this Code with respect any other Associate must be approved in writing by our CFO. Waivers will be granted only as permitted by law and in extraordinary circumstances.

Reporting Ethical Violations

Your conduct can reinforce an ethical atmosphere and provide influence on the conduct of fellow Associates. Associates are empowered by the Code to act in situations where they have the authority or feel comfortable enough to stop unethical behavior. If the unethical behavior is prevented by your actions, then no report is necessary. However, if you are aware of any violations of this Code and feel powerless to stop them, you must report them to the CFO or to your direct supervisor. You also may contact the Chief Executive Officer of the company.

If you are still concerned after speaking with Arcturus officers or feel uncomfortable speaking with them (for whatever reason), you may contact the Chairman of Arcturus's Audit Committee at the following address:

Chairman of the Audit Committee
Arcturus Therapeutics, Ltd.
10628 Science Center Drive,
Suite 250
San Diego, CA 92121

You may write anonymously and you should include copies of relevant documents.

Arcturus's policy prohibits discrimination, harassment and retaliation against any Associate who in good faith provides any information or otherwise assists in any investigation or proceeding regarding any potential violation of this Policy.

Accountability for Adherence to the Code

The CFO shall report to our Audit Committee on all material issues relating to this Policy. Our Audit Committee enforces this Code by evaluating all alleged violations of this Code after all of the pertinent information has been gathered and appropriate action will be determined with the involvement of counsel. If an alleged violation of this Code has been reported to it, the Audit

Committee shall determine whether that violation has occurred and, if so, shall determine the disciplinary measures to be taken against any Associate who has violated this Code.

The disciplinary measures, which may be invoked at the discretion of the Audit Committee, include, but are not limited to, counseling, oral or written reprimands, warnings, probation or suspension without pay, termination of employment or other relationship with us and restitution.

Until an Audit Committee is formed, the Board of Directors of Arcturus shall have all responsibilities and authority our Audit Committee has under this Code.

Arcturus is committed to upholding this Code and is supporting all Associates who aid in this endeavor. Arcturus will not tolerate any form of retaliation for reporting suspected violations of this Code.

CONSENT OF INDEPENDENT REGISTERED ACCOUNTING FIRM

We consent to the incorporation by reference in the Registration Statements on Form F-3 (Registration Nos. 333-209960 and 333-197411) and Registration Statements on Form S-8 (Registration Nos. 333-194875, 333-202394, 333-209947, 333-217556, 333-221830 and 333-227843) of Arcturus Therapeutics Ltd. of our report dated March 15, 2019, with respect to the consolidated financial statements of Arcturus Therapeutics Ltd. and its subsidiaries for the year ended December 31, 2018 included in this Annual Report (Form 10-K) for the year ended December 31, 2018.

/s/ Ernst & Young LLP

San Diego, California
March 15, 2019

CONSENT OF INDEPENDENT REGISTERED ACCOUNTING FIRM

We consent to the incorporation by reference in the Registration Statements on Form F-3 (Registration Nos. 333-209960 and 333-197411) and Registration Statements on Form S-8 (Registration Nos. 333-194875, 333-202394, 333-209947 333-217556, 333-221830 and 333-227843) of Arcturus Therapeutics Ltd. of our report dated May 14, 2018 with respect to the consolidated financial statements of Arcturus Therapeutics Ltd. and its subsidiaries for the year ended December 31, 2017 included in this Annual Report on Form 10-K for the year ended December 31, 2018.

Tel-Aviv, Israel
March 15, 2019

KOST FORER GABBAY & KASIERER
A member of Ernst & Young global

**CERTIFICATION PURSUANT TO
RULES 13a-14(a)**

I, Joseph E. Payne, certify that:

1. I have reviewed this Annual Report on Form 10-K of Arcturus Therapeutics Ltd.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a) all significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b) any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 15, 2019

By: _____
/s/ Joseph E. Payne
Joseph E. Payne
President, Chief Executive Officer and Director
(principal executive officer)

**CERTIFICATION PURSUANT TO
RULES 13a-14(a)**

I, Andrew Sassine, certify that:

1. I have reviewed this Annual Report on Form 10-K of Arcturus Therapeutics Ltd.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a) all significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b) any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 15, 2019

By: _____ /s/ Andrew Sassine

Andrew Sassine
Director and Chief Financial Officer
(principal financial officer)

**CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350**

In connection with the Annual Report of Arcturus Therapeutics Ltd. (the "Company") on Form 10-K for the fiscal year ended December 31, 2018 (the "Report"), I, Joseph E. Payne, President, Chief Executive Officer and Director of the Company, hereby 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 15(d) of the Securities Exchange Act of 1934; 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: March 15, 2019

By: _____ /s/ Joseph E. Payne
Joseph E. Payne
President, Chief Executive Officer and Director
(principal executive officer)

**CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350**

In connection with the Annual Report of Arcturus Therapeutics Ltd. (the "Company") on Form 10-K for the fiscal year ended December 31, 2018 (the "Report"), I, Andrew Sassine, Chief Financial Officer and Director of the Company, hereby 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 15(d) of the Securities Exchange Act of 1934; 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: March 15, 2019

By: _____ /s/ Andrew Sassine
Andrew Sassine
Director and Chief Financial Officer
(principal financial officer)

**CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350**

In connection with the Annual Report of Arcturus Therapeutics Ltd. (the "Company") on Form 10-K for the fiscal year ended December 31, 2018 (the "Report"), I, Keith C. Kummerfeld, Vice President of Finance and Corporate Controller of the Company, hereby 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 15(d) of the Securities Exchange Act of 1934; 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: March 15, 2019

By: _____ /s/ Keith C. Kummerfeld

Keith C. Kummerfeld

Vice President of Finance and Corporate Controller
(principal accounting officer)