ARATANA THERAPEUTICS, INC.
Form 10-K
March 13, 2019

UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

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

For the Fiscal Year Ended December 31, 2018

TRANSITION REPORT PURSUANT TO SECTION 12 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

Commission file number: 001-35952

ARATANA THERAPEUTICS, INC.

(Exact name of registrant as specified in its charter)

Delaware	38-3826477
(State or other jurisdiction of	(I.R.S. Employer

incorporation or organization) Identification Number)

11400 Tomahawk Creek Parkway, Suite 340

Leawood, KS 66211

(913) 353-1000

(Address of principal executive offices, zip code and telephone number, including area code)

Securities Registered Pursuant to Section 12(b) of the Act:

Title of Each Class	Name of Exchange on Which Registered
Common Stock, par value $0.001 per share	The Nasdaq Stock Market LLC

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

_____

Indicate by check mark whether the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act of 1933 Yes: No:

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

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 and 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 is not contained herein, and will not be contained, to the best of the registrant’s knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K

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

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

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

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

The approximate aggregate market value of the common stock held by non-affiliates of the registrant based upon the closing price of the registrant's common stock on the Nasdaq Global Market on June 30, 2018 was $172,128,753.

As of March 8, 2019, there were 48,974,228 shares of common stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Specified portions of the registrant's definitive proxy statement to be filed in connection with the registrant's 2019 annual meeting of stockholders are incorporated by reference into Part III of this Form 10-K.

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ARATANA THERAPEUTICS, INC.

FORM 10-K

For the Year Ended December 31, 2018

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Aratana Therapeutics and our logo are two of our trademarks that are used in this filing. This filing also includes trademarks, tradenames and service marks that are the property of other organizations. Solely for convenience, trademarks and tradenames referred to in this filing appear without the ® and ™ symbols, but those references are not intended to indicate, in any way, that we will not assert, to the fullest extent under applicable law, our rights or that the applicable owner will not assert its rights, to these trademarks and tradenames.

PART I

Cautionary Note Regarding Forward-Looking Statements

Except for historical information, the matters discussed in this Annual Report on Form 10-K for the fiscal year ended December 31, 2018 ("2018 Annual Report") are forward-looking statements that involve risks, uncertainties and assumptions that, if they never materialize or if they prove incorrect, could cause our consolidated results to differ materially from those expressed or implied by such forward-looking statements. The Company makes such forward-looking statements under the "Safe Harbor" section of the Private Securities Litigation Reform Act of 1995. Actual future results may vary materially from those projected, anticipated, or indicated in any forward-looking statements as a result of various important factors, including those set forth in Item 1A of this 2018 Annual Report under the heading "Risk Factors." Readers should also carefully review the risk factors described in the other documents that we file from time to time with the SEC. In this 2018 Annual Report, the words "anticipates," "believes," "expects," "intends," "future," "could," "estimates," "plans," "would," "should," "potential," "continues" and similar words or expression as other words or expressions referencing future events, conditions or circumstances) identify forward-looking statements. Forward-looking statements also include the assumptions underlying or relating to any of the foregoing statements. The forward-looking statements contained in this 2018 Annual Report include, but are not limited to, statements related to: industry trends; market conditions; management's plans, objectives and expectations regarding product development and commercialization; expectations regarding regulatory submissions and approvals and the anticipated timing thereof; potential stockholder class action lawsuits or other litigation; customer trends and demand for our current or potential products; investments in research and development; business prospects, including our expectation to continue to incur operating losses; our collaboration partners and our relationships and arrangements therewith; anticipated achievement of milestones; anticipated financial performance, including future revenues; expected liquidity and capitalization; our ability to protect our intellectual property from third-party claims; changes in accounting principles; changes in actual or assumed tax liabilities; expectations regarding tax exposures; anticipated reinvestment of future earnings; our intention to use traditional forms of financing, including credit facilities; and our intentions regarding the use of cash. All forward-looking statements included in this document are based on information available to us on the date hereof. We will not undertake and specifically decline any obligation to update any forward-looking statements, except as required under applicable law.

Item 1. Business

ARATANA THERAPEUTICS ®

Our Company

Aratana Therapeutics, Inc. is a pet therapeutics company focused on the development and commercialization of innovative therapeutics for dogs and cats. As a pioneer in pet therapeutics, Aratana's mission is to deliver safe and effective therapeutics that elevate the standard of care in veterinary medicine. We work with companion animal veterinarians to bring new therapeutics to market that support the needs of pets and their owners.

We were incorporated on December 1, 2010 under the laws of the State of Delaware. We have completed several licensing transactions and acquisitions to build our pipeline. The address of our principal executive offices is 11400 Tomahawk Creek Parkway, Suite 340, Leawood, Kansas 66211. Unless the context requires otherwise, references to "Aratana," the "Company," "we," "us" or "our" in this 2018 Annual Report refer to Aratana Therapeutics, Inc., a Delaware corporation, and its subsidiaries.

We have three marketed therapeutics in the U.S., including NOCITA® (bupivacaine liposome injectable suspension) as a local post-operative analgesia for cranial cruciate ligament surgery in dogs and as a peripheral nerve block to provide regional post-operative analgesia following onychectomy in cats; ENTYCE® (capromorelin oral solution) for appetite stimulation in dogs; and GALLIPRANT® (grapiprant tablets) for the control of pain and inflammation associated with osteoarthritis in dogs, which we co-promote under an agreement with Elanco Animal Health, Inc. ("Elanco"). Our Canine Osteosarcoma Vaccine, Live Listeria Vector (AT-014) is conditionally licensed by the United States Department of Agriculture's ("USDA") Center for Veterinary Biologics ("CVB") and is available at approximately two dozen study sites across the United States.

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Our pipeline has multiple therapeutic candidates in development for potential treatments of feline and canine conditions with recognizable needs. For example, in 2018 we in-licensed exclusive, worldwide rights to a second-generation EP4 receptor antagonist. With the approval and initial commercial success of GALLIPRANT, the EP4 receptor antagonist's mechanism of action has been validated as a treatment for pain and inflammation in canine osteoarthritis. We believe the therapeutic candidate, AT-019, has potential in pain, inflammation and other indications in dogs and cats.

Our Goal and Strategies

Our goal is to develop and commercialize highly differentiated pet therapeutics in compelling markets. We plan to accomplish this by:

Establishing brand recognition for Aratana and our innovative therapeutics.

We have strong aided brand recognition of more than 70 percent on our three therapeutics with our target customers, veterinarians, and we believe our aided brand recognition will continue to increase through continued use and promotion. We strive to establish the Aratana brand as a leader or pioneer in developing and delivering therapeutics that are highly differentiated and specifically designed for dogs and cats. Aratana is recognized for our category leadership and we are building a presence because we have fulfilled veterinarians' need for new, innovative options.

Making our portfolio of pet therapeutics commercially successful.
We believe we have a strong opportunity to grow our commercial success for NOCITA and ENTYCE, as well as a strong revenue stream on GALLIPRANT. Our team of veterinary medical liaisons in the field is able to partner with veterinarians to provide vet-to-vet training on our practice-building therapeutics. Our direct sales organization calls directly on veterinary clinics, works alongside distributors and collaborates with corporate accounts to make our therapeutics available in the United States.

Building a differentiated commercial foundation.
We aim to build a commercial organization with a competitive advantage – our sales representatives and veterinary medical liaisons in the field partner directly with veterinarians. We believe our sales force is highly trained and has already started to successfully unlock the potential in veterinary clinics, especially in specialty clinics. Our sales force calls and in-clinic visits are typically with the veterinarian rather than other staff members who do not prescribe therapeutics. We collaborate with veterinarians to provide education on conditions, doctor-to-doctor conversations, technician training, sampling, help with case selection and in the case of NOCITA, offer hands-on training. Our comprehensive service is unique because we are able to collaborate with a veterinarian to adjust their current treatment protocol to utilize our first-of-their-kind therapeutics. We believe our results from these mutually beneficial relationships with veterinarians show our strategy generates strong initial use and helps us drive re-orders.

Advancing and developing our pipeline of therapeutic candidates.
We have a proven ability to access innovation and translate into regulatory success as evidenced by our FDA-approved new chemical entities ("NCEs"). We have received four United States Food and Drug Administration ("FDA") approvals of our lead therapeutic candidates and several USDA licensures in the past few years. Our therapeutic candidates are in various stages of development for cats or dogs, or both. In addition, we believe there are opportunities for lifecycle management with our therapeutics, including different formulation or delivery, additional species and additional indications. We believe our research and development team has a strong track record with

safety and efficacy studies, as well as our ability to quickly and effectively earn regulatory approvals.

Accessing innovation for our therapeutic portfolio.
We believe the pet therapeutics market is compelling and there are recognizable needs for many conditions or diseases. We have identified therapeutic areas that are highly differentiated and overlap with areas of human pharmaceutical development. Our strategy is to identify candidates and when appropriate, to seek exclusive, worldwide rights to these compounds in animal health. In addition to candidates that require development, we seek opportunities to collaborate with companies where we can provide commercialization for pet therapeutics. We have built strong relationships with more than half a dozen companies we consider our collaboration partners, including: Advaxis, Inc. (“Advaxis”), Atopix Therapeutics Ltd. acquired by Chiesi Farmaceutici Spa in November 2016 (“Atopix”), Elanco, Pacira Pharmaceuticals, Inc. (“Pacira”), RaQualia Pharma Inc. (“RaQualia”), Ajinomoto Pharmaceuticals Co., Ltd. (“Ajinomoto”), AskAt Inc. (“AskAt”), and Katholieke University Leuven Research and Development (“KU-Leuven”).

Exploring global initiatives.
We have a collaboration, license, development and commercialization agreement (the “Collaboration Agreement”) and co-promotion agreement (the “Co-Promotion Agreement”) granting Elanco exclusive rights globally outside the United States to develop, manufacture, market and commercialize our products based on licensed grapiprant rights and technology, including GALLIPRANT (collectively, “Grapiprant Products”), and co-promotion rights in the United States with regards to such products. We continue to explore other efforts to collaborate on our innovative pet therapeutics in countries outside the United States.

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Attracting and retaining personnel with robust experience in human pharmaceutical and animal health industries. In order to successfully execute our plan, we have assembled an experienced team consisting of veterinarians, scientists and other experts in their field. Our seasoned leadership team and staff members bring significant experience as veterans in the animal health or human health industries.

Key Developments

During 2018, Aratana had significant achievements that affected the business, including commercial success, progress with therapeutic candidates and other corporate updates.

entyce (capromorelin oral solution)	NOCITA net product sales were $7.5 million for the year ended December 31, 2018, as compared to $2.8 million for the year ended December 31, 2017. In 2018, NOCITA net product sales increased sequentially quarter-after-quarter as a result of more than a 60% increase in the number of new accounts ordering NOCITA and an average monthly order size of $1,800. Additionally, the FDA approval in August 2018 adds a second species, cats, and second administration technique to the label. The Company has also commenced the regulatory process for a smaller, 10 mL vial size, which if approved, may allow Aratana to expand the account base from primarily specialty clinics to general practice clinics.
nocita (bupivacaine liposome injectable suspension)	ENTYCE net product sales were $4.6 million for the year ended December 31, 2018, as compared to $1.3 million for the year ended December 31, 2017 (ENTYCE was launched in the fourth quarter of 2017). In 2018, ENTYCE was ordered by more than 13,000 veterinary clinics with re-order rates of more than 70%. Market research among veterinarians also showed strong ENTYCE awareness and satisfaction with the therapeutic's efficacy. While canine inappetence is a market that the Company expects will take time to build, the Company remains confident in its ability to grow the market and increase ENTYCE revenues. The Company plans to continue to focus on growing use by existing customers, driving usage in chronic conditions and increasing days of use.
Galliprant (grapiprant tablets)	Aratana recorded $23.3 million in total revenues related to GALLIPRANT for the year ended December 31, 2018, which included a $15.0 million commercial milestone payment from Elanco, and compares to approximately $20.9 million in total revenues related to GALLIPRANT for the year ended December 31, 2017, which included a one-time non-recurring $1.0 million manufacturing payment and $15.5 million in product sales of finished goods prior to the assumption of manufacturing responsibility by Elanco in the third quarter of 2017. According to third-party data, GALLIPRANT is second in market share (approximately 15%) within the competitive nonsteroidal anti-inflammatory drug ("NSAID") market and dispensed by more clinics than any other oral NSAID. Elanco reported that market demand for GALLIPRANT continues to grow and exceeded supply capacity in the fourth quarter of 2018, which resulted in GALLIPRANT backorders that impacted financial results in that quarter. Elanco anticipates backorders will clear by the end of the first quarter or early second quarter of 2019.

Strategic Expansion of the Pipeline. Aratana in-licensed from AskAt the exclusive, worldwide rights to develop and commercialize AT-019, an EP4 receptor antagonist therapeutic candidate with potential in pain, inflammation and other indications. With Aratana's ability to gain approval and with initial commercial success of GALLIPRANT, the EP4 receptor antagonist's mechanism of action has been validated as a treatment for pain and inflammation in canine

osteoarthritis.

Corporate Recognition and Awards. In early 2018, GALLIPRANT was named Best Companion Animal Product for 2017 by Animal Pharm. In mid-2018, the Kansas City Business Journal and Ingram's Kansas City also listed Aratana as the top growth company in the Kansas City metro area based on 2017 annual revenue growth.

Sales and Marketing

We are well-positioned in what we believe to be the most attractive segment of the animal health industry – companion animals. We work with companion animal veterinarians to bring new therapeutics to market that support pets and their owners. We reach companion animal veterinarians through a variety of sales channels depending on the specific business situation for a particular therapeutic, which includes utilizing a sales force; telesales; e-commerce; corporate veterinary entities; group purchasing organizations; veterinary distributors; and commercial collaboration partners who sell to companion animal veterinarians.

Typically, direct selling and indirect selling are complementary efforts aimed at raising awareness of the product, generating customer interest, driving product purchases and use, as well as supporting a good customer experience. When a therapeutic would require broad geographic sales coverage or faces established competition, we may choose to co-promote with one of the larger incumbent animal health companies.

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In 2018, we gained significant sales experience with three FDA-approved therapeutics, NOCITA, ENTYCE and GALLIPRANT, and we recorded revenues from the commercialization of our therapeutics. We reported $35.4 million in total revenues in 2018 related to NOCITA and ENTYCE net product sales and GALLIPRANT licensing and collaboration revenues (including a one-time $15.0 million milestone payment from Elanco). This compares to 2017 total revenues of $25.6 million and to 2016 total revenues of $38.6 million, which primarily consisted of a one-time payment of $38.0 million from Elanco pursuant to the Collaboration Agreement.

Our selling, general and administrative expenses were $28.8 million, $28.9 million and $27.3 million for the years ended December 31, 2018, 2017 and 2016, respectively. The focus of our current commercial activities is in the United States. According to independent market research commissioned by us, there are approximately 25,000 veterinary clinics in the United States. We will continue to review opportunities for incremental expansion of the sales organization where the increase is expected to be significantly funded by incremental sales. In addition, we believe we have indirect access to the remainder of the revenue opportunity through our relationships with distributors, corporate accounts and, as in the case of GALLIPRANT, through a co-promotion arrangement. In 2019, we intend to remain focused on marketing our three FDA-approved therapeutics in four indications as we continue research and development work on our therapeutic candidate portfolio.
NOCITA® (bupivacaine liposome injectable suspension) for single-dose infiltration into the surgical site to provide local post-operative analgesia for cranial cruciate ligament surgery in dogs and for use as a peripheral nerve block to provide regional post-operative analgesia following onychectomy in cats.

NOCITA is a long-acting local anesthetic that provides up to 72 hours of post-operative pain relief. NOCITA was made commercially available to veterinarians in the United States in October 2016 through our direct sales organization. In 2018, we recorded approximately $7.5 million in NOCITA net product sales, which is more than 2.5 times higher than our net product sales of approximately $2.8 million in 2017. Net product sales have increased sequentially every quarter since its launch.
We believe the sequential growth is also correlated to strong brand awareness of 90% among surgeons and positive experiences with the therapeutic. In 2018, there was more than a 60% increase in the number of accounts using NOCITA and in the clinics that ordered on a monthly basis, the average monthly order size was $1,800 per clinic. According to market research, veterinary surgeons feel comfortable with the NOCITA infiltration administration technique in 1-2 surgeries and cite that it only adds approximately 3-5 minutes to surgery time. The FDA approval in 2018 adds a second species, cats, and second administration technique to the label. While we believe NOCITA will continue to remain most relevant to surgeons, we have commenced the prior-approval submission process for a smaller vial size (10 mL) and if approved, we anticipate the 10 mL vial could be available in the fall of 2019. We believe having NOCITA available in a smaller volume vial size has the potential to expand our account base from the specialty clinics we currently target and add general practitioner clinics.

Recognizable need. We believe that there is a significant market opportunity in painful feline and canine surgeries. According to market research, approximately 10 million dogs and cats in the United States undergo painful surgeries per year, which includes amputations, knee/hip repairs, and other orthopedic or dental surgeries. There is not one established protocol for the use of pain medications in these surgeries, animal research demonstrates that pain can have a detrimental effect on healing. Pain experts are

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advocating more use of local anesthesia for pain control and 72 hours is the recommended minimum amount of time analgesics should be provided following a surgery.

Highly Differentiated Mechanism of Action. NOCITA is a long-acting, local anesthetic that lasts up to 72 hours post-surgery by releasing bupivacaine from multi-vesicular liposomes gradually over a period of time. The therapeutic is administered as a single dose by tissue infiltration during closure of cranial cruciate ligament surgery in dogs or as a peripheral nerve block to provide regional post-operative analgesia following onychectomy in cats. With 72 hours of pain control, NOCITA prevents analgesia gaps in the first 72 hours post-surgery and provides consistent pain control after the patient is discharged.

Efficacy & Safety in dogs. FDA approval was based on a pivotal clinical field study in dogs undergoing knee surgery and measured pain using the Glasgow Composite Measure Pain Scale-Short Form (“CMPS-SF”). NOCITA-treated dogs had statistically significant reduction in pain scores compared to placebo at 24, 48 and 72 hours following surgical closure. A four-week laboratory study at up to five times the labeled dose demonstrated there were no clinically relevant treatment-related effects.

Efficacy & Safety in cats. FDA approval was based on a pivotal field study in client-owned cats undergoing an elective onychectomy surgery. Results from the study showed NOCITA met efficacy success criteria of no required rescue analgesia using a cat-specific post-operative pain assessment tool. Cats receiving NOCITA demonstrated a statistically significant improvement in pain evaluation success rates at 24, 48 and 72 hours. In a 22-day laboratory safety study with cats receiving NOCITA, bupivacaine HCl or saline as a femoral nerve block, NOCITA did not produce systemic toxicity when administered on days 0, 9 and 18 at doses representing 2, 4 and 6 times the maximum labeled dose of 5.3 mg/kg/forelimb.

Compelling Market. Post-surgical pain can be well-controlled using a multimodal analgesic regimen that includes the combination of local anesthetics, opioids, NSAIDs and alpha2agonists. We believe the most widely used drugs approved for treatment of post-operative pain are COX-inhibiting NSAIDs in dogs. In 2017, the United States Drug Enforcement Administration implemented its initiative to reduce opioids manufactured in the United States by 25%, including opioids sold to veterinarians. We believe veterinarians will continue to be impacted by the initiative to reduce opioid use. Veterinarians also have a desire to move away from opioids because of systemic side effects, logistics, safety and potential for abuse by others in the household. NOCITA is the only long-acting local anesthetic FDA-approved for veterinary use.

ENTYCE® (capromorelin oral solution) for appetite stimulation in dogs.

ENTYCE was made commercially available to veterinarians in the United States in October 2017 through our direct sales organization and our network of national and regional distributors. We currently market ENTYCE in three bottle sizes, 10mL, 15mL and 30mL. ENTYCE is administered as a flavored oral solution at a dose of 3 mg/kg daily and the treatment cost is based on the body weight of the dog. For the year ended December 31, 2018, the first full year of its launch, we recorded $4.6 million in ENTYCE net product sales for 2018.
As of December 31, 2018, more than 13,000 of the approximately 25,000 veterinary clinics in the United States have ordered ENTYCE. In 2018, more than 70% of ENTYCE customers re-ordered the therapeutic. Nearly three-quarters of our targeted accounts (~4,000 clinics) have purchased ENTYCE and on average, the order size in targeted accounts

in 2018 was 80% higher than orders from outside-of-territory accounts.

According to market research completed in June 2018 with 300 veterinarians, 70% of the veterinarians surveyed were aware of ENTYCE. Of the veterinarians who are prescribing ENTYCE, 90% cite doing so because of their belief in the therapeutic's efficacy. Additionally, according to the same market research, approximately 20% of veterinarians surveyed prescribe ENTYCE in the acute setting (~5 days of therapy) and approximately 30% of veterinarians surveyed prescribe ENTYCE in the chronic setting (~11 days of therapy). We believe the market research signifies there is an opportunity to position ENTYCE as a first choice by differentiating the strong efficacy and safety data and emphasizing broad application. We believe, based on market research, the majority of veterinarians are currently approaching inappetence with a "wait and see" mentality – they wait to see if appetite returns without therapy, and in some cases, veterinarians continue to use therapies off-label. We remain confident in our ability to increase the awareness of the inappetence market and the benefits of using ENTYCE. We plan to continue to focus on growing use by existing customers, driving usage in chronic conditions and increasing days of use.

Aratana is continuing to explore capromorelin for weight management in cats with chronic kidney disease and if approved, we believe the therapeutic candidate may better address weight loss in cats as a mimetic to the naturally occurring hunger hormone.

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Recognizable Need. The control of hunger and satiety involves a complex system in mammals. In many acute and chronic disease states, as well as with aging, lack of appetite is a problem and can fuel a downward spiral. Malnutrition and decreased muscle mass can result from inadequate food intake regardless of the underlying condition. Until ENTYCE, veterinarians did not have an FDA-approved therapeutic designed specifically to treat the symptom of inappetence in dogs. Inappetence can be caused by a myriad of conditions that veterinarians diagnose daily, including chronic diseases like kidney failure, gastrointestinal or heart diseases. It can also be caused by acute conditions like nausea, pain, medications or changes in diet.

Highly Differentiated Mechanism of Action. ENTYCE is a first-in-class ghrelin receptor agonist that works by mimicking the effect of ghrelin, the hunger hormone. Like naturally occurring ghrelin, ENTYCE binds to specific cell receptors affecting signaling in the hypothalamus, which causes the feeling of hunger.

Efficacy & Safety. The FDA approved ENTYCE based on a pivotal clinical field study that demonstrated a significantly higher proportion of inappetent dogs receiving ENTYCE had increased appetite in the single question assessment and owner appetite assessment as compared to dogs receiving placebo. ENTYCE-treated dogs in the study also demonstrated an increase in body weight. A 12-month laboratory safety study demonstrated capromorelin was well-tolerated in dogs at daily doses up to 40 mg/kg (17.5x labeled dose).

Compelling Market. We believe there is a significant market opportunity for a therapeutic that can safely and effectively stimulate appetite in pets. According to market research in June 2018, of the veterinarians surveyed, 95% report seeing inappetence cases in the past six months. Almost any disease can manifest or develop decreased appetite (hyporexia), complete lack of appetite (anorexia) or changes in appetite (dysrexia). Inappetence can be the first sign, and may be the only sign, that a dog is sick or has an underlying health condition. Improper food intake not only inhibits the overall health of the dog, but it can be perceived to have a negative impact on a dog’s quality of life. Pet owners can view their dog’s eating habits as the primary indicator to assess their pet’s quality of life and overall well-being. Before the launch of ENTYCE, market research showed approximately 10 million dogs presented annually in the U.S. for inappetence (decreased appetite, complete lack of appetite or altered eating patterns) and only about 4 million were treated. Before ENTYCE, therapy to address inappetence was limited to human drugs affecting the central nervous system, such as benzodiazepines, cyproheptadine and mirtazapine. However, these drugs are not approved for use in dogs, are believed to have limited effectiveness in pets and are contraindicated for cats with hepatic lipidosis. We believe some veterinarians use antiemetics to determine if the dog is nauseous. We believe a significant number of veterinarians are not prescribing these various therapies due to their limited safety and efficacy.

GALLIPRANT® (grapiprant tablets) for the control of pain and inflammation associated with osteoarthritis in dogs.

In January 2017, GALLIPRANT was made commercially available to veterinarians in the United States through our commercial collaboration partner, Elanco, our sales organization, and distributors. Elanco recorded approximately $44.0 million in GALLIPRANT sales in 2018. Aratana recorded $23.3 million in licensing and collaboration revenues, which includes a $15.0 million commercial milestone payment based on 2018 GALLIPRANT net product sales exceeding $35.0 million within the year. The third quarter was especially strong primarily due to the re-introduction of the 100mg tablets and continued uptake of the product.

ANT SALES BY QUARTER RECORDED BY ELANCO (IN MILLIONS) Q1 2017 $5.0 Q2 2017 $4.0 Q3 2017 $6.0 Q4 2017 $8.0 GALLIPRANT was made commercially availability in the first quarter of 2017.

According to Elanco, the fourth quarter of 2018 revenue decrease was impacted by both timing and availability of GALLIPRANT shipments. A planned shipment in late-2018 was delayed until early-2019 in order to appropriately complete the quality release process. Elanco has reported that market demand for GALLIPRANT continues to grow, exceeding supply capacity and resulting in GALLIPRANT backorders, primarily in the distribution channel, at the end of 2018, which are anticipated to clear by the end of the first quarter or early second quarter of 2019. Aratana's 2018 licensing and collaboration revenues of $23.3 million compare to approximately $20.9 million in 2017 total revenues related to GALLIPRANT, which included a one-time non-recurring $1.0 million manufacturing payment and $15.5 million in product sales of finished goods prior to the assumption of manufacturing responsibility by Elanco in the third quarter of 2017.

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According to Elanco, GALLIPRANT is stocked by nearly 20,000 veterinary clinics in the United States and approximately 95% of those accounts have re-ordered GALLIPRANT based on data received from Elanco. According to third-party data, which was based on a sample of approximately 6,000 veterinary clinics as of December 2018, GALLIPRANT is second in market share (approximately 15%) within the competitive NSAID market and dispensed by more clinics than any other oral NSAID. In 2018, GALLIPRANT was awarded Best Companion Animal Product of 2017 by Animal Pharm.

As part of the Collaboration Agreement, Elanco has the lead responsibility for all commercial activities globally. Until 2028, we will continue to record certain co-promotion fees and global royalties. If achieved, Aratana is also eligible for certain regulatory, manufacturing and sales milestones. Under the Collaboration Agreement, the Company is entitled to two additional payments totaling up to $60.0 million upon the achievement of certain sales milestones. Hence, the success of Grapiprant Products is very meaningful to us. See “GALLIPRANT Collaboration, License, Development and Commercialization and Co-Promotion Agreements with Elanco” for additional information.

Canine Osteosarcoma Vaccine, Live Listeria Vector (AT-014) for the treatment of dogs diagnosed with osteosarcoma, one year of age or older.

In December 2017, the USDA’s CVB granted Aratana conditional licensure for Canine Osteosarcoma Vaccine, Live Listeria Vector. The therapeutic is developed by us using a listeria-based antigen delivery system in-licensed from Advaxis and is a lyophilized formulation of a modified live, attenuated strain of listeria that activates cytotoxic T-cells. The therapeutic capitalizes on the dog's immune system and its ability to attack bacterial infections, redirecting it to fight cancer cells. Data from a clinical study in 18 client-owned dogs with osteosarcoma suggests that Canine Osteosarcoma Vaccine may be able to delay or prevent metastatic disease and prolong overall survival in dogs with osteosarcoma. The single-arm study evaluated dogs that had primary tumor removal and four doses of carboplatin chemotherapy, followed by the therapeutic vaccine one dose every three weeks for three total doses. Median survival time was 956 days compared to 423 days for a historical control group ($p \leq 0.05$).

In the first quarter of 2018, we made the therapeutic available for purchase at approximately two dozen veterinary oncology practice groups participating in an extended field safety study across the United States. We anticipate completing target enrollment for the field safety study in 2019. The field safety study is required by USDA to progress from conditional licensure to full licensure. While the study is on-going, product purchased for use in the clinical study will offset research and development expenses.

Competition

The development and commercialization of new animal health medicines is highly competitive, and we expect considerable competition from major pharmaceutical, biotechnology and specialty animal health medicines companies. As a result, there are, and likely will continue to be, extensive research and substantial financial resources invested in the discovery and development of new animal health medicines. Our potential competitors include large animal health companies, such as Zoetis; Merck Animal Health, the animal health division of Merck & Co., Inc.; Elanco; Bayer Animal Health, the animal health division of Bayer AG; Boehringer Ingelheim Animal Health, the animal health division of Boehringer Ingelheim GmbH; Virbac Group; Ceva Animal Health; Vetoquinol and Dechra Pharmaceuticals PLC. We are also aware of several smaller early-stage animal health companies, such as Kindred Biosciences; Zomedica Pharmaceuticals; VetDC; Skyline Vet Pharma; and Anivive, that are developing products for use in the pet therapeutics market.

Osteoarthritis is a competitive marketplace and Elanco has taken the lead on commercial activities for Grapiprant Products. ENTYCE entered a new market where it is the only product approved for veterinary use to stimulate appetite in dogs. However, we are aware of an ointment FDA-approved for management of weight loss in cats that is applied to the inner pinna of the cat's ear once daily for 14 days. NOCITA competes primarily with existing analgesics that are part of multi-modal pain protocols, including local anesthetics, opioids and cox-inhibiting NSAIDs. Regarding AT-014, we are aware that veterinarians often utilize human chemotherapy off-label to treat this disease and we are aware of a variety of investigational candidates for osteosarcoma.

We have limited history of operations and many of our competitors have substantially more resources than we do, including both financial, personnel and technical resources. In addition, many of our competitors have more experience than we have in the development, manufacture, regulation and worldwide commercialization of animal health medicines. We are also competing with academic institutions, governmental agencies and private organizations that are conducting research in the field of animal health medicines.

Our competitive position will be determined in part by the potential indications for which our products are developed and ultimately approved by regulatory authorities. Additionally, the timing of market introduction of some of our potential products or of competitors' products may be an important competitive factor. Accordingly, the speed with which we can develop our compounds, complete target animal studies and approval processes, and supply commercial quantities to market are expected to be important competitive factors. We expect that competition among products approved for sale will be based on various factors, including product efficacy, safety, reliability, availability, price and patent position.

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Research and Development

Our drug development programs focus on the development of highly differentiated compounds with the intention of capturing compelling market opportunities that will fulfill a recognizable need. We have built a development pipeline through strategically in-licensing early-stage therapeutic candidates. Our development approach provides access to promising therapeutic development opportunities within our focus areas. Even after a therapeutic is commercially available, we may conduct additional clinical studies for life cycle management purposes (supplemental indications) or for scientific exchange. Our current therapeutic candidates are regulated by the FDA or USDA.

We are focused on our core strengths of clinical development of NCEs that are designed specifically for pets and navigating the regulatory environment. We continue to prioritize our development and commercial efforts with a primary focus on the United States.

We have incurred and will continue to incur research and development expense as we develop our business. Our research and development expenses were $6.9 million, $15.1 million and $30.5 million for the years ended December 31, 2018, 2017 and 2016, respectively. In 2016, our contract development costs were correlated with several pivotal field studies and production of drug product. Since 2016, we have had fewer expenses related to pivotal field studies and production of drug product, however as pipeline programs progress to pivotal stage or we initiate new programs, research and development costs may increase.

The following summarizes our regulatory and development updates in 2018 and other relevant information on our pipeline of therapeutic candidates:

NOCITA® (bupivacaine liposome injectable suspension) for use as a peripheral nerve block to provide regional post-operative analgesia following onychectomy in cats.

On August 3, 2018, we received FDA approval to expand the NOCITA label to include use as a peripheral nerve block to provide regional post-operative analgesia following onychectomy in cats. The supplemental New Animal Drug Application (sNADA) approval is based on a multi-center, placebo-controlled, randomized and masked field study of 241 client-owned cats undergoing an elective onychectomy surgery. Results from the study showed NOCITA met efficacy success criteria of no required rescue analgesia using a cat-specific post-operative pain assessment tool. Cats receiving NOCITA demonstrated a statistically significant improvement in pain evaluation success rates at primary and secondary endpoints. At 72 hours, NOCITA success rates were 68.4% compared to 35.3% for placebo. Separately, in a 22-day laboratory safety study with cats receiving NOCITA, bupivacaine HCl or saline as a femoral nerve block, NOCITA was well-tolerated when administered on days 0, 9 and 18 at doses representing 2, 4 and 6 times the maximum labeled dose of 5.3 mg/kg/forelimb.

AT-002 (capromorelin) for cats.

AT-002 (in-licensed from RaQualia) is a cat-specific formulation of capromorelin, a ghrelin receptor agonist. Currently, AT-002 is being evaluated in an ongoing, FDA-concurred field effectiveness study for weight management in cats with chronic kidney disease and we anticipate target enrollment will be completed in mid-2019. Once

enrollment is completed, we anticipate data will readout in late-2019 with a technical section submission for efficacy to follow. In August 2018, we submitted the target animal safety technical section to the FDA's Center for Veterinary Medicine ("CVM") for AT-002 and received a technical section complete letter from CVM on February 27, 2019. In December 2018, we submitted the technical section for chemistry, manufacturing and controls ("CMC") for the cat-specific formulation.

AT-018 (timapiprant) for dogs.

AT-018, which we in-licensed from Atopix following an option period between the parties, is an oral CRTH2 antagonist for the potential treatment of atopic dermatitis in dogs. In April 2017, we initiated a pilot study evaluating timapiprant for the prevention of clinical signs of atopic dermatitis in at-risk dogs and anticipate completing target enrollment in mid-2019. We decided to extend the study, because we believe we may benefit from new regulations on CVM's conditional approval pathway introduced with the 2018 reauthorization of the Animal Drug User Fee Act ("ADUFA").

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AT-006 (eprociclovir) for cats.

AT-006 is an anti-viral for the treatment of feline herpes virus-induced ophthalmic conditions in-licensed from Ajinomoto. We continue to evaluate the best regulatory and commercial path forward for this program.

AT-016 (allogeneic adipose-derived stem cells) for dogs.

In December 2017, our license partner responsible for the development of AT-016, VetStem BioPharma ("VetStem"), shared results of a pivotal study, that did not achieve protocol-defined efficacy success criteria. In January 2018, we exercised our right to terminate the license agreement with VetStem, which was effective as of mid-April 2018.

AT-019.

In February 2018, we licensed exclusive, worldwide rights to develop and commercialize AT-019 from AskAt. AT-019 is a potent and innovative EP4 receptor antagonist therapeutic candidate with potential in pain, inflammation and other indications. We executed an agreement with an active pharmaceutical ingredient (API) manufacturer in 2019 and have begun transferring the manufacturing process and early formulation work. In connection with the Exclusive License Agreement with AskAt, the Company also entered into Collaboration and Option Agreement ("COA") with AskAt for an option to acquire multiple therapeutic candidates with potential in pain, allergy and cancer. In December 2018, the Company exercised its right to terminate the COA, and on February 18, 2019, the termination became effective.

Regulatory and development advances in 2018 for therapeutic candidates outside the United States:

Grapiprant Products.

Under the Collaboration Agreement, Elanco has exclusive rights to Grapiprant Products globally outside the United States for development, manufacturing, marketing and commercialization in additional species and/or indications. In January 2018, Elanco and Aratana announced the European Medicines Agency ("EMA") granted marketing authorization of GALLIPRANT in Europe. Elanco anticipates launching GALLIPRANT in Europe in the first quarter of 2019. If Elanco successfully expands the EU label for GALLIPRANT to include inflammation, we are eligible to receive a $4.0 million milestone payment, which may occur after 2019. In addition, Aratana's contractual commitment for certain potential research and development expenses expired on December 31, 2018, in accordance with the Collaboration Agreement.

AT-008 (rabacfosadine) for dogs in Europe.

AT-008 is a potential therapeutic candidate for canine lymphoma we sub-licensed from KU-Leuven and we have rights to develop and market the therapeutic candidate outside North America. VetDC has rights to the therapeutic candidate in North America, and it was conditionally approved by the FDA as Tanovea®-CA1 in late-2016. As Tanovea®-CA1 is established in the United States, we continue to evaluate if and how to move the therapeutic

forward in Europe.

Other therapeutics for dogs and cats in Europe.

We have started to develop a dossier for EMA regulatory authorities on bupivacaine liposome injectable suspension in Europe. Separately, based on conversations with European National Agencies, we believe the path forward for capromorelin may be informed by studies investigating weight gain in cats.

Manufacturing and Supply Chain

We manage third-party manufacturers to supply API, drug product and packaged product for the development and commercialization of our small molecule product candidates. We have chosen to rely on third-party contract manufacturer organizations ("CMOs") rather than devote resources toward developing or acquiring internal manufacturing facilities.

entyce (capromorelin oral solution)	For NOCITA, Pacira is our exclusive supplier and is responsible for supplying us with finished drug product in vials. We are responsible for the labeling, packaging and shipping of NOCITA. In July 2018, we announced that we amended our agreements with Pacira to include a smaller vial size (10 mL) in addition to our 20 mL vial. We have submitted the prior-approval supplement for the 10 mL vial to FDA and if approved, we anticipate the 10 mL vial could be available in the fall of 2019. In 2018, we had excess supply of ENTYCE finished goods that were manufactured after commercial launch and we incurred write-offs on these finished goods. We do not anticipate incurring significant finished goods write-offs in 2019, as our ENTYCE finished goods inventories as of year-end 2018 had been adjusted to reflect our sales expectations. The majority of our remaining ENTYCE inventories are in API, which we plan to convert to finished goods over time.

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Galliprant (grapiprant tablets)	As of September 2017, Elanco assumed ownership of the New Animal Drug Application ("NADA") and manufacturing responsibility for GALLIPRANT. If Elanco successfully establishes an alternate supply source and a technology transfer at its expense, we are eligible for a $4.0 million milestone payment, which may occur after 2019. In the third quarter of 2018, the 100 mg tablets of GALLIPRANT were re-introduced into the market after being on backorder due to isolated reports of 100 mg tablets breaking in the bottle. According to Elanco, a planned shipment in late-2018 was delayed until early-2019 to appropriately complete the quality release process. Elanco has reported market demand for GALLIPRANT continues to grow, exceeding supply capacity and resulting in GALLIPRANT backorders at the end of the year, which are anticipated to clear by the end of the first quarter or early second quarter 2019.

Canine Osteosarcoma Vaccine.

We currently utilize a third-party USDA-licensed CMO.

Intellectual Property and License Agreements

We seek to protect our products and technologies through a combination of patents, regulatory exclusivity, and proprietary know-how. Our goal is to obtain, maintain and enforce patent protection for our products, formulations, processes, methods and other proprietary technologies, preserve our trade secrets, and operate without infringing on the proprietary rights of other parties, both in the United States and in other countries. Our policy is to actively seek to obtain, where appropriate, the broadest intellectual property protection possible for our current compounds and any future compounds for development, proprietary information and proprietary technology through a combination of contractual arrangements and patents, both in the United States and abroad. However, even patent protection may not always afford us with complete protection against competitors who seek to circumvent our patents.

We depend upon the skills, knowledge and experience of our scientific and technical personnel, as well as that of our advisors, consultants and other contractors, none of which is patentable. To help protect our proprietary know-how, which is not patentable, and inventions for which patents may be difficult to obtain or enforce, we rely on trade secret protection and confidentiality agreements to protect our interests. To this end, we generally require all of our employees, consultants, advisors and other contractors to enter into confidentiality agreements that prohibit the disclosure of confidential information and, where applicable, require disclosure and assignment to us of the ideas, developments, discoveries and inventions important to our business.

Exclusive License Agreements with RaQualia.

In December 2010, we entered into two agreements with RaQualia pursuant to which we exclusively licensed intellectual property rights relating to AT-001 and AT-002 in the animal health field. Pursuant to these agreements we obtained the rights to certain patents in the United States and other jurisdictions. The patents relating to AT-001 include composition of matter claims as well as claims to methods of use of AT-001. The patent rights relating to the use of AT-001 further include methods of preparing the compounds of interest and salts, polymorphs and intermediates thereof, as well as certain combination therapies. Additionally, we licensed from RaQualia additional patent rights relating to AT-002 that include composition of matter claims as well as claims to methods of use of AT-002. Under these agreements, we were granted exclusive, worldwide licenses to develop, manufacture and commercialize AT-001 and AT-002 in the field of animal health, except that we cannot develop, manufacture or

commercialize injectable AT-001 products in Japan, South Korea, China or Taiwan. We have the right to grant sublicenses to third parties under these agreements. Under our agreement with RaQualia, we are responsible for using commercially reasonable efforts to develop and commercialize AT-001 and AT-002. The patent that we believe covers the crystalline form of the AT-001 compound expires on February 21, 2027 and is expected to be eligible for a patent term extension to August 2029. Certain of the AT-002 patents and applications licensed under the agreement are expected to extend out to 2034. In addition, the use of AT-002 in companion animals is protected by an Aratana patent, which expires in January 2036.

We are responsible for contingent milestone payments upon achievement of development and regulatory milestones and royalties on net sales of licensed products, subject to certain potential offsets and deductions, under each of the AT-001 and AT-002 agreements, and the royalty percentage is in the mid-single digits. We must also pay to RaQualia a portion of royalties we receive from any sublicensees, subject to a minimum royalty on net sales by such sublicensees. Our royalty obligations apply on a country-by-country and licensed product-by-licensed product basis, and end upon the expiration or abandonment of all patents with valid claims covering a licensed product in a given country.

Each of the AT-001 and AT-002 agreements continues until terminated. RaQualia may terminate the AT-001 agreement or the AT-002 agreement if we fail to pay any undisputed fee under the relevant agreement and do not cure such failure within 60 days after RaQualia notifies us of such failure. We may terminate the AT-001 agreement or the AT-002 agreement, or any license granted under either agreement, on a patent-by-patent and country-by-country basis at will, upon 30 days' prior written notice to RaQualia. Once all of the patents licensed under the AT-001 agreement or the AT-002 agreement have expired or been abandoned, the licenses granted under the relevant agreement become fully-paid and irrevocable.

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GALLIPRANT Collaboration, License, Development and Commercialization and Co-Promotion Agreements with Elanco.

On April 22, 2016, we entered into a Collaboration Agreement with Elanco that granted Elanco rights to develop, manufacture and commercialize Grapiprant Products, an FDA-approved therapeutic for the control of pain and inflammation associated with osteoarthritis in dogs. Elanco will have exclusive rights globally outside the United States and co-promotion rights with us in the United States during the term of the Collaboration Agreement.

Elanco paid us an upfront payment of $45.0 million. Elanco has also agreed to pay us a $4.0 million milestone related to European approval of a Grapiprant Product for the treatment of pain and inflammation, a $4.0 million milestone related to the manufacturing of a Grapiprant Product from an alternate supply source and up to $75.0 million upon the achievement of certain sales milestones, of which $15.0 million was achieved in 2018. The sales milestone payments are subject to a one third reduction for each year the occurrence of the milestone is not achieved beyond December 31, 2021, with any non-occurrence beyond December 31, 2023, cancelling out the applicable milestone payment obligation entirely.

Elanco will also pay us royalty payments on a percentage of net sales in the mid-single to low-double digits. In addition, we and Elanco had agreed to pay 25% and 75%, respectively, of all third-party development fees and expenses through December 31, 2018, in connection with preclinical and clinical trials necessary for any registration or regulatory approval of the products (“Registration”), provided that our contribution to such development fees and expenses was capped at $7.0 million. We were responsible for all development activities required to obtain the first Registration for Grapiprant Products for use in dogs in each of the European Union and the United States, and Elanco was responsible for all other development activities.

The term of the collaboration will continue throughout the development and commercialization of the product candidates, on a product-by-product and country-by-country basis, until the latest of (i) the date on which no valid claim of certain issued or granted patents specified in the Collaboration Agreement in the respective country exists, (ii) the expiration of any regulatory exclusivity in such country covering such Grapiprant Product, and (iii) the tenth anniversary of the first commercial sale of such product in such country.

The Collaboration Agreement may be terminated by Elanco at any time upon 90 days’ written notice to us. The Collaboration Agreement may also be terminated by either party (i) for the other party’s material breach, where such breach is not cured within the timeframe specified by the agreement, (ii) upon the bankruptcy, insolvency or dissolution of the other party, or (iii) for certain activities involving the challenge of certain patents licensed by us to Elanco. Upon Elanco’s voluntary termination or termination for Elanco’s breach, among other things, (a) all licenses and rights granted to Elanco will terminate and revert to us, and (b) Elanco has agreed to assign to us all registrations and trademarks obtained in connection with the Grapiprant Products. Upon termination for our breach, among other things, Elanco may elect to retain its rights to the licenses granted by us under the Collaboration Agreement subject to specified payment obligations.

On April 22, 2016, in connection with the Collaboration Agreement, we entered into the Co-Promotion Agreement with Elanco to co-promote the Grapiprant Products in the United States.

Under the terms of the Co-Promotion Agreement, Elanco has agreed to pay us, as a fee for services performed and expenses incurred by us under the Co-Promotion Agreement, (i) 25% of the gross margin on net sales of Grapiprant Products sold in the United States under the Collaboration Agreement prior to December 31, 2018, and (ii) a mid-single digit percentage of net sales of the Grapiprant Products in the United States after December 31, 2018 through 2028 (unless extended by mutual agreement).

The Co-Promotion Agreement expires on December 31, 2028, unless extended by mutual agreement. In addition, the Co-Promotion Agreement provides that it will automatically terminate if the Collaboration Agreement is terminated early.

Exclusive License Agreement with Pacira.
On December 5, 2012, the Company entered into an Exclusive License, Development, and Commercialization Agreement with Pacira (the "Pacira License Agreement") that granted the Company global rights for development and commercialization of licensed animal health products for NOCITA (also known as AT-003). On the same date, the Company also entered into a supply agreement with Pacira (the "Pacira Supply Agreement", and together with the Pacira License Agreement, the "Pacira Agreements").

On July 5, 2018 (the "Effective Date"), the Company and Pacira entered into an amendment and restatement of the Pacira License Agreement ("A&R License Agreement") and an amendment and restatement of the Pacira Supply Agreement (the "A&R Supply Agreement").

Under the A&R Supply Agreement, Pacira has agreed to manufacture and supply the licensed product in a 10 mL vial size in addition to the 20 mL vial size that is currently supplied to the Company. The supply price for the 10 mL vial size will remain fixed until December 31, 2021. Prior to December 31, 2021, the Company and Pacira have agreed to negotiate in good faith the applicable terms related to the 10 mL vial, including the price, for after December 31, 2021. If the Company and Pacira are unable to reach agreement, then as of January 1, 2022 and on each anniversary thereafter during the term of the A&R Supply Agreement, the price for the 10 mL vial will be automatically increased by a low single-digit percentage.

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The A&R License Agreement amended various sections of the Pacira License Agreement, including milestone payments and royalties, to incorporate the introduction of the 10 mL vial size. Prior to December 31, 2021, the Company will not be obligated to pay any royalty payments to Pacira on the sales of the 10 mL vial and thereafter, the Company and Pacira have agreed to negotiate in good faith the applicable terms relating to the 10 mL vial in accordance with the A&R Supply Agreement. The tiered royalties on the Company's product sales of 20 mL vials remain unchanged. In addition, the A&R License Agreement reduces the annual net sales thresholds for achieving each of the potential commercial milestone payments owed to Pacira. The remaining $40,000 of commercial milestones per the A&R License Agreement begin to be triggered once NOCITA annual net sales reach $50,000 with the final tier being owed to Pacira once NOCITA annual net sales reach $250,000. Further, the A&R License Agreement lowered the minimum annual revenue payment to be provided to Pacira by the Company and delayed by one year the first period in which this minimum annual revenue payment requirement would be triggered such that the period is now expected to commence on January 1, 2023. The definition of a competing product was specified and narrowed to those injectable analgesic products preventing pain for at least 48-72 hours post-surgery as an API labeled for the control of post-operative pain for surgical veterinary use. The term of the A&R License Agreement was extended with the initial term commencing as of the new Effective Date.

As of December 31, 2018, the Company had paid $2,500 in milestone payments since execution of the Pacira License Agreement, and no milestone payments were accrued. No milestones were achieved during the year ended December 31, 2018. The Company does not expect to achieve any milestones related to the A&R License Agreement in the next twelve months.

Regulatory

The development, approval and sale of animal health products are governed by the laws and regulations of each country in which we intend to sell our products. To comply with these regulatory requirements, we have established processes and resources to provide oversight of the development and launch of our products and their maintenance in the market.

Requirements for Approval of Veterinary Pharmaceuticals for Pets

As a condition to regulatory approval for sale of animal products, regulatory agencies worldwide require that a product to be used for pets be demonstrated to be safe for the intended use in the intended species; have substantial evidence of effectiveness for the intended use; have a defined manufacturing process that ensures that the product can be made with high quality consistency; and be safe for humans handling the product and for the environment.

Safety. To determine that a new veterinary drug is safe for use, regulatory bodies will require us to provide data from a safety study generated in laboratory cats and dogs tested at doses higher than the intended label dose, over a period of time determined by the intended length of dosing of the product. In the case of the CVM, the design and review of the safety study and the study protocol are completed prior to initiation of the study to help assure that the data

generated will meet FDA requirements. These studies are conducted under rigorous quality control, including Good Laboratory Practice ("GLP"), to assure integrity of the data. They are designed to clearly define a safety margin, identify any potential safety concerns, and establish a safe dose for the product. This dose and effectiveness is evaluated in the pivotal field effectiveness study where the product is studied in the animal patient population in which the product is intended to be used. Field safety data, obtained in a variety of breeds and animals kept under various conditions, are evaluated to assure that the product will be safe in the target population. Safety studies are governed by regulations and regulatory pronouncements that provide the parameters of required safety studies and are utilized by regulatory bodies in the United States, the European Union, Japan and other countries.

Chemistry, Manufacturing and Controls (CMC). To assure that the product can be manufactured consistently, regulatory agencies will require us to provide documentation of the process by which the API is made and the controls applicable to that process that assure the API and the formulation of the final commercial product meet certain criteria, including purity and stability. For FDA and EMA approvals, both pharmaceutical API and commercial formulations are required to be manufactured at facilities that practice cGMP. After a product is approved, we will be required to communicate with the regulatory bodies any changes in the procedures or manufacturing site. For example, with regard to FDA-regulated products, different reporting requirements apply depending on the scope and extent of post-approval changes to the CMC. Generally, "major changes" (as defined in the FDA's guidance documents) require a prior-approval supplement ("PAS") filing, which has a 120-day review period by the FDA and must be approved by the FDA before distribution or sale of the product. "Moderate changes" (as defined in the FDA's guidance documents) can be filed as a Supplement Changes Being Effected in 30 Days ("CBE30") or as a Supplement Changes Being Effected ("CBE-"). Products manufactured involving changes filed as a CBE30 can only be distributed and/or sold 30 days post receipt of the CBE30 by FDA or immediately if filed with the FDA as a CBE. No affirmative approval is required by the FDA for those categories of changes prior to distribution or sale. Finally, "minor changes" (as defined in the FDA's guidance documents) are required to be provided to the FDA by companies in their annual reports on CMC application matters titled Minor Changes and Stability Reports.

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Effectiveness. Early pilot studies may be done in laboratory cats or dogs to establish effectiveness and the dose range for each product. Data on how well the drug is absorbed when dosed by different routes and the relationship of the dose to the effectiveness are studied. When an effective dose is established, a study protocol to test the product in real world conditions is developed prior to beginning the study. In the case of the CVM, the pivotal effectiveness field study protocol is submitted for review and concurrence prior to study initiation, to help assure that the data generated will meet regulatory requirements. The pivotal field effectiveness study must be conducted with the formulation of the product that is intended to be commercialized, and is a multi-site, randomized, placebo-controlled study, generally with a placebo control. To reduce bias in the study, individuals doing the assessment are not told whether the subject is in the group receiving the treatment being tested or the placebo group. For pharmaceuticals, in both the United States and the European Union, the number of patients enrolled in the pivotal field effectiveness studies is required to be approximately 100 to 150 animal subjects treated with the test product and a comparable number of subjects in the control group that receive the placebo. In many cases, a pivotal field study may be designed with clinical sites in both the European Union and the United States, and this single study may satisfy regulatory requirements in both the European Union and the United States.

Environmental and Human Safety. We will not be required under United States law to provide an environment impact statement for products currently in development if the products are given at the home of the pet’s owner or in a veterinary hospital. If products might result in some type of environmental exposure or release, the environmental impact must be assessed. For approval in the EU, a risk assessment for potential human exposure will be required.

Labeling, All Other Information (“AOI”), and Freedom of Information Summary (“FOI”). We also will be required to submit the intended label for the product, and any information regarding additional research that has been conducted with the drug, to CVM and other regulatory bodies for review. The accepted technical sections are used to create the draft language for the FOI summary for use in the United. FOIs are published on the CVM website at the time of drug approval.

Post-Approval Product Monitoring and Maintenance. Post-approval monitoring of products is required by law, with reports being provided to the CVM's Surveillance and Compliance group. Reports of product quality defects, adverse events or unexpected results are produced in accordance with the law. Additional regulatory filings include the Periodic Drug Experience Report and the Minor Changes and Stability Report.

United States

Three federal regulatory agencies regulate the health aspects of animal health products in the United States: the FDA; the USDA; and the Environmental Protection Agency (“EPA”).

The CVM at the FDA regulates animal pharmaceuticals under the Food, Drug and Cosmetics Act. The CVB at the USDA regulates veterinary vaccines and some biologics pursuant to the Virus, Serum, Toxin Act. The EPA regulates veterinary pesticides under the Federal Insecticide, Fungicide and Rodenticide Act. Many topical products used for treatment of flea and tick infestations are regulated by the EPA.

Our current product candidates are animal pharmaceuticals regulated by the CVM and animal biologics regulated by the USDA. Manufacturers of animal health pharmaceuticals, including us, must show their products to be safe, effective and produced by a consistent method of manufacture. The CVM's basis for approving a drug application is documented in a Freedom of Information Summary. We will be required to conduct post-approval monitoring of FDA- and EMA-approved pharmaceutical products and to submit reports of product quality defects, adverse events or unexpected results to the CVM's Surveillance and Compliance group.

Regulatory Process at the FDA. To begin the development process for our products in the United States, we establish an Investigational New Animal Drug ("INAD") file with the CVM. We then hold a pre-development meeting with the CVM to reach a general agreement on the plans for providing the data necessary to fulfill requirements for a NADA. During development, we submit pivotal protocols to the CVM for review and concurrence prior to conducting the required studies. We gather and submit data on manufacturing, safety and effectiveness to the CVM for review, and this review is conducted according to timelines specified in the ADUFA legislation. Once all technical sections have been reviewed and completed – safety, effectiveness, CMC, environmental, labeling, FOI and AOI – the CVM issues a technical section complete letter. We then compile and submit the technical section complete letters as an administrative NADA for CVM review. Generally, if there are no deficiencies in the submission, the NADA is issued within 60 days after submission of the administrative NADA. After approval, we will be required to collect reports of adverse events and submit them on a regular basis to the CVM.

The CVM has an alternative approval process for drugs used in minor species, or for drugs that are used for a 'minor use' in a major species. This process is called MUMS which stands for minor use, minor species. For example, if it can be documented that the population of cats or dogs that contract a specific condition is below a specified number, a company can apply to the CVM for MUMS designation. Once designation has been granted, then we must submit the same safety and CMC data as required for a full NADA, and also submit data to support a reasonable expectation of effectiveness. After a review period, the CVM can then grant a conditional approval. This approval allows for the commercialization of the product, while completing the pivotal effectiveness study required for a full NADA. Because in many cases the CMC section of the submission takes the longest, MUMS conditional approval may not

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shorten the time to commercialization. Following submission, review and approval of the pivotal field effectiveness study, the CVM may grant a full NADA.

Requirements for Approval of Certain Veterinary Biologics for Pets

There are many parallels between the requirements to receive approvals for a veterinary pharmaceutical product candidates and certain veterinary biologics product candidates. The terminology differs, but the three main components are the same: efficacy, manufacturing, and safety. USDA regulations are designed to ensure that veterinary biologics are pure, safe, potent and effective. The differences compared to pharmaceutical product regulations are based on the immunological nature of the mode of action of the product and the manufacturing process involving living organisms.

Efficacy. Documentation requirements depend significantly on product type and typically include data from preliminary dose determination studies and master seed immunogenicity/efficacy studies.

Safety. Typical safety documentation includes safety data from laboratory animal studies, typically rodents, studies in host animals, typically laboratory dogs or cats, in biocontainment, and field safety studies conducted in client-owned animals.

Manufacturing. The required documentation must include an Outline of Production, Master Seed Reports, and Summary Information Formats, or SIFs, for novel live biological products and products based on recombinant DNA technology. SIFs contain additional safety and identity data to establish proper biocontainment requirements and to conduct confirmatory testing. Other supportive documentation is product-type specific and includes in-process procedures and corresponding validation reports, potency test development report, stability reports, and veterinary biologics production and test for satisfactory three consecutive prelicensing serials (numbered lots) of product.

Other information. This includes labels or label sketches.

A unique requirement for veterinary biologics in the United States is that manufacturers must hold a United States Veterinary Biologics Establishment License to produce licensed veterinary biologicals. An establishment license will only be issued if at least one biological product qualifies for a license. Applications for veterinary biologics establishments include articles of incorporation for the applicant, qualifications of veterinary biologics personnel for key employees, water quality statement, facility blueprints, plot plans, and legends.

Regulatory Process at the USDA

Applicants are encouraged to contact the CVB early in the product development process. A licensing reviewer will be assigned to help with the regulatory process. Initially, the CVB will confirm that the proposed product meets the definition of a veterinary biologic and is subject to regulation by the CVB. The CVB then recommends that applicants submit a licensing plan, including pivotal study protocols, to the CVB for review and comment prior to initiating work that will be used to support product licensure. The USDA provides a complete list of guidance documents named "Veterinary Services Memorandums" that lay out the data requirements and regulatory process. Applicants that do not hold a United States Veterinary Biologics Establishment License need to submit the required documentation for the establishment and the product concurrently.

Study protocols and reports can be submitted any time after the initial applications have been made. The administrative process is facilitated by forms (APHIS Forms) that accompany the submissions and capture regulatory actions. There is no requirement to submit parts of dossiers or entire dossiers. The CVB provides official responses to submissions indicating if more data are needed or that the submission was satisfactory to support licensure. When master seed and master cell reports have been found to be satisfactory, samples have to be submitted to the CVB laboratory for confirmatory testing. Once all requirements have been satisfactorily met, the CVB will issue a veterinary biological product license.

In cases of emergencies, which means there is no approved product available, the USDA will issue a time-limited conditional license after the manufacturing and safety requirements have been substantially fulfilled and a reasonable expectation of efficacy has been established. The applicant has to continue the pivotal efficacy program and product testing validation. The conditional license can be extended if reasonable progress towards full licensure can be demonstrated.

There are no statutory review times. Submissions enter the review queue in chronological order. Hence predictions of development timelines and time to approval are difficult to make. However, we believe the typical time to achieve conditional licensure is approximately three years and the typical time to achieve full licensure is approximately five years.

Furthermore, while the CVB regulates certain biologics (for instance, based on the immunological nature of the mode of action) the CVM regulates other biologics in a manner described above under "Regulatory Process at the FDA."

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Other Regulatory Considerations

Regulatory rules relating to human food safety, food additives, or drug residues in food will not apply to the products we currently are developing because our products are not intended for use in food production animals.

Advertising and promotion of animal health products is controlled by regulations in many countries. These rules generally restrict advertising and promotion to those claims and uses that have been reviewed and endorsed by the applicable agency. We will conduct a review of advertising and promotional material for compliance with the local and regional requirements in the markets where we sell pet therapeutics.

European Regulatory Process

In general, the requirements for regulatory approval of an animal health product in the EU are similar to those in the United States, requiring demonstrated evidence of purity, safety, efficacy and consistency of manufacturing processes.

The EMA is responsible for coordinating scientific evaluation of applications for marketing approval via the centralized procedure for pet therapeutics in the EU. To perform these evaluations, the EMA established a specific scientific committee, the CVMP. The CVMP considers applications submitted by companies for the marketing approval of individual pet therapeutics and evaluates whether or not the medicines meet the necessary quality, safety and efficacy requirements. Assessments conducted by the CVMP are based on scientific criteria and are intended to ensure that pet therapeutics reaching the marketplace have a positive benefit-risk balance in favor of the pet population they are intended for. Based on the CVMP's recommendation, a centralized marketing authorization is granted by the European Commission, which allows the product to be marketed throughout the EEA. The CVMP is also responsible for various post-authorization and maintenance activities, including the assessment of modifications or extensions to an existing marketing authorization.

There are three different procedures to receive a marketing authorization (regulatory approval) in Europe, the decentralized procedure ("DCP"), the mutual recognition procedure ("MRP"), and the centralized procedure ("CP"). The centralized procedure is mandatory for certain products and technologies, for example biopharmaceuticals, gene therapy products, somatic cell therapeutic products or certain therapeutic areas, for example oncology or neurodegenerative disorders. Otherwise the sponsor can opt between CP and DCP.

An application for CP is submitted to the EMA which coordinates the scientific evaluation. To perform these evaluations, the EMA established a specific scientific committee, the CVMP. The CVMP evaluates whether the medicines meet the necessary quality, safety and efficacy requirements. Assessments conducted by the CVMP are based on scientific criteria and are intended to ensure that pet therapeutics reaching the marketplace have a positive benefit-risk balance in favor of the pet population they are intended for. Based on the CVMP's recommendation, a

centralized marketing authorization is granted by the European Commission, which allows the product to be marketed in any of the EU states. The CVMP is also responsible for various post-authorization and maintenance activities, including the assessment of modifications or extensions to an existing marketing authorization. The final opinion of the CVMP is generally given within 210 days of the submission of a dossier.

For products that are not eligible for centralized approval, the competent authorities of the EU Member States are responsible for granting marketing authorizations for products that are sold in their markets. Such products may be approved nationally in one Member State, or in multiple Member States via the mutual recognition procedure or the decentralized procedure.

A DCP can be used for products that have not been approved in any of the EU member states and do not fall under mandatory CP. The sponsor selects one Reference Member State (“RMS”) and one or more Concerned Member States (“CMS”). The RMS leads the scientific evaluation and with the input from CMS issues the initial and final assessment report. The regulatory assessment period is similar to the CP and divided into two periods of 120 and 90 days, respectively. The procedure ends with a consensus decision and leads to products approval in the RMS and CMS.

The MRP must be used for products that have been approved in at least one EU member state either by national procedure or DCP. The MRP uses an existing and if needed updated assessment report to extend marketing authorizations to more EU member states.

In the EU, products for MUMS are eligible for regulatory incentives such as free scientific advice and fee reductions. These incentives may apply, for example, if it can be documented that the population of cats or dogs that contract a specific condition is below a specified number in Europe. However, the EMA recently announced that fee reductions are only applicable to products indicated for food-producing species. An applicant may apply to the EMA for MUMS classification for any product irrespective of the intended route of approval (i.e. centralized, decentralized or national approval) and incentives may be requested for all routes of authorization. The CVMP has established guidelines specific to MUMS for data requirements, which apply to all sections of the application, i.e. quality, safety and efficacy. Consequently, there may be scope for a reduced quality data package. Similarly, the safety and efficacy sections might be abridged to a certain extent (more flexibility for the combination of dose-determination, dose-confirmation and field studies) provided reasonable evidence of safety and effectiveness are submitted. However, the CVMP and national veterinary medicines regulators have significant discretion in this respect. Overall, data requirements for demonstrating quality, efficacy and

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safety in the target species for minor use indications of a new medicine will be determined on a case-by-case basis and any potential applicant should seek scientific advice on specific data requirements to guide its research and development activities.

Rest of World

Each other country has its own regulatory requirements for approving and marketing veterinary pharmaceuticals. For example, in countries like Canada, Brazil or Australia, a government agency is responsible for the regulation and control of pharmaceuticals for animal use.

Many country specific regulatory laws contain provisions that include requirements for labeling, safety, efficacy and manufacturers' quality control procedures to assure the consistency of the products, as well as company records and reports. With the exception of the EU, the regulatory agencies of most other countries generally refer to the FDA, USDA, EMA, and other international animal health entities, including the World Organization for Animal Health and the Codex Alimentarius Commission, in establishing standards and regulations for veterinary pharmaceuticals and vaccines.

Segment and Geographic Information

We operate in one business segment and have operations in the United States. In late-2018, we closed our Belgium entity. See our consolidated financial statements for further information regarding our segment, including revenues and loss from operations. See Note 2 "Summary of Significant Accounting Policies" to our consolidated financial statements for total assets, and geographic information including revenues and long-lived assets.

Cooperation Agreement

In February 2019, the Cooperation Agreement between the Company and Engaged Capital, LLC and certain of its affiliates, effective May 18, 2018 (the "Cooperation Agreement"), expired and terminated pursuant to the agreed terms of the Cooperation Agreement. The ad hoc Strategic Review Committee of the Board of Directors of the Company, which was formed pursuant to the Cooperation Agreement, remains in place to make recommendations to our Board of Directors with respect to our strategy and opportunities to enhance stockholder value.

Employees

As of December 31, 2018, we had a total of 83 employees, all of which were full-time employees.

As of March 8, 2019, we have a total of 79 employees, all of which were full-time employees. We have a total of 13 employees with D.V.M., V.M.D., or Ph.D. degrees. Within our workforce, 19 employees are engaged in research and development and 60 in manufacturing and supply chain, business development, marketing and sales, finance, legal, human resources, facilities, information technology, and general management and administration.

Available Information

We maintain a website at www.aratana.com. We make available free of charge on our website our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, and amendments to these reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act as soon as reasonably practicable after we electronically file such material with, or furnish it to the Securities and Exchange Commission.

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Executive Officers of the Registrant

The executive officers of Aratana Therapeutics, Inc. as of March 8, 2019, are as follows:

Craig A. Tooman, age 53, has served as our President and Chief Executive Officer and a member of our Board of Directors since January 17, 2019. Mr. Tooman previously served as our Chief Financial Officer from November 2013 to February 2019 and our Treasurer from January 2014 to February 2019. He was a member of our Board of Directors from April 2012 to November 2013, before accepting the CFO role. Mr. Tooman previously served as the Chief Executive Officer of Avanzar Medical, Inc., a privately-held company focused on commercial oncology opportunities, from February 2012 until November 2014. Mr. Tooman was also the founder and principal of Stockbourne LLC, a firm that provides strategic business and financial advisory services, a position he held from January 2011 to November 2013. From July 2010 to January 2011, Mr. Tooman was the Senior Vice President of Finance and Chief Financial Officer of Ikaria Inc., a biotherapeutics company. From January 2005 to July 2010, Mr. Tooman was the Executive Vice President of Finance and Chief Financial Officer at Enzon Pharmaceuticals, a biopharmaceutical company. Prior to that, Mr. Tooman was the Senior Vice President of Strategic Planning and Corporate Communications at ILEX Oncology, Inc. and the Vice President of Investor Relations at Pharmacia Corporation. Mr. Tooman previously served on the Board of Directors of Insite Vision Incorporated, a publicly-traded ophthalmological company, from September 2011 to November 2015. Mr. Tooman also served on the Board of Directors and as chair of the audit committee of Xanodyne Pharmaceuticals Inc., a privately-held specialty pharmaceutical company, from October 2007 until it was acquired in June 2013 upon the sale of its commercial assets. He has a B.A. in Economics from Kalamazoo College and M.B.A. in Finance from the University of Chicago. As noted above, Mr. Tooman is a member of our Board of Directors and as such, we believe Mr. Tooman is qualified to serve on our Board based on his strong background in finance and investor relations and his extensive executive leadership experience in the pharmaceutical and biotechnology industries, including his service as a public company director and in various executive officer roles.

Rhonda L. Hellums, age 47, has served as our Chief Financial Officer and Treasurer since February 1, 2019. In addition, she served as our Vice President, Finance from March 2014 to January 31, 2019 and was a consultant to the Company from November 2013 to March 2014. Ms. Hellums previously served as the Director of Global Finance of Kinetic Concepts, Inc. (“KCI,” a subsidiary of Acelity L.P. Inc.), a medical device company, from January 2010 until March 2014. Ms. Hellums has also served as the principal of Summit Springs LLC, a firm that provides strategic business and financial consulting services, since August 2010. From January 2006 to January 2010, Ms. Hellums was the Vice President of Finance of Enzon Pharmaceuticals, Inc., a biopharmaceutical company. Prior to that, Ms. Hellums was the Director of Finance, Strategy and Alliance Management at Genzyme Corp., a global biopharmaceutical company and Director of Finance and Strategic Planning at ILEX Oncology, Inc. Ms. Hellums previously served as Controller for EG&G Management Services, a division of URS Corporation and as a financial management consultant at KPMG, LLC. She has a B.A. in Accounting and Information Systems and M.B.A. from The University of Texas at San Antonio.

Ernst Heinen, D.V.M., Ph.D., age 56, has served as our Chief Development Officer since March 5, 2014. In addition, he served as our Head of Drug Evaluation and Development from June 2012 until March 5, 2014. From 1990 to 2012, Dr. Heinen held positions of increasing responsibility at Bayer Animal Health, the animal health division of Bayer AG, where he ultimately served as Vice President of Research & Development and Veterinary Technical Services, Pets. Dr. Heinen currently serves on the Kansas State University Olathe Advisory Board and previously served on the boards of the Kansas City Area Development Council and the Center for Animal Health Innovation, and he is the author of dozens of scientific articles and presentations focused on the animal health industry. Dr. Heinen received a veterinary degree and a D.V.M. in veterinary microbiology from the Justus-Liebig-University of Giessen Veterinary

School in Giessen, Germany, and is a certified specialist in veterinary microbiology.

Chris Ready, age 45, has served as our Vice President of Sales and Marketing since November 1, 2018. In addition, he has served as our Sr. Director of Marketing from November 2016 to October 31, 2018. Previously, Mr. Ready served as Senior Director of Companion Animal Global Marketing at Elanco Animal Health from January 2015 to November 2016 and was responsible for the strategic marketing and brand management teams of the entire companion animal portfolio. Within Elanco, he also held various marketing roles in the companion animal, beef, dairy, swine and poultry business units from October 2005 to December 2014. Before Elanco, Mr. Ready spent nearly 10 years with Bayer Animal Health in various marketing and sales positions from July 1996 to October 2005. Mr. Ready holds a bachelor's degree in biology from the University of Kansas.

John C. Ayres, J.D., age 40, has served as our Vice President – Corporate Development and Administration, General Counsel and Secretary since January 1, 2019. In addition, he served as our General Counsel and Secretary since November 2013. Previously, Mr. Ayres served as corporate and securities counsel for Amgen Inc., a publicly-traded biotechnology company from June 2010 through October 2013. Prior to joining Amgen, Mr. Ayres was an attorney at the law firm of Latham & Watkins LLP in its Chicago office, where he specialized in public company representation and corporate transactions. Mr. Ayres earned his Juris Doctorate degree from the University of Missouri. He also holds a B.A. degree in finance from Truman State University.

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Non-Employee Directors

The non-employee directors of Aratana Therapeutics, Inc. as of March 8, 2019, are as follows:

Wendy L. Yarno, age 64, has been a member of our Board of Directors since October 2013 and since August 2015 has served as the Chairperson of the Board. Ms. Yarno retired in September 2008 from Merck & Co., Inc. following a 26-year career there in commercial and human resource positions of increasing seniority, most recently Executive Vice President and Chief Marketing Officer before she retired. In that role, Ms. Yarno led a global organization charged with all aspects of supporting pre-and post-launch commercialization of pharmaceuticals in more than 20 therapeutic areas. Prior to this role, she served as General Manager, Cardiovascular/Metabolic United States Business Unit, where she had P&L responsibility for Merck's largest therapeutic area, and as Senior Vice President, Human Resources. Ms. Yarno currently serves on the board of directors of publicly-traded biopharmaceutical companies MyoKardia, Inc., Global Blood Therapeutics, Inc., Inovio Therapeutics, Inc. and Alder Biopharmaceuticals, Inc. Ms. Yarno has served as a Director for both Myokardia and Alder Biopharmaceuticals since March 2017. She serves as a member of the compensation committee and audit committee for MyoKardia and chair of the nominating and governance committee and a member of the compensation committee for Alder. Since December 2017, she has served as a Director for both Global Blood Therapeutics and Inovio Therapeutics. She serves as a member of the compensation committee and nominating and governance committee and chair of the commercial committee for Global Blood Therapeutics and as chair of the compensation committee and a member of the audit committee and nominating and governance committee for Inovio. Ms. Yarno served as a Director and member of the governance and nominating committee and compensation committee of St. Jude Medical, Inc., a Fortune 500 medical device company, from April 2002 until January 2017 when St. Jude Medical was acquired by Abbott Laboratories. She served as a Director and member of the governance and nominating committee and audit committee as well as the chair of the compensation committee of Medivation, Inc., a publicly-traded biopharmaceutical company, from April 2013 until September 2016 when Medivation was acquired by Pfizer Inc. Ms. Yarno also served as a Director and member of the compensation committee of Durata Therapeutics, Inc., a publicly-traded pharmaceutical company, from August 2014 until November 2014 when Durata was acquired by Actavis plc. Ms. Yarno received a B.S. in Business Administration from Portland State University and an M.B.A from Temple University. We believe Ms. Yarno is qualified to serve on our Board based on her extensive experience in commercialization of pharmaceutical products and in human resource management in the pharmaceutical industry and her service on the boards of multiple life sciences companies.

Craig A. Barbarosh, Esq., age 51, has been a member of our Board of Directors since May 2018. Mr. Barbarosh has been a partner at the international law firm of Katten Muchin Rosenman LLP since June 2012, where he also serves as a member of its Board of Directors. From 1999 until June 2012, Mr. Barbarosh was a partner of the international law firm of Pillsbury Winthrop Shaw Pittman LLP, where he began his career as an associate in 1992. Mr. Barbarosh has served as a Director of Nextgen Healthcare, Inc. (formerly known as Quality Systems, Inc.) since September 2009, where he also serves as Vice Chairman of the Board of Directors, chair of the compensation committee and a member of the special transactions committee. He has also served as a Director of Sabra Health Care REIT, Inc. since November 2010, where he also serves as chair of its audit committee and a member of its compensation committee. Mr. Barbarosh previously served as a Director of BioPharmX Corporation from January 2016 to October 2016, and Bazaarvoice, Inc. from September 2017 until February 2018 when Bazaarvoice was acquired by Marlin Equity Partners. Mr. Barbarosh holds a J.D. from the University of the Pacific, McGeorge School of Law and a B.A. in Business Economics from the University of California at Santa Barbara. We believe that Mr. Barbarosh is qualified to serve on our Board based on his experience as a practicing attorney and his prior public company board experience.

Laura A. Brege, age 61, has been a member of our Board of Directors since February 2014. From September 2015 to January 2018, Ms. Brege was managing director of Cervantes Life Sciences Partners, LLC, a healthcare advisory and consulting company. She also served as President and Chief Executive Officer of Nodality, Inc., a privately-held life sciences company, from September 2012 to July 2015. Prior to joining Nodality, from January 2011 to January 2012, Ms. Brege was the Executive Vice President, Corporate Affairs of Onyx Pharmaceuticals, Inc., a biopharmaceutical company. From October 2007 to January 2011, she was the Chief Operating Officer, and from June 2006 to October 2007, she was the Executive Vice President and Chief Business Officer of Onyx Pharmaceuticals. From 1999 to 2006, Ms. Brege was a General Partner at Red Rock Capital Management, a venture capital firm. Previously, Ms. Brege served as Chief Financial Officer at companies such as COR Therapeutics, Inc., a biotechnology company, and Flextronics, Inc., a supply-chain solutions company. Ms. Brege currently also serves on the Board of Directors of publicly-traded Acadia Pharmaceuticals, Inc., Dynavax Technologies Corporation, Pacira Pharmaceuticals, Inc. and Portola Pharmaceuticals, Inc. Ms. Brege has served as a Director of Acadia since May 2008 and is currently a member of its audit committee and has served as a Director and chair of the audit committee of Dynavax since February 2015. Ms. Brege has served as a Director of Pacira since June 2011 and is currently the chair of its audit committee and a member of its nominating and governance committee and has served as a Director and member of the audit committee of Portola since January 2015. Ms. Brege previously served as a member of the Board of Directors of publicly-traded Angiotech Pharmaceuticals, Inc. from 2007 to 2011 and Delcath Systems, Inc. from 2012 to December 2014.
Ms. Brege earned her undergraduate degrees from Ohio University and has an M.B.A. from the University of Chicago. We believe Ms. Brege is qualified to serve on our Board based on her strong background in finance and her extensive executive leadership experience in the life sciences and biotechnology industries, including her service as a public company director and in various executive officer roles.

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David L. Brinkley, age 61, has been a member of our Board of Directors since March 2014. Mr. Brinkley worked for Theravance, Inc., a publicly-traded biopharmaceutical company, from 2000 to 2013, most recently as the Head of Business Development from November 2008 to July 2013. Mr. Brinkley had previously served as Senior Vice President, Commercial Development at Theravance from September 2000 through December 2007, when he left to start a consulting practice. From 1996 to 2000 he served as Worldwide Team Leader for Viagra at Pfizer Inc., leading the team that had full responsibility for the global launch and marketing of Viagra. Mr. Brinkley joined Pfizer in 1995 through its acquisition of SmithKline Beecham's Animal Health operations and was Director of New Product Planning before leading the Viagra launch team. Mr. Brinkley held various management positions with SmithKline Animal Health from 1983 to 1995. Mr. Brinkley previously served on the Board of Directors of Ziarco Pharma Ltd., a privately-held pharmaceutical company. Mr. Brinkley holds an M.A. with honors in International Economics from the School of Advanced International Studies of the Johns Hopkins University and a B.A. in International Relations from Kent State University, where he graduated with University Honors. We believe Mr. Brinkley is qualified to serve on our Board due to his extensive leadership experience in the biopharmaceutical industry, including his roles at Theravance and Pfizer.

Irvine "Irv" O. Hockaday, Esq., age 82, has been a member of our Board of Directors since August 2014. Mr. Hockaday is the retired President and Chief Executive Officer of Hallmark Cards, Inc. Prior to joining Hallmark in 1983, Mr. Hockaday served as President and Chief Executive Officer of Kansas City Southern Industries, Inc. He was a member of the Hallmark Board of Directors from 1978 through 2001. Mr. Hockaday has been on the Board of Directors of the Estee Lauder Companies, Inc. since 2001 and is currently lead Director and chair of its audit committee. Mr. Hockaday is a former Director or Lead Director of Crown Media Holdings, Inc., Dow Jones & Company, Inc., Ford Motor Company and Sprint Nextel Corporation. He currently holds various civic positions including trustee of the Hall Family Foundation and board member of BioNexus KC (formerly known as the Kansas City Area Life Sciences Institute), the Kansas City Symphony and has previously served as chairman of the board of the Tenth District Federal Reserve Bank. He graduated with an A.B. in English from Princeton University in 1958 and from the University of Michigan Law School with a J.D. in 1961. We believe Mr. Hockaday is qualified to serve on our Board due to his extensive experience as a Chief Executive Officer and board member of public companies.

Merilee Raines, age 63, has been a member of our Board of Directors since February 2014. Ms. Raines served as Chief Financial Officer of IDEXX Laboratories, Inc., a publicly-traded company providing diagnostic and IT products and services primarily to the companion animal health market, from October 2003 until her retirement in May 2013. Ms. Raines also served as Executive Vice President of IDEXX Laboratories from July 2012 to May 2013, and as Corporate Vice President, Finance of IDEXX Laboratories from May 1995 to July 2012. Ms. Raines has served as a Director of Watts Water Technologies, Inc., a publicly-traded manufacturer of products and systems focused on control, conservation and quality of water, since 2011, where she is currently a member of its nominating and corporate governance committee and chair of its audit committee. She is also a Director of Benchmark Electronics, Inc., a publicly-traded worldwide provider of engineering services, integrated technology solutions and electronic manufacturing services for complex products, since May 2018, where she is currently a member of its audit committee and nominating/governance committee. Ms. Raines also currently serves on the board of directors of privately-held companies such as Excelitas Technologies Corporation, in which she chairs its audit committee, and Dead River Company, in which she serves as a member of its finance committee and risk management committee. Ms. Raines previously served as a Director of Affymetrix, Inc., a publicly-traded provider of life sciences products and molecular diagnostic products, from January 2015 until April 2016 when Affymetrix was acquired by Thermo Fisher Scientific, Inc. Ms. Raines also served as a Director of PetVet Care Centers, a privately-held operator of a network of veterinary hospitals from April 2016 until February 2018 when PetVet Care was acquired by KKR. Ms. Raines earned a bachelor's degree in mathematics from Bowdoin College and an M.B.A. from the University of Chicago. We believe Ms. Raines is qualified to serve on our Board based on her experience as an executive of a public company in the

animal health industry and her extensive financial expertise, including her role as Chief Financial Officer of IDEXX Laboratories and her service on the audit committee of Watts Water Technologies.

Lowell W. Robinson, age 70, has been a member of our Board of Directors since May 2018. Mr. Robinson is an experienced former executive with over thirty years of senior global strategic, financial, operational and governance experience. From 2006 through 2009, Mr. Lowell served in various roles for MIVA, Inc., an online advertising network, including Chief Financial Officer, Chief Operating Officer and Chief Administrative Officer. Prior to that, Mr. Robinson served as the President of LWR Advisors, LLC, a strategic and financial consulting services firm, from 2002 to 2006. Previously, he served as the Chief Financial Officer and Chief Administrative Officer at HotJobs.com Ltd., an online recruiting and job search engine, from 2000 to 2002 when HotJobs.com Ltd. was sold to Yahoo! Inc. Mr. Robinson has also held senior financial positions at Advo, Inc., Citigroup Inc. and Kraft Foods Inc. Mr. Robinson previously served as a director of each of EVINE Live Inc. (March 2014 to June 2018), SITO Mobile, Ltd. (April 2017 to June 2017), Higher One Holdings, Inc. (June 2014 to August 2016), Support.com, Inc. (March 2016 to June 2016), The Jones Group, Inc. (2005 to April 2014) and International Wire Group, Inc. (2003 to 2009). Mr. Robinson's prior board experience also includes serving as a director of each of Independent Wireless One Corp., Diversified Investment Advisors Inc. and Edison Schools Inc. He is also on the board of the New York Academy of Sciences and the advisory board for the University of Wisconsin Economics Department, and previously served on the boards of The Council for Economic Education, The Metropolitan Opera Guild, The Smithsonian Libraries and the University of Wisconsin School of Business. Mr. Robinson earned his M.B.A. from Harvard Business School and B.A. in Economics from the University of Wisconsin. We believe that Mr. Robinson is qualified to serve on our Board because of his extensive executive experience in corporate finance, financial reporting and strategic planning, as well as his significant experience serving as a director of public companies.

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Robert P. Roche, age 63, has been a member of our Board of Directors since June 2014. Mr. Roche is the founding member of Robert Roche Associates, LLC, a consulting firm providing guidance to the pharmaceutical and healthcare industries. Mr. Roche created this firm upon his retirement from Cephalon, Inc., a biopharmaceutical company, in February 2010. Mr. Roche joined Cephalon in January 1995 as the Vice President of Sales and Marketing and was named Executive Vice President, Worldwide Pharmaceutical Operations of Cephalon in 2005. Before joining Cephalon, Mr. Roche served as Director and Vice President, Worldwide Strategic Product Development, for SmithKline Beecham's central nervous system and gastrointestinal products business. Mr. Roche also was Managing Director of SmithKline's pharmaceutical operations in the Philippines. Prior to that, he held senior marketing positions in Canada and Spain and had product planning responsibilities for SmithKline in Latin America. Mr. Roche began his pharmaceutical career in 1982 with SmithKline as a United States pharmaceutical sales representative. Mr. Roche has served as a Director of Antares Pharma, Inc., a publicly-traded specialty pharmaceutical company, since July 2013 and is currently a member of its governance and nominating committee and audit committee. In December 2016, Mr. Roche was appointed as a Director of Egalet Corporation, a publicly-traded specialty pharmaceutical company focused on innovative treatments of pain and other conditions, and is currently a member of its compensation committee and nominating and corporate governance committee. Mr. Roche is also currently a Director of Paragon Bioservices, Inc., a privately-held contract development and manufacturing organization. He formerly served as a Director of EKR Therapeutics until its acquisition in 2012, NuPathe Inc. until its acquisition in February 2014 and Civitas Therapeutics until its acquisition in November 2014. He also serves on the boards of Bryn Mawr Hospital and Westtown School. Mr. Roche earned his B.A. from Colgate University and his M.B.A. from The Wharton School at the University of Pennsylvania. We believe Mr. Roche is qualified to serve on our Board due to his executive and board leadership experience in the global pharmaceutical industry and his extensive commercial operations and product launch background.

John Vander Vort, Esq., age 54, has been a member of our Board of Directors since September 2012. Mr. Vander Vort is currently a Managing Director at Pilot House Associates, LLC, a family investment office based in Boston which he joined in September 2014. Prior to this role, Mr. Vander Vort was a Managing Director and the Chief Operating Officer of Charlesbank Capital Partners, a private equity firm. Mr. Vander Vort joined Charlesbank in September 2013 from MPM Asset Management LLC, a venture capital firm, where he served as a Managing Director, the Chief Operating Officer and the Chief Compliance Officer since May 2005, and he served on the Board of Directors of MPM Acquisition Corp., a public shell company, from February 2008 to November 2010. Prior to joining MPM Asset Management, from May 2003 until May 2005, he worked as Portfolio Manager for DuPont Capital Management. Prior to that, he was a General Partner and co-founder of BlueStream Ventures, a venture capital firm. Previously, he was a Managing Director at Dain Rauscher Wessels (now the Royal Bank of Canada), where he was the head of the West Coast networking and communications investment banking group and served as an advisor to leading venture-backed technology companies. Mr. Vander Vort began his career as a corporate transaction attorney in the San Francisco office of Cooley Godward, where he represented venture capital firms and venture-backed companies. Mr. Vander Vort earned his B.A. from Amherst College and his J.D. from The University of Chicago Law School. We believe Mr. Vander Vort is qualified to serve on our Board because of his background in venture capital, significant legal experience and business acumen.

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Item 1A. Risk Factors

Investing in our common stock involves a high degree of risk. You should carefully consider the important risks described below, as well as the other information contained in or incorporated by reference into our public filings with the Securities and Exchange Commission, before deciding whether to invest in our common stock. The occurrence of any of the events or developments described below could harm our business, financial condition, results of operations and growth prospects. In such an event, the market price of our common stock could decline, and you may lose all or part of your investment.

Risks Related to Our Business

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

We are a fully integrated pet therapeutics company in the animal health industry that transitioned into a commercial enterprise in 2016, but we have a limited operating history. The development of pet therapeutics is a highly speculative undertaking and involves a substantial degree of risk. We currently have a product pipeline with multiple therapeutics under development, and in 2016, we received FDA approval of three therapeutics, GALLIPRANT, ENTYCE and NOCITA. We also have a biologic, Canine Osteosarcoma Vaccine, Live Listeria Vector (AT-014), for which we received a conditional license from the USDA in December 2017, but for which we have not and do not expect to receive significant revenues during the ongoing clinical study.

We are not profitable and have incurred losses in each year since our inception in December 2010. In addition, we have limited experience and have not yet demonstrated an ability to successfully overcome many of the risks and uncertainties frequently encountered by companies in new and rapidly evolving fields, particularly in the animal health industry. We continue to incur significant research and development expenses, selling expenses and other expenses related to our ongoing operations. Our net loss for the year ended December 31, 2018 was $14.7 million, for the year ended December 31, 2017 was $47.5 million and for the year ended December 31, 2016 was $33.6 million. As of December 31, 2018, we had an accumulated deficit of $241.2 million and we had $42.7 million in cash, cash equivalents and short-term investments. We expect to continue to incur losses for the foreseeable future, and we expect these losses to continue as we commercialize our FDA-approved therapeutics and continue our development of, and seek regulatory approvals for, our therapeutic candidates by the FDA, or for our biologic therapeutics, the USDA. Even if we achieve profitability in the future, we may not be able to sustain profitability in subsequent periods. Our prior losses, combined with expected future losses, have had and will continue to have an adverse effect on our stockholders' equity and working capital.

We may require substantial additional financing to achieve our goals, and a failure to obtain this necessary capital when needed on acceptable terms, or at all, could force us to delay, limit, reduce or terminate our therapeutics portfolio expansion, product development, other operations or commercialization efforts.

Since our inception, a majority of our resources have been dedicated to the in-licensing, acquisition, research and development, and sales and marketing of our therapeutics and current therapeutic candidates. We believe that we will expend substantial resources for the foreseeable future for the commercialization of our FDA-approved therapeutics and the continuing development of, and obtaining regulatory approval for, our therapeutic candidates and any future

therapeutic candidates we may choose to pursue. We also have an active in-licensing effort focused on identifying human therapeutics for development and commercialization as pet therapeutics. Expenditures related to the foregoing efforts will include costs associated with identifying potential therapeutic candidates, licensing or acquisition payments, conducting target animal studies, completing other research and development, obtaining regulatory approvals and manufacturing and supply, as well as marketing and selling any therapeutics approved for sale. In addition, other unanticipated costs may arise. Because the outcome of any target animal study is uncertain, we cannot reasonably estimate the actual amounts necessary to successfully complete the development and commercialization of any of our current or future therapeutic candidates. As of the date of the filing of this 2018 Annual Report, we believe that our existing cash, cash equivalents and short-term investments at December 31, 2018 will allow us to fund our operations for at least one year from the issuance of our consolidated financial statements. However, our operating plan may change as a result of many factors currently unknown to us, and we may seek additional funds sooner than planned through corporate collaborations and licensing arrangements, or other sources, such as public or private equity and further debt financings. Such financings may result in dilution to stockholders, imposition of debt covenants and repayment obligations, or other restrictions that may affect our business. In addition, we may seek additional capital due to favorable market conditions or strategic considerations even if we believe we have sufficient funds for our current or future operating plans.

Our future capital requirements depend on many factors, including, but not limited to:

- the cost of commercialization activities for any of our current therapeutics, current therapeutic candidates or future therapeutic candidates, including marketing, sales and distribution costs;
- the cost of manufacturing our current therapeutics, current therapeutic candidates and future therapeutic candidates and any therapeutics we successfully commercialize as well as the cost of minimum purchase commitments and the potential for funding time lags between purchase commitment and payment from the sale of the therapeutic;
- the scope, progress, results and costs of researching and developing our current or future therapeutic candidates and conducting target animal studies;

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- the timing of, and the costs involved in, obtaining regulatory approvals for any of our current or future therapeutic candidates, or for our therapeutics, if any follow-up approval is required;
- the upfront and other payments, and associated costs, related to identifying, acquiring and in-licensing new therapeutic candidates;
- the number and characteristics of the therapeutic candidates we pursue;
- whether we acquire any other companies, assets, intellectual property or technologies in the future;
- our ability to collaborate with companies with an established commercial presence in Europe and/or other countries to provide our therapeutics in those markets;
- our ability to establish and maintain strategic collaborations, licensing or other arrangements and the financial terms of such arrangements, and the potential costs and other financial terms of amending or terminating such arrangements, including litigation costs and the outcome of such litigation;
- whether we are required to repay grant amounts that we received from foreign, United States and/or state governments;
- the expenses needed to attract and retain skilled personnel;
- the costs associated with being a public company;
- the costs involved in preparing, filing, prosecuting, maintaining, defending and enforcing patent rights, including litigation costs;
- any litigation we may be involved in from time to time; and
- demand for our commercialized therapeutics.

Additional funds may not be available when we need them on terms that are acceptable to us, or at all. If adequate funds are not available to us on a timely basis, we may be required to delay, limit, reduce or terminate:

- our target animal studies or other development activities for our current or future therapeutic candidates;
- our establishment of sales and marketing capabilities or other activities that may be necessary to launch and/or commercialize any of our current therapeutics, current therapeutic candidates or future therapeutic candidates; or
- our in-licensing and acquisition efforts and expansion of our therapeutics portfolio.

We have recognized substantial intangible asset impairment losses and may be required to recognize additional non-cash impairment losses in the future.

During the second quarter, fourth quarter and for the year ended 2016, we recorded non-cash impairment charges of $2.7 million, $5.2 million and $7.9 million, respectively, related to our intangible assets BLONTRESS, TACTRESS and AT-007. During the fourth quarter of 2017, we recorded non-cash impairment charges of $7.4 million related to our intangible assets AT-006 and AT-008. At December 31, 2018, we had $6.1 million of remaining intangible assets on our balance sheet, compared to $6.6 million at December 31, 2017. We could experience material impairment losses in the future. Certain factors, including reduced market potential, might have a negative impact on the carrying value of our intangible assets. The process of testing intangible assets for impairment involves numerous judgments, assumptions and estimates made by management including expected future profitability, cash flows and the fair values of assets and liabilities, which inherently reflect a high degree of uncertainty and may be affected by significant variability. If the business climate deteriorates, then actual results may not be consistent with these judgments, assumptions and estimates, and our intangible assets may become further impaired in future periods. This would in turn have an adverse impact on our business, financial condition and results of operations.

We have been named as a party in stockholder class action lawsuits, and we may be named in additional litigation, which will require significant management time and attention, and may result in significant legal expenses and an unfavorable outcome, which could have a material adverse effect on our business, operating results and financial condition.

We have been and may become subject to legal proceedings and claims that arise in or outside the ordinary course of business, including those related to patents, product liability and government investigations. Also, we have been and may become subject to purported class action lawsuits filed against us on behalf of certain purchasers of our common stock. Securities class action suits and derivative suits are often brought against companies following periods of volatility in the market price of their securities.

For example, as the Company previously disclosed, the Company and two of its officers were named as defendants in a securities class action lawsuit filed in the United States District Court for the Southern District of New York (the "Court") under the caption, In re Aratana Therapeutics, Inc. Securities Litigation, Case No. 1:17-cv-00880. The Company vigorously defended all claims asserted, including by filing a motion to dismiss, and on June 11, 2018, the Court issued an Opinion and Order granting the motion to dismiss in

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its entirety and dismissing with prejudice all claims asserted against the Company and its senior officers (the "Opinion and Order"). The plaintiffs did not file a notice of appeal of the Court's Opinion and Order, and the time to file such notice has expired. The Company considers the matter to be closed.

We vigorously defend all lawsuits and claims asserted. We cannot assure you, however, that we will be successful. Also, our insurance coverage may be insufficient, our assets may be insufficient to cover any amounts that exceed our insurance coverage, and we may have to pay damage awards or otherwise may enter into settlement arrangements in connection with such claims. Any such payments or settlement arrangements in any future litigation could have material adverse effects on our business, operating results or financial condition. Future litigation could result in substantial costs and significantly and adversely impact our reputation and divert management's attention and resources even if the plaintiffs' claims are not successful, which could have a material adverse effect on our business, operating results or financial condition. In addition, such lawsuits may make it more difficult to finance our operations.

Unstable market and economic conditions may have serious adverse consequences on our business.

Our business may be adversely affected by unpredictable and unstable market conditions (including as a result of a prolonged U.S. government shutdown). If the equity and credit markets deteriorate, it may make any necessary debt or equity financing more difficult to obtain and more costly. Failure to secure any necessary financing in a timely manner and on favorable terms could have a material adverse effect on our development programs, commercialization efforts, financial performance and stock price and could require us to delay or abandon plans for our target animal studies and/or the commercialization of any approved therapeutics. In addition, difficult economic conditions (including as a result of a prolonged U.S. government shutdown) may limit pet owners' discretionary funds, which could in turn limit their ability to purchase pet therapeutics. A tight spending climate for pet owners could negatively affect our ability to generate revenues from any approved therapeutics. Further, we rely on third-parties for several aspects of our business, including contract manufacturers for the manufacture of our therapeutics, licensors of pharmaceutical compounds, national and regional distributors and national third-party logistics providers. During challenging and uncertain economic times and in difficult credit markets, there may be a disruption or delay in the performance of our third-party contractors and other collaborators. If such third parties are unable to satisfy their commitments to us, or if they become bankrupt or insolvent, our agreements with such parties may terminate, and our business and results of operations would likely be adversely affected.

Any credit facilities that we may use to finance our assets may require us to provide additional collateral or pay down debt.

We intend, when appropriate, to use traditional forms of financing, including credit facilities. In the event we utilize such financing arrangements, they would involve the risk that the market value of our assets pledged to the provider of the credit facility may decline in value, in which case the lender may require us to provide additional collateral or to repay all or a portion of the funds advanced. We may not have the funds available to repay our debt at that time, which would likely result in defaults unless we are able to raise the funds from alternative sources, which we may not be able to achieve on favorable terms or at all. Posting additional collateral would reduce our liquidity and limit our ability to leverage our assets. If we cannot meet these requirements, the lender could accelerate our indebtedness, increase the interest rate on advanced funds and terminate our ability to borrow funds from them, which could materially and adversely affect our financial condition and ability to implement our business plan. In addition, in the event that the lender files for bankruptcy or becomes insolvent, our loans may become subject to bankruptcy or insolvency proceedings, thus depriving us, at least temporarily, of the benefit of these assets. Such an event could restrict our access to credit facilities and increase our cost of capital. The providers of credit facilities may also require us to

maintain a certain amount of cash or set aside assets sufficient to maintain a specified liquidity position that would allow us to satisfy our collateral obligations. As a result, we may not be able to leverage our assets as fully as we would choose, which could reduce our return on assets. In the event that we are unable to meet these collateral obligations, our financial condition and prospects could deteriorate rapidly. Currently, we have no credit facilities in place, and there can be no assurance that we will be able to utilize such arrangements on favorable terms, or at all.

We are substantially dependent on the commercial success of our therapeutics GALLIPRANT, ENTYCE and NOCITA.

To date, we have invested substantial efforts and financial resources in the in-licensing, research and development, and commercialization of GALLIPRANT, ENTYCE and NOCITA. Our collaboration partner began commercializing GALLIPRANT in early-2017. We began commercializing NOCITA in late-2016 and began commercializing ENTYCE in late-2017.

Our near-term prospects, including our ability to finance our company and to enter into future strategic collaborations and generate revenue, will depend heavily on the successful development and commercialization of GALLIPRANT, ENTYCE and NOCITA. The commercial success of our current therapeutics will depend on a number of factors, including the following:

- the effectiveness of our commercialization efforts, including the effectiveness of marketing, sales and distribution strategy and operations, whether performed solely by us or in collaboration with others;
- the ability of us or our third-party manufacturers to manufacture supplies of any of our therapeutics to meet the market demand and to develop, validate and maintain commercially viable manufacturing processes that are compliant with cGMP and to manufacture such therapeutics at an acceptable cost as well as the ability to sell such therapeutics at an acceptable price with reasonable margins;

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- our ability to establish and maintain strategic collaborations, licensing or other arrangements, the financial terms of such agreements and the potential costs and financial terms to amend or terminate such relationships or other arrangements, including litigation costs;
- the availability, perceived advantages, relative cost, relative safety and relative efficacy of alternative and competing treatments;
- achieving and maintaining compliance with all regulatory requirements applicable to our therapeutics, including related to regulatory requirements for manufacturing by our third-party manufacturers;
- the prevalence and severity of adverse side effects and our ability to maintain a continued acceptable safety profile of the therapeutic following approval;
- our ability to obtain supplemental indications for our therapeutics;
- our ability to enforce our intellectual property rights in and to our therapeutics, and avoid third-party patent interference, third-party initiated and United States Patent and Trademark Office ("PTO")-initiated administrative patent proceedings or patent infringement claims;
- our success in educating veterinarians and pet owners about the benefits, administration and use of our therapeutics;
- acceptance of our therapeutics as safe and effective by veterinarians, pet owners and the animal health community; and
- any product liability claim or lawsuit we may be involved in from time to time with regards to our therapeutics.

Many of these factors are beyond our control. If we are not successful in our development and commercialization of our current therapeutics, our business will be materially harmed and the value of your investment could substantially decline.

The development of our biologic therapeutic candidates is dependent upon relatively novel technologies and compliance with complex regulatory requirements.

We are developing biologics for pets, such as vaccines, and may in the future develop other biologics such as animal antibodies. Identification, optimization and manufacturing of therapeutic animal biologics is a relatively new field in which unanticipated difficulties or challenges could arise. While many biologics have been approved for use in humans, very few have been approved for use in animals, except for vaccines. There are unique risks and uncertainties with biologics, the development, manufacturing and sale of which are subject to regulations that are often as complex and extensive as the regulations applicable to other small molecule therapeutics. We anticipate that our animal biologics will continue to be regulated by the USDA, rather than CVM, and the regulatory standards that the USDA may require for novel biologics may be more difficult to satisfy than we anticipate.

We may be unable to obtain regulatory approval for our existing or future therapeutic candidates under applicable regulatory requirements. The denial or delay of any such approval would delay commercialization efforts and adversely impact our potential to generate revenue, our business and our results of operations.

Our therapeutic candidates are in various stages of development. The research, testing, manufacturing, labeling, approval, sale, marketing and distribution of pet therapeutics are subject to extensive regulation by the CVM, the USDA, the EMA and other regulatory authorities in the United States and other countries, whose regulations differ from country to country. We are not permitted to market our therapeutics in the United States until we receive approval of a NADA from the CVM or a product license from the USDA with respect to our biologic therapeutics, or in Europe until we receive approval from the European Commission or applicable EU State national competent authorities.

Even if we receive approval of an NADA, USDA product license or foreign regulatory filing for our therapeutic candidates, the CVM, the USDA or the applicable foreign regulatory body may approve our therapeutic candidates for a more limited indication than we originally requested, and the CVM or the USDA may not approve the labeling that we believe is necessary or desirable for the successful commercialization of our therapeutic candidates.

We also cannot predict the likelihood, nature or extent of government regulation that may arise from future legislation or administrative or executive action, either in the United States or abroad. For example, the current United States presidential administration has taken several executive actions, including the issuance of a number of Executive Orders, that could potentially impose significant burdens on, or otherwise materially delay, FDA's ability to engage in routine regulatory and oversight activities such as implementation of statutes through rulemaking, issuance of guidance, and review and approval of marketing applications. If these executive actions impose constraints on FDA's ability to engage in oversight and implementation activities in the normal course, our customers may be affected. Any delay in obtaining, or inability to obtain, applicable regulatory approval, or any uncertainties around related government regulation, would delay or prevent commercialization of our therapeutic candidates and would materially adversely impact our business and prospects.

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Our therapeutics, and our current or future therapeutic candidates that may obtain regulatory approval, may never achieve market acceptance or commercial success.

Even if we obtain CVM, USDA, EMA or other regulatory approvals, our current or future therapeutics may not achieve market acceptance among veterinarians and pet owners, and may not be commercially successful. For example, our two canine-specific monoclonal antibody (MAb) therapies, BLONTRESS and TACTRESS, both received a full license from the USDA, however, we impaired the value of both of these assets during the third quarter of 2015 and again in 2016 (in the second quarter of 2016 for TACTRESS and in the fourth quarter of 2016 for BLONTRESS). Based on the results of the final clinical study and resulting market demand, the therapeutics are no longer being made commercially available and were discontinued as of the fourth quarter of 2017. In addition, to date, NOCITA has taken a longer sales cycle than what we would expect for a general practice product, and we believe the long-term success of ENTYCE will be driven by veterinarians becoming comfortable with its use and shifting towards chronic use settings, which may never occur or may take longer than we would expect for a general practice product. Market acceptance of any of our current or future therapeutics will depend on a number of factors, including:

- the effectiveness of our sales and marketing efforts and those of our collaborators;
- the consistent and reliable supply and manufacture of the therapeutics;
- the acceptance by veterinarians and pet owners of the therapeutics as safe and effective treatments;
- the indications for which our therapeutics are approved;
- the proper training and administration of our therapeutics by veterinarians;
- the actual, potential and perceived advantages of our therapeutics over alternative treatments, including generic medicines and therapeutics approved for use by humans that are used off label;
- the cost of alternative treatments and willingness to pay for our therapeutics, if approved, on the part of veterinarians and pet owners;
- the willingness of pet owners to pay for our treatments, relative to other discretionary items, especially during economically challenging times;
- the relative convenience and ease of administration;
- the prevalence and severity of adverse side effects;
- the safety of our therapeutics as demonstrated in our target animal studies; and
- any negative publicity surrounding our Company, therapeutics or current or future therapeutic candidates, including any negative perception that may result from product liability lawsuit or other litigation.

Because we expect sales of GALLIPRANT, ENTYCE and NOCITA to generate substantially all of our product revenues for the foreseeable future, the failure of these therapeutics to gain market acceptance or achieve commercial success would adversely affect our financial results and require us to seek additional financing.

Product liability lawsuits against us could cause us to incur substantial liabilities and limit commercialization of our therapeutics and any therapeutics that we may develop.

We face an inherent risk of product liability exposure related to the testing of our therapeutic candidates in clinical trials and will face an even greater risk for our therapeutics under commercialization. If we cannot successfully defend ourselves against claims that our therapeutic candidates or therapeutics caused injuries, we will incur substantial liabilities. Regardless of merit or eventual outcome, liability claims may result in:

- regulatory investigations, product recalls or withdrawals, or labeling, marketing or promotional restrictions;
- decreased demand for any product candidates or products that we may develop;
- injury to our reputation and significant negative media attention;
- significant costs to defend the related litigation;
- substantial monetary awards to consumers of our therapeutics;
- loss of revenue;
- reduced resources of our management to pursue our business strategy; and
- the inability to commercialize any therapeutics that we develop.

We currently maintain product liability insurance at limits of $5.0 million per occurrence and in the policy aggregate. Those limits may not be adequate to cover all liabilities that we may incur. We may need to increase our insurance coverage as we expand our

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clinical trials and commercialize our therapeutics and therapeutic candidates. Product liability insurance is increasingly expensive. We may not be able to maintain insurance coverage at a reasonable cost or in an amount adequate to satisfy any liabilities that might arise.

We may not realize all of the anticipated benefits of acquisitions, or those benefits may take longer to realize than expected. We may also encounter significant unexpected difficulties in integrating acquired businesses.

We have made, and may continue to make, acquisitions. The overall integration of any acquired businesses may result in material unanticipated problems, expenses, liabilities, competitive responses, and diversion of management's attention. The difficulties of combining the operations of acquired companies include, among others:

- the diversion of management's attention to integration matters;
- difficulties in achieving anticipated cost savings, synergies, business opportunities and growth prospects from combining any acquired businesses with our company;
- difficulties in the integration of operations and systems;
- difficulties in the assimilation of employees;
- challenges in attracting and retaining key personnel; and
- challenges in maintaining previously-established relationships with licensors and licensees.

Many of these factors will be outside of our control and any one of them could result in increased costs and diversion of management's time and energy, which could materially impact our business, financial condition and results of operations. In addition, even if the operations of any acquired businesses are integrated successfully, we may not realize the full benefits of the transaction, including the synergies or growth opportunities that we expect. For example, we acquired BLONTRESS and TACTRESS in connection with our acquisition of Vet Therapeutics, Inc., and since the acquisition, have fully impaired the value of these assets, discontinued the products and closed a USDA-licensed facility in San Diego where they had been produced. Other expected benefits of our acquisitions may not be achieved within the anticipated time frame, or at all.

In addition, through acquisitions, we may assume liabilities, losses or costs for which we are not indemnified or insured or for which our indemnity or insurance is inadequate. Any such liabilities may have a material adverse effect on our financial position or results of operations.

Development of pet therapeutics is an expensive and lengthy process with an uncertain outcome, and results of earlier studies may not be predictive of future study results.

Development of pet therapeutics is expensive and can take many years to complete, and its outcome is inherently uncertain. To gain approval to market a pet therapeutic for a particular species of pet, we must provide the CVM, the USDA or foreign regulatory authorities, as applicable, with data from animal safety and effectiveness studies that adequately demonstrate the safety and efficacy of that product in the target animal for the intended indication applied for in the NADA, product license or other regulatory filing. We rely on contract research organizations, or CROs, and other third parties to ensure the proper and timely conduct of most of our studies and development efforts and, while we have agreements governing their committed activities, we have limited influence over their actual performance. Failure can occur at any time during the development process. Success in prior target animal studies or in the treatment of human beings with a therapeutic candidate does not ensure that our target animal studies will be successful and the results of development efforts by other parties may not be indicative of the results of our target

animal studies and other development efforts. For example, in December 2017, VetStem Biopharma, our collaborator responsible for the development of AT-016, shared the results of a pivotal study that did not achieve protocol-defined efficacy success criteria and as a result, we ultimately made the decision to exercise our rights to terminate the license agreement effective April 2018. Product candidates in our studies may fail to show the desired safety and efficacy despite showing such results in initial data or previous human or animal studies conducted by other parties. Even if our studies and other development efforts are completed, the results may not be sufficient to obtain regulatory approval for our therapeutic candidates.

Once our target animal studies commence, we may experience delays in such studies and other development efforts and we do not know whether planned studies will begin on time, need to be redesigned or be completed on schedule, if at all. Pet therapeutics studies can be delayed or discontinued for a variety of reasons, including delay or failure to:

- reach agreement on acceptable terms with prospective CROs and study sites, the terms of which can be subject to extensive negotiation and may vary significantly among different CROs and trial sites;
- complete target animal studies due to deviations from study protocol;
- address any safety concerns that arise during the course of testing;
- address any conflicts with new or existing laws or regulations;
- add new study sites and/or enroll patients; or

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- manufacture sufficient quantities of formulated drug for use in studies.

If we experience delays in the completion of, or terminate any development efforts for our therapeutic candidates, the commercial prospects of our therapeutic candidates will be harmed, and our ability to generate product revenues from any of these therapeutic candidates will be delayed. In addition, any delays in completing our development efforts will increase our costs, slow down our therapeutic candidate development and approval process and jeopardize our ability to commence product sales and generate revenues. Any of these occurrences may harm our business, financial condition and prospects significantly. In addition, many of the factors that cause, or lead to, a delay in the commencement or completion of our development efforts may also ultimately lead to the denial of regulatory approval of our therapeutic candidates.

Our therapeutics, and therapeutic candidates, if approved, will face significant competition and our failure to effectively compete may prevent us from achieving significant market penetration.

The development and commercialization of new animal health medicines is highly competitive, and we expect considerable competition from major pharmaceutical, biotechnology and specialty animal health medicines companies. As a result, there are, and likely will continue to be, extensive research and substantial financial resources invested in the discovery and development of new animal health medicines. Our potential competitors include large animal health companies, such as Zoetis; Merck Animal Health, the animal health division of Merck & Co., Inc.; Elanco; Bayer Animal Health, the animal health division of Bayer AG; Boehringer Ingelheim Animal Health, the animal health division of Boehringer Ingelheim GmbH; Virbac Group; Ceva Animal Health; Vetoquinol and Dechra Pharmaceuticals PLC. We are also aware of several smaller early stage animal health companies, such as Kindred Biosciences, Zomedica Pharmaceuticals, VetDC, Skyline Vet Pharma and Anivive that are developing products for use in the pet therapeutics market.

Osteoarthritis is a competitive marketplace and Elanco has taken the lead on commercial activities for Grapiprant Products. ENTYCE entered a new market where it is currently the only product FDA approved for veterinary use to stimulate appetite in dogs. However, we are aware that some veterinarians use maropitant citrate as an anti-emetic or utilize mirtazapine, a human generic antidepressant with known side effects and limited effectiveness, to encourage a dog to begin eating again. We are aware of an ointment FDA-approved for management of weight loss in cats that is applied to the inner pinna of the cat’s ear once daily for 14 days. We expect NOCITA in dogs and cats will compete primarily with existing analgesics that are part of multi-modal pain protocols, including local anesthetics, opioids and cox-inhibiting NSAIDs. Regarding AT-014, we are aware of investigational candidates for osteosarcoma.

We are a company with a limited history of operations and many of our competitors have substantially more resources than we do, including both financial and technical resources. In addition, many of our competitors have more experience than we have in the development, manufacture, regulation and worldwide commercialization of animal health medicines. We are also competing with academic institutions, governmental agencies and private organizations that are conducting research in the field of animal health medicines.

Our competition will be determined in part by the potential indications for which our therapeutics are developed and ultimately approved by regulatory authorities. Additionally, the timing of market introduction of some of our potential products or of competitors’ products may be an important competitive factor. Accordingly, the speed with which we can develop our compounds, complete target animal studies and approval processes, and supply commercial quantities to market are expected to be important competitive factors. We expect that competition among products approved for sale will be based on various factors, including product efficacy, safety, reliability, availability, price and patent position.

If we are not successful in identifying, licensing or acquiring, developing and commercializing additional therapeutic candidates, our ability to expand our business and achieve our strategic objectives would be impaired.

A key element of our strategy is to identify, license or acquire, develop and commercialize a portfolio of therapeutics to serve the pet therapeutics market. We derive potential pet therapeutic candidates from molecules and compounds discovered or developed as part of human biopharmaceutical research. We expect to enter into license arrangements with third parties to provide us with rights to human health compounds for purposes of our business. Such agreements are typically complex and require time to negotiate and implement. If we enter into these arrangements, we may not be able to maintain these relationships or establish new ones in the future on acceptable terms or at all. If we are unable to access human health-generated molecules and compounds to conduct research and development on cost-effective terms, our ability to develop new products could be limited. In some instances, human biopharmaceutical companies may be unwilling to license us their products or compounds for development as pet therapeutics because of perceived regulatory and commercial risks, including the risk that the FDA could delay or halt an ongoing human development trial if the same compound, when studied in animals, produces an unexplained adverse event or death, and the risk that, if the same compound is developed for humans and pets, and the human version is priced significantly higher than the pet version, which is usually the case, human patients would attempt to use the cheaper animal version of the drug. Even if we successfully identify and license potential therapeutic candidates, we may still fail to yield therapeutic candidates for development and commercialization for many reasons, including the following:

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- competitors may develop alternatives that render our therapeutic candidates obsolete;

- therapeutic candidates we develop may nevertheless be covered by third parties' patents or other exclusive rights;

- a therapeutic candidate may on further study be shown to have harmful side effects in pets or other characteristics that indicate it is unlikely to be effective or otherwise does not meet applicable regulatory criteria;

- a therapeutic candidate may not be capable of being produced in commercial quantities at an acceptable

cost, or at all; and

- a therapeutic candidate may not be accepted as safe and effective by veterinarians, pet owners and the pet therapeutics community.

If we fail to develop and successfully commercialize other therapeutic candidates, our business and future prospects may be harmed and our business will be more vulnerable to any problems that we encounter in developing and commercializing our current and future therapeutic candidates.

If we fail to attract and keep senior management and key scientific and commercial personnel, we may be unable to successfully develop any of our current or future therapeutic candidates, conduct our in-licensing and development efforts and commercialize any of our therapeutics or current or future therapeutic candidates.

Our success depends in part on our continued ability to attract, retain and motivate highly qualified management and scientific personnel. We are highly dependent upon our senior management team as well as our senior scientists and sales and marketing team. The loss of services of any of these individuals could delay or prevent the successful development of our current or future therapeutic pipeline, completion of our planned development efforts or the commercialization of our therapeutics and therapeutic candidates.

In addition, we could experience difficulties attracting and retaining qualified employees in the future. For example, competition for qualified personnel in the animal health fields is intense due to the limited number of individuals who possess the skills and experience required by our industry. We will need to hire additional personnel as we expand our development and commercial activities. We may not be able to attract and retain quality personnel on acceptable terms, or at all. In addition, to the extent we hire personnel from competitors, we may be subject to allegations that they have been improperly solicited or that they have divulged proprietary or other confidential information, or that their former employers own their research output. Failure to attract and retain highly qualified personnel could have an adverse effect on our business and our ability to develop our therapeutic candidates and commercialize our therapeutics.

We rely completely on third-party manufacturers and collaboration partners to manufacture the supplies for the development of therapeutic candidates and to produce commercial quantities of our therapeutics.

We do not currently have, nor do we currently plan to acquire, the internal infrastructure or capability to manufacture the formulated drug for use in the conduct of our target animal studies. We also lack the resources and the capability to manufacture any of our therapeutics or therapeutic candidates on a scale necessary for commercialization. We rely on contract manufacturers and/or collaboration partners to provide commercial supplies of the formulated drugs. For example, for NOCITA, we have entered into a commercial supply agreement with Pacira to supply the formulated drug. If this supply agreement terminates for any reason, or Pacira does not produce the necessary quantities, or demand of the product unexpectedly exceeds forecasts, we may be unable to arrange for alternative supply of NOCITA in a timely manner, on commercially reasonable terms, or at all, which could result in the product being unavailable. Our agreement with Pacira may terminate due to factors outside of our control, including if Pacira ceases to manufacture, for any reason, the formulated drug. With respect to NOCITA and our other therapeutics, as well as

our therapeutic candidates, any delay in our ability to identify and contract with a replacement or an initial third-party contract manufacturer, as applicable, on commercially reasonable terms, or at all, would have an adverse impact upon our business.

Additionally, any damage to or destruction of our third-party manufacturers' facilities or equipment may significantly impair our ability to manufacture our therapeutics and therapeutic candidates on a timely basis.

We are completely dependent upon the third-party manufacturers' and collaboration partners' adequate quality control and compliance with regulatory requirements.

The facilities used by our contract manufacturers and collaboration partners to manufacture the active pharmaceutical ingredients and formulated drugs may be subject to inspections by one or more regulatory bodies. We do not control the manufacturing processes used by, and we are completely dependent on, our contract manufacturers to comply with cGMP, as applicable, for the manufacture of active pharmaceutical ingredients and/or finished drug products. In addition, we have no control over the ability of our contract manufacturers to maintain adequate quality control and quality assurance practices and to engage qualified personnel. If our contract manufacturers and/or collaboration partners cannot successfully manufacture material that conforms to our specifications and complies with regulatory requirements, they will not be able to secure and/or maintain regulatory approval for their manufacturing facilities. The CVM requested additional information regarding the proposed transfer in order to complete the supplemental application, which was ultimately approved in October 2017 but delayed our commercialization of ENTYCE. We may also decide to add additional redundant contract manufacturers or replace current contract manufacturers, which could require regulatory approval for the new manufacturing facilities. If the CVM, the USDA or the EMA does not approve our contract manufacturers' or

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collaboration partners' facilities used for the manufacture of our therapeutics or therapeutic candidates, or if any such agency withdraws any such approval in the future, we may need to find alternative manufacturing facilities, which would adversely impact our ability to develop and obtain regulatory approval for or market our therapeutics or therapeutic candidates, if approved, and may have an adverse impact upon our business. For example, in February 2017, we received a response from the CVM in connection with our PAS to transfer the manufacturing of ENTYCE to a new vendor in order to produce ENTYCE at commercial scale. The CVM requested additional information regarding the proposed transfer in order to complete the supplemental application, which was ultimately approved in October 2017 but delayed our commercialization of ENTYCE.

The manufacturing process for our therapeutics and therapeutic candidates are complex and unique, and we or our third party contractors or collaboration partners may encounter difficulties with such manufacturing processes.

We and our third-party contractors and collaboration partners are continuing to refine and improve the manufacturing process for our therapeutics and therapeutic candidates, certain aspects of which are complex and unique. We may encounter difficulties with new or existing manufacturing processes. In addition, to manufacture our therapeutics and therapeutic candidates in the quantities that we believe would be required to meet anticipated market demand, our third-party manufacturers and/or collaboration partners may need to increase manufacturing capacity, which could involve significant challenges and may require additional regulatory approvals (including, for example, Grapiprant Products for Elanco pursuant to the Collaboration Agreement). Neither we nor our third-party manufacturers nor our collaboration partners may successfully complete any manufacturing scale-up activities required to increase existing manufacturing capabilities in a timely manner, or at all. For example, due to an increased market demand exceeding supply capacity, GALLIPRANT was backordered at the end of the year, and the backorders are anticipated to clear by the end of the first quarter or early second quarter of 2019. In certain instances, we may have to switch our third-party manufacturer to meet the scale of demand, which may require PAS and may result in regulatory action, additional costs incurred, delay in commercialization of our therapeutics and lawsuits.

We rely on third-party manufacturers and collaboration partners to obtain the raw materials necessary to manufacture our therapeutics, and we do not have any control over the process or timing of the acquisition of these materials.

We rely on our contract manufacturers and/or collaboration partners to obtain any raw materials necessary to manufacture our therapeutics, and we do not have any control over the process or timing of the acquisition of these materials. If there is a disruption to our or our third-party manufacturers' or collaboration partners' relevant operations, we will have no other means of producing our therapeutics or therapeutic candidates until they restore the affected facilities or we or they procure alternative manufacturing facilities or raw materials, and our business would be adversely impacted.

We currently rely on third parties to conduct our target animal studies and certain other development efforts. If these third parties do not successfully carry out their contractual duties or meet expected deadlines, we may be unable to obtain regulatory approval for current or future therapeutic candidates or commercialize our current therapeutic candidates or future therapeutic candidates.

We currently do not conduct our target animal studies, and we rely on CROs and/or academic institutions to conduct these studies. The third parties with whom we contract for the execution of our studies play a significant role in the conduct of these studies and the subsequent collection and analysis of data. However, these third parties are not our employees, and except for contractual duties and obligations, we have limited ability to control the amount or timing of resources that they devote to our programs. Although we rely on these third parties to conduct our studies, we remain responsible for ensuring that each of our studies is conducted in accordance with the development plan and

protocol. Moreover, the CVM, the USDA and EMA require us to comply with regulations and standards, commonly referred to as current good clinical practices, or cGCPs, or GLPs for conducting, monitoring, recording and reporting the results of our studies to ensure that the data and results are scientifically credible and accurate.

In addition, the execution of target animal studies and the subsequent compilation and analysis of the data produced requires coordination among various parties. If the third parties conducting our target animal studies do not perform their contractual duties or obligations, experience work stoppages, do not meet expected deadlines, terminate their agreements with us or need to be replaced, or if the quality or accuracy of the data they obtain is compromised due to the failure to adhere to our development protocols or cGCPs, or for any other reason, we may need to enter into new arrangements with alternative third parties, which could be difficult and costly, and our target animal studies may be extended, delayed or terminated or may need to be repeated. If any of the foregoing were to occur, the regulatory approval for the therapeutic candidate being tested in any such study or commercialization of our approved therapeutics may be delayed or require us to utilize additional resources.

Our ability to market our approved therapeutics and therapeutic candidates, if approved, will be limited to use for the treatment of the indications for which they are approved, and if we want to expand the indications for which we may market our therapeutics and therapeutic candidates, we will need to obtain additional CVM, USDA or EMA approvals, which may not be granted.

We received CVM approval in the United States for GALLIPRANT for the control of pain and inflammation associated with osteoarthritis in dogs, ENTYCE for appetite stimulation in dogs and NOCITA as a local post-operative analgesia for cranial cruciate ligament surgery in dogs or as a peripheral nerve block to provide regional post-operative analgesia following onychectomy in cats. We and Elanco also received marketing authorization in the European Union for GALLIPRANT for the treatment of pain associated with mild to moderate osteoarthritis in dogs. In addition, we have received a conditional license from the USDA for Canine Osteosarcoma Vaccine, Live Listeria Vector (AT-014) for the treatment of dogs diagnosed with osteosarcoma, one year of age or

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older. We may market or advertise our therapeutics only for the treatment of indications for which they are approved, which could limit their adoption by veterinarians and pet owners. We may attempt to develop, promote and commercialize new treatment indications and protocols for these therapeutics or other therapeutic candidates in the future, but we cannot predict when or if we will receive the approvals required to do so. In addition, we would be required to conduct additional target animal studies to support our applications, which would utilize additional resources and may produce results that do not result in CVM, USDA or EMA approvals. If we do not obtain additional CVM, USDA or EMA approvals, our ability to expand our business will be limited.

We currently have a small commercial organization. If we are unable to expand sales capabilities on our own or through third parties, we may not be able to market and sell significant amounts of our approved therapeutics or current or future therapeutic candidates, if approved, or generate product revenue.

We currently have a small commercial organization. In order to commercialize any of our approved therapeutics in the United States and any jurisdictions outside the United States, including GALLIPRANT, ENTYCE and NOCITA, we must be successful at marketing, selling, managing distribution, managing corporate accounts and other non-technical capabilities or making arrangements with third parties to perform these services, and we may not be successful in doing so. We expanded our direct sales organization in the United States in 2016 and expect to continue to expand over time, complemented by distributors, to commercialize our therapeutics, which will be expensive and time-consuming. Because we have limited prior experience in the marketing, sale and distribution of pet therapeutics, there are significant risks involved in building and managing a sales organization, including our ability to hire, retain and motivate qualified individuals, generate sufficient sales leads, provide adequate training to sales and marketing personnel, and effectively oversee a geographically dispersed sales and marketing team. Any failure or delay in the development of our internal sales, marketing and distribution management capabilities would adversely impact the commercialization of our therapeutics. Outside of the United States we intend to collaborate with companies with an established commercial presence to market our therapeutics in those locations. If we are unable to enter into such arrangements on acceptable terms or at all, we may not be able to successfully commercialize our therapeutics. If we are not successful in commercializing any of our therapeutics, either on our own or through collaborations with one or more distributors, our future product revenue will suffer and we would incur significant additional losses.

We may need to increase the size of our organization, and we may experience difficulties in recruiting new employees or retaining existing employees.

Since our initial public offering in June 2013, we have grown from approximately 16 full-time employees to approximately 79 full-time employees as of March 8, 2019. In the future, we may need to continue to expand our managerial, operational, financial and other resources to manage our operations and target animal studies, continue our development activities and commercialize our therapeutics, current therapeutic candidates or future therapeutic candidates. Our management and personnel, systems and facilities currently in place may not be adequate to support this future growth. Our need to effectively execute our growth strategy requires that we:

- manage our target animal studies and other development efforts effectively;
- identify, recruit, maintain, motivate and integrate additional employees;
- manage our internal development efforts effectively while carrying out our contractual obligations to third parties; and

- continue to improve our operational, financial and management controls, reporting systems and procedures.

Any failure to successfully manage our growth could have a material adverse effect on our ability to effectively carry out our target animal studies, continue our development of our therapeutic candidates and commercialize our therapeutics.

We are incurring significant costs as a result of operating as a public company, and our management is expected to devote substantial time to new compliance initiatives.

As a publicly-traded company, we have incurred and will continue to incur significant legal, accounting and other expenses that we did not incur when we were a private company. In addition, new and changing laws, regulations and standards relating to corporate governance and public disclosure, including the Dodd-Frank Wall Street Reform and Consumer Protection Act and the rules and regulations promulgated and to be promulgated thereunder, as well as under the Sarbanes-Oxley Act, and the rules and regulations of the United States Securities and Exchange Commission, or SEC, and the Nasdaq Global Market, have created uncertainty for public companies and increased our costs and time that our Board of Directors and management must devote to complying with these rules and regulations. We expect these rules and regulations to continue to increase our legal and financial compliance costs and lead to a diversion of management time and attention from revenue-generating activities.

Furthermore, the need to establish and maintain the corporate infrastructure demanded of a public company may divert management’s attention from implementing our growth strategy, which could prevent us from improving our business, results of operations and financial condition.

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Any failure to maintain effective internal control over financial reporting could have a significant adverse effect on our business and the price of our common stock.

Our management is required to report annually on the effectiveness of our internal control over financial reporting pursuant to Section 404 of the Sarbanes-Oxley Act, or Section 404. The rules governing the standards that must be met for our management to assess our internal control over financial reporting are complex and require significant documentation, testing and possible remediation.

In the future, we may identify material weaknesses or significant deficiencies in our internal control over financial reporting, and we may not be able to remediate them in a timely manner. If we are not able to comply with the requirements of Section 404 in a timely manner each year, we could be subject to sanctions or investigations by the SEC, the Nasdaq Stock Market or other regulatory authorities that would require additional financial and management resources and could adversely affect the market price of our common stock. If we are unable to conclude that we have effective internal controls over financial reporting, then investors could lose confidence in our reported financial information, which would likely have a negative effect on the trading price of our common stock. In addition, if we do not maintain effective internal controls, we may not be able to accurately and timely report our financial information on a timely basis, which could harm the trading price of our common stock, impair our ability to raise additional capital, or jeopardize our continued listing on the Nasdaq Global Select Market or any other stock exchange on which common stock may be listed. Furthermore, failure to achieve and maintain an effective internal control environment could materially adversely affect our business.

Changes in distribution channels for pet therapeutics could negatively impact our market share, margins and distribution of our therapeutics.

Most pet owners typically purchase their pet therapeutics directly from veterinarians. Pet owners increasingly could purchase pet therapeutics from sources other than veterinarians, such as Internet-based retailers, “big-box” retail stores or other over-the-counter distribution channels. This trend has been demonstrated by the significant shift away from the veterinarian distribution channel in the sale of parasiticides and other routinely used pharmaceuticals in recent years. Pet owners also could decrease their reliance on, and visits to, veterinarians as they rely more on Internet-based animal health information. Because we expect to market our pet prescription therapeutics through the veterinarian, any decrease in visits to veterinarians by pet owners could reduce our market share for such therapeutics and materially adversely affect our operating results and financial condition.

Legislation has also been proposed in the United States in the past, and may be proposed in the United States or abroad in the future, that could impact the distribution channels for our pet therapeutics. For example, such legislation may require veterinarians to provide pet owners with written prescriptions and disclosure that the pet owner may fill prescriptions through a third party, which may further reduce the number of pet owners who purchase their pet therapeutics directly from veterinarians. Such requirements may lead to increased use of generic alternatives to our products or the increased substitution of our products with other animal health products or human health products if such other products are deemed to be lower-cost alternatives. Many states already have regulations requiring veterinarians to provide prescriptions to pet owners upon request and the American Veterinary Medical Association has long-standing policies in place to encourage this practice.

Over time, these and other competitive conditions may increase our reliance on Internet-based retailers, “big-box” retail stores or other over-the-counter distribution channels to sell our pet therapeutics. Any of these events could materially adversely affect our operating results and financial condition.

Consolidation of our customers could negatively affect the pricing of our therapeutics.

Veterinarians are our primary customers. In recent years, there has been a trend towards the concentration of veterinarians in large clinics and hospitals. For example, it was announced in January 2017 that Mars, Inc. (“Mars”) and VCA Inc. (“VCA”), a leading provider of pet health care services with nearly 800 small animal veterinary hospitals in the United States and Canada, had entered into an agreement under which Mars would acquire VCA and VCA would join Mars Petcare, one of the world’s leading pet care providers. If this trend towards consolidation continues, these customers could attempt to improve their profitability by leveraging their buying power to obtain favorable pricing. The resulting decrease in our prices could have a material adverse effect on our operating results and financial condition.

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

As of December 31, 2018, we had net operating loss carryforwards, or NOLs, for federal and state income tax purposes of approximately $107.0 million and $104.0 million, respectively, which may be available to offset our future taxable income, if any. Our federal NOLs begin to expire in 2031, and our state NOLs begin to expire in 2020. In general, under Section 382 of the Internal Revenue Code of 1986, as amended, or the Code, a corporation that undergoes an “ownership change” is subject to limitations on its ability to use its pre-change net operating loss carryforwards to offset future taxable income. If the Internal Revenue Service challenges our analysis that our existing NOLs will not expire before utilization due to previous ownership changes, or if we undergo an ownership change in the future, our ability to use our NOLs could be limited by Section 382 of the Code. Future changes in our stock ownership, some of which are outside of our control, could result in an ownership change under Section 382 of the Code. Furthermore, our ability to use NOLs of companies that we may acquire in the future may be subject to limitations. For these reasons, we may not be able to use a material portion of the NOLs disclosed in the notes to our consolidated financial statements, even if we

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attain profitability. We have not completed a study to assess whether an ownership change has occurred, or whether there have been multiple ownership changes since its formation, due to significant complexity and related costs associated with such a study.

New legislation on tax reform could have a material impact on the Company's financial position and/or results of operations.

Our business is subject to numerous international, federal, state, and other governmental laws, rules, and regulations that may adversely affect our operating results, including, taxation and tax policy changes, tax rate changes, new tax laws, or revised tax law interpretations, which individually or in combination may cause our effective tax rate to increase.

On December 22, 2017, the President of the United States signed into law the Tax Cuts and Jobs Act of 2017 (“TCJA”), which significantly changed existing United States tax laws, effective January 1, 2018, by a reduction of the corporate tax rate from a maximum of 35% to 21%, the implementation of a new system of taxation of non-United States earnings, and by expansion of the limitations on the deductibility of executive compensation and interest expense. The TCJA also provides that net operating losses generated in years ending after December 31, 2017, will be carried forward indefinitely and can no longer be carried back, and that net operating losses generated in years beginning after December 31, 2017, can only reduce taxable income by 80% when utilized in a future period. The exact ramifications of the legislation is subject to interpretation and could have a material impact on our financial position and/or results of operations. The TCJA is complex and far-reaching, and its effect, whether adverse or favorable, may not become evident for some period of time. Due to our cumulative losses, we continue to maintain a full valuation allowance against our deferred tax assets after adjusting for the impact of the tax reform.

Generic products may be viewed as more cost-effective than our therapeutics.

We may face competition from products produced by other companies, including generic (or non-patented) alternatives to any of our therapeutics. We will depend on patents to provide us with exclusive marketing rights for some of our therapeutics. As of December 31, 2018, we had licensed an extensive portfolio of issued patents or pending patent applications relating to our AT-001, AT-002 and AT-003 compounds, including for GALLIPRANT, ENTYCE and NOCITA therapeutics, covering various composition of matter claims as well as methods of treatment and methods of manufacturing our therapeutics. In addition, as part of our Vet Therapeutics acquisition, we acquired a patent family related to the specialization of antibodies that covers all Vet Therapeutics. We also acquired a patent family related to antibody constant domain regions and uses thereof, which also covers all Vet Therapeutics’ therapeutic candidates. Further, as part of our acquisition of Okapi Sciences, we acquired two patent applications that cover formulations of AT-006 and commercially-viable methods of making the active ingredient of AT-006. Finally, we have a license to certain patent rights that covers composition and methods of use of AT-008 outside of North America. These patent rights will expire between 2024 and 2027.

The protection afforded to our patents, which varies from country to country, is limited by the scope and applicable terms of our patents and the availability of legal remedies in the applicable country. As a result, we may face competition from lower-priced generic alternatives to many of our therapeutics. Generic competitors are becoming more aggressive in terms of pricing, and generic products are an increasing percentage of overall animal health sales in certain regions. In addition, private label products may compete with our therapeutics. If pet therapeutics customers increase their use of new or existing generic or private label products, our operating results and financial condition could be materially adversely affected.

Our pet therapeutics are subject to unanticipated safety, quality or efficacy concerns, which may harm our reputation.

Unanticipated safety, quality or efficacy concerns can arise with respect to pet therapeutics, whether or not scientifically or clinically supported, leading to product recalls, withdrawals or suspended or declining sales, as well as product liability, and other claims. For example, in December 2017, our license partner responsible for the development of AT-016, VetStem, shared results of a pivotal study showing the investigational allogeneic adipose-derived stem cell treatment for dogs did not achieve protocol-defined efficacy success criteria. In January 2018, we exercised our right to terminate the license agreement with VetStem, which was effective as of mid-April 2018. In addition, we depend on positive perceptions of the safety, quality and efficacy of our therapeutics, and pet therapeutics generally, by our customers, veterinarians and end-users, and such concerns may harm our reputation. These concerns and the related harm to our reputation could materially adversely affect our operating results and financial condition, regardless of whether such reports are accurate.

Our business and operations would suffer in the event of system failures or security breaches.

Our internal computer systems and those of our current and future employees and contractors, third-party vendors and consultants are vulnerable to damage from unauthorized access, natural disasters, terrorism, war and telecommunication and electrical failures. The secure processing, maintenance and transmission of electronic information, including customer, employee and company data, is critical to our operations and the legal environment surrounding information security, storage, use, processing, disclosure and privacy is demanding with the frequent imposition of new and changing requirements. We also store certain information with third parties and we utilize third-party service providers to process, manage or transmit data, which may also increase our risk. Our information systems and those of our third-party vendors are subjected to computer viruses or other malicious codes, cyber- or phishing-attacks and also are vulnerable to an increasing threat of continually evolving cybersecurity risks and external hazards, as well as improper or inadvertent employee behavior, all of which could expose confidential company and personal data systems and information to security breaches. Any system failure or security breach by employees or others may pose a risk that sensitive data, including data from our target animal studies, intellectual property, trade secrets, confidential information or personal information belonging to us may be

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exposed to unauthorized persons or to the public. If such an event were to occur and cause interruptions in our operations, it could result in a material disruption of our development programs and our business operations. For example, the loss of data from completed or future studies could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce the data. Likewise, we rely on third parties to manufacture our therapeutics and therapeutic candidates, and similar events relating to their computer systems could also have a material adverse effect on our business. To the extent that any disruption or security breach were to result in a loss of, or damage to, our data or applications, or inappropriate disclosure of confidential or proprietary information, we could incur liability, the further development of our therapeutic candidates and commercialization of our therapeutics could be delayed, and the trading price of our common stock could be adversely affected. To date, we have not experienced any material impact to the business or operations resulting from security breaches, including from information or cybersecurity attacks; however, because of the frequently changing attack techniques, along with the increased volume and sophistication of the attacks, there is the potential for us to be adversely impacted.

Our Collaboration Agreement and Co-Promotion Agreement with Elanco are important to our business. If we or Elanco terminate the Collaboration Agreement and/or the Co-Promotion Agreement, the development of grapiprant therapeutic candidates and commercialization of Grapiprant Products would be delayed or terminated and our business would be adversely affected.

The Collaboration Agreement and Co-Promotion Agreement are important to our business, as well as the development of grapiprant therapeutic candidates and commercialization of Grapiprant Products is dependent upon these agreements.

The Collaboration Agreement may be terminated by Elanco at any time upon 90 days' written notice to us. The Collaboration Agreement may also be terminated by either party:

- for the other party's material breach, where such breach is not cured within the timeframe specified by the agreement;
- upon the bankruptcy, insolvency or dissolution of the other party; or
- for certain activities involving the challenge of certain patents licensed by us to Elanco.

Upon Elanco's voluntary termination or termination for Elanco's breach, among other things, all licenses and rights granted to Elanco will terminate and revert to us, and Elanco has agreed to assign to us all registrations and trademarks obtained in connection with the products covered by the agreement. Upon termination for our breach, among other things, Elanco may elect to retain its rights to the licenses granted by us under the Collaboration Agreement subject to specified payment obligations.

Elanco may terminate the Co-Promotion Agreement in the event Elanco substantially stops marketing the products covered by the Collaboration Agreement, and either party may terminate the Co-Promotion Agreement upon the other party's material breach, where such breach is not cured within the timeframe specified by the Co-Promotion Agreement. In addition, the Co-Promotion Agreement provides that it will automatically terminate if the Collaboration Agreement is terminated early.

Termination of the Collaboration Agreement and/or the Co-Promotion Agreement could cause significant delays in our product development and commercialization efforts that could prevent us from commercializing our Grapiprant Products without first expanding our internal capabilities, securing additional financing or entering into another agreement with a third party. Any alternative collaboration or license could also be on less favorable terms to us.

Under the Collaboration Agreement, Elanco has agreed to provide funding for certain clinical development activities. If the Collaboration Agreement were terminated, we may need to seek additional financing to support the research and development of any terminated products or discontinue any terminated products, which could adversely affect our business.

Our Collaboration Agreement and Co-Promotion Agreement with Elanco are important to our business. If we or Elanco fail to adequately perform under the Collaboration Agreement and/or the Co-Promotion Agreement, the development of grapiprant therapeutic candidates and commercialization of Grapiprant Products would be delayed or terminated and our business would be adversely affected.

Under the Collaboration Agreement, Elanco is solely responsible for commercializing products outside the United States. We cannot directly control Elanco's commercialization activities or the resources it allocates to our therapeutics. Our interests and Elanco's interests may differ or conflict from time to time, or we may disagree with Elanco's level of effort or resource allocation. Elanco may internally prioritize our therapeutics differently than we do or it may not allocate sufficient resources to effectively or optimally commercialize them or may change strategic direction in its business. For example, as a result of Eli Lilly & Co. selling their stake of Elanco, our business could be adversely affected as Elanco will be required to operate as a stand-alone entity and Eli Lilly & Co. resources will no longer be available. As a result, our business could be adversely affected.

Our business is subject to risk based on customer exposure to rising costs and reduced customer income.

Concerns about the financial resources of pet owners also could cause veterinarians to alter their treatment recommendations in favor of lower-cost alternatives to our products. These shifts could result in a decrease in sales.

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The animal health industry is highly competitive.

The animal health industry is highly competitive. We believe many of our competitors are conducting R&D activities in areas served by our products and in areas in which we are developing products. Our competitors include the animal health businesses of large pharmaceutical companies and specialty animal health businesses. There are also several new start-up companies working in the animal health area. These competitors may have access to greater financial, marketing, technical and other resources. As a result, they may be able to devote more resources to developing, manufacturing, marketing and selling their products, initiating or withstanding substantial price competition or more readily taking advantage of acquisitions or other opportunities. In addition to competition from established market participants, new entrants to the animal health medicines and vaccines industry could substantially reduce our market share or render our products obsolete.

To the extent that any of our competitors are more successful with respect to any key competitive factor or we are forced to reduce, or are unable to raise, the price of any of our products in order to remain competitive, our operating results and financial condition could be materially adversely affected. Competitive pressure could arise from, among other things, safety and efficacy concerns, limited demand growth or a significant number of additional competitive products being introduced into a particular market, price reductions by competitors, the ability of competitors to capitalize on their economies of scale, the ability of competitors to produce or otherwise procure animal health products at lower costs than us and the ability of competitors to access more or newer technology than us.

Risks Related to Intellectual Property

While we try to obtain patent coverage for our molecules, formulated products, manufacturing processes, and methods of use where feasible and commercially reasonable, we cannot assure you that any patents based on any of our pending patent applications will ever be granted.

We currently own several issued patents and several patent applications, as well as foreign equivalent patents and applications. We also have licenses to issued patents covering our small molecule therapeutics and therapeutic candidates and have certain rights to prosecute and enforce those licensed patents.

We own a granted United States patent and related foreign patents and applications on a crystalline form of the active ingredient for GALLIPRANT. We own patents or have filed patent applications to cover the composition and method of use of AT-001 to treat pain and inflammation in non-human animals. We also own patent families relating to our AT-002 compounds, including ENTYCE, covering a method of treating inappetence or weight loss using AT-002. We have granted patents from these families in several geographies. We cannot assure you that a patent based on any of these patent applications will ever be issued. We do not own any other patents or patent applications relating to AT-001 or any patents or patent applications relating to AT-003. We have exclusive license agreements in the field of animal health with RaQualia, pursuant to which we license key intellectual property relating to AT-001 and AT-002, including GALLIPRANT and ENTYCE, and with Pacira pursuant to which we license key intellectual property relating to AT-003, including NOCITA. Under each of the license agreements, RaQualia and Pacira retain ownership over the licensed patents and patent applications and retain control over the maintenance and prosecution of the licensed patents and patent applications. In the case of AT-003, we have no control over the manner in which Pacira chooses to maintain or prosecute its patent and patent applications and have no right to continue to prosecute any patents or patent applications that Pacira elects to abandon. We do not have the right to enforce patents licensed from Pacira against any third-party infringement, although we have certain limited rights to request our licensor to enforce

such patents against infringement.

If we cannot obtain ownership of or adequate license rights to issued patents covering our therapeutic candidates or we cannot prosecute or enforce licensed patents, our business, results of operations, financial condition and prospects would be adversely affected.

If we fail to comply with our obligations under our intellectual property licenses with third parties, we could lose license rights that are essential to our business.

We are party to license agreements for our therapeutics and therapeutic candidates that are essential to our business, including the Collaboration Agreement with Elanco. These license agreements impose various payment and performance obligations on us. If we fail to comply with these obligations, RaQualia, Pacira or Elanco, as applicable, may have the right to terminate the relevant license agreement, in which event we would not be able to develop or commercialize those licensed compounds including GALLIPRANT, ENTYCE and/or NOCITA, as the case may be.

If we lose such license rights, our business, results of operations, financial condition and prospects would be adversely affected. We may enter into additional licenses in the future and if we fail to comply with obligations under those agreements, we could suffer adverse consequences.

We may not own any intellectual property rights we develop with respect to AT-003 or be able to share our licensed patent rights to AT-003 with future collaborators.

Our license agreement with Pacira contains certain obligations and restrictions on our ability to develop and commercialize AT-003, including NOCITA. All of the intellectual property rights that we develop with respect to AT-003 will be owned by Pacira upon termination of this license agreement. If we wish to enter into any collaboration agreements relating to AT-003, Pacira has the right to

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approve all of our sublicenses. Furthermore, Pacira has a right of first negotiation for shared commercialization rights to AT-003 in the United States. These restrictions may impair or delay our ability to engage third parties to commercialize AT-003, including NOCITA.

We may become subject to third parties' claims alleging infringement of patents and proprietary rights or seeking to invalidate our patents or proprietary rights, which would be costly, time-consuming and, if successfully asserted against us, delay or prevent the development of our current or future therapeutic candidates or commercialization of our therapeutics.

There has been substantial litigation and other proceedings regarding patent and other intellectual property rights in the field of pet therapeutics, as well as patent challenge proceedings, including interference and administrative law proceedings before the United States PTO and oppositions and other comparable proceedings in foreign jurisdictions. Recently, under United States patent reform laws, new procedures including inter party review and post grant review have been implemented. As stated below, the novel implementation of such reform laws presents uncertainty regarding the outcome of challenges to our patents in the future. We cannot assure you that any of our therapeutics or current or future therapeutic candidates will not infringe existing or future patents. Because we have not conducted a formal freedom to operate analysis for patents related to our therapeutics, we may not be aware of patents that have already been issued that a third party might assert are infringed by one of our therapeutics or current or future therapeutic candidates. Because patent applications can take many years to issue and may be confidential for eighteen months or more after filing, there also may be applications now pending of which we are unaware and which may later result in issued patents that we may infringe by commercializing any of our therapeutics or current or future therapeutic candidates.

We may be subject to third-party claims in the future against us or our collaborators that would cause us to incur substantial expenses and, if successful against us, could cause us to pay substantial damages, including treble damages and attorney's fees if we are found to be willfully infringing a third party's patents. If a patent infringement suit were brought against us or our collaborators, we or they could be forced to stop or delay research, development, manufacturing or sales of the therapeutic or therapeutic candidate that is the subject of the suit. As a result of patent infringement claims, or in order to avoid potential claims, we or our collaborators may choose to seek, or be required to seek, a license from the third party and would most likely be required to pay license fees, milestone payments, royalties or other payments. These licenses may not be available on acceptable terms, or at all. Even if we or our collaborators were able to obtain a license, the rights may be nonexclusive, which would give our competitors access to the same intellectual property. Ultimately, we could be prevented from commercializing a therapeutic, or forced to redesign it, or to cease some aspect of our business operations if, as a result of actual or threatened patent infringement claims, we or our collaborators are unable to enter into licenses on acceptable terms. Even if we are successful in defending such claims, infringement and other intellectual property litigation can be expensive and time-consuming to litigate and divert management's attention from our core business. Any of these events could harm our business significantly.

In addition to infringement claims against us, if third parties have prepared and filed patent applications in the United States that also claim technology to which we have rights, we may have to participate in interference proceedings in the United States PTO to determine the priority of invention. Third parties may also attempt to initiate reexamination, post grant review or inter party review of our patents in the United States PTO. We may also become involved in similar opposition proceedings in the European Patent Office or similar offices in other jurisdictions regarding our intellectual property rights with respect to our therapeutics and technology. Moreover, we may face claims from non-practicing entities, which have no relevant product revenue and against whom our own patent portfolio may thus have no deterrent effect.

If our efforts to protect the proprietary nature of the intellectual property related to any of our therapeutics and current or future therapeutic candidates are not adequate, we may not be able to compete effectively in our market.

We rely upon a combination of patents, trade secret protection, confidentiality and license agreements to protect the intellectual property related to our therapeutics and current therapeutic candidates and our development programs.

Composition-of-matter patents on the API are generally considered to be the strongest form of intellectual property protection for pharmaceutical products, including pet therapeutics, as such patents provide protection without regard to any particular method of use or manufacture. Method-of-use patents protect the use of a product for the specified method. This type of patent does not prevent a competitor from making and marketing a product that is identical to our therapeutic for an indication that is outside the scope of the patented method. Moreover, even if competitors do not actively promote their product for our targeted indications, veterinarians may recommend that pet owners use these products off label, or pet owners may do so themselves. Although off-label use may infringe or contribute to the infringement of method-of-use patents, the practice is common and such infringement is difficult to prevent or prosecute. Method of manufacturing patents protect a specific way to make a product and do not prevent a third party from making the product by a different method and then using the product for our uses. We cannot be certain that the claims in our patent applications will be considered patentable by the United States PTO and courts in the United States, or by the patent offices and courts in foreign countries.

The strength of patents in the field of pet therapeutics involves complex legal and scientific questions and can be uncertain. The patent applications that we own or license may fail to result in issued patents in the United States or in other foreign countries. Even if the patents do successfully issue, third parties may challenge the validity, enforceability or scope thereof, which may result in such patents being narrowed, invalidated or held unenforceable. Furthermore, even if they are unchallenged, our patents and patent applications may not adequately protect our therapeutics or our intellectual property or prevent others from designing around our claims. If the breadth or strength of protection provided by the patents and patent applications we own, in-license or pursue with respect to any of

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our therapeutics or current or future therapeutic candidates is threatened, it could threaten our ability to commercialize any of our therapeutics or current or future therapeutic candidates. Further, if we encounter delays in our development efforts, the period of time during which we could market any of our current or future therapeutic candidates under patent protection would be reduced. Since patent applications in the United States and most other countries are confidential for a period of time after filing, we cannot be certain that we were the first to file any patent application related to our therapeutics or therapeutic candidates. Furthermore, for patent applications in which claims are entitled to a priority date before March 16, 2013, an interference proceeding can be provoked by a third party or instituted by the United States PTO to determine who was the first to invent any of the subject matter covered by the patent claims of our applications. For patent applications containing a claim not entitled to a priority date before March 16, 2013, there is a greater level of uncertainty in the patent law due to the passage of the America Invents Act, which brings into effect significant changes to the United States patent laws that have yet to be well defined, and which introduces new procedures for challenging pending patent applications and issued patents. A primary change under this reform is creating a “first to file” system in the United States, which requires us to minimize the time from invention to filing of a patent application.

We also rely on trade secret protection and confidentiality agreements to protect proprietary know-how that is not patentable, processes for which patents are difficult to enforce and any other elements of our product development processes that involve proprietary know-how, information or technology that is not covered by patents. We cannot be certain that we have executed such agreements with all parties, including our collaborators and contract manufacturers, who may have helped to develop our intellectual property or had access to our proprietary information, nor that our agreements will not be breached. We cannot guarantee 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. If we are unable to prevent material disclosure of the intellectual property related to our technologies to third parties, we will 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.

Any disclosure to or misappropriation by third parties of our confidential proprietary information could enable competitors to quickly duplicate or surpass our technological achievements, thus eroding our competitive position in our market.

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

Competitors may infringe our patents, or patents that may be issued to us in the future, or the patents of our licensors that are licensed to us. To counter infringement or unauthorized use, we may be required to file infringement claims, which can be expensive and time-consuming. In addition, if we or one of our future collaborators were to initiate legal proceedings against a third party to enforce a patent covering our therapeutics or current therapeutic candidates, or one of our future therapeutics, the defendant could counterclaim that our patent is invalid and/or unenforceable. In patent litigation in the United States, defendant counterclaims alleging invalidity and/or unenforceability are commonplace. Grounds for a validity challenge could be an alleged failure to meet any of several statutory requirements, including lack of novelty, obviousness or non-enablement. Grounds for an unenforceability assertion could be an allegation that someone connected with prosecution of the patent withheld relevant information from the United States PTO, or made a materially misleading statement, during prosecution. Third parties may also raise similar claims before the United States PTO, even outside the context of litigation. The outcome following legal assertions of invalidity and unenforceability is unpredictable. With respect to the validity question, for example, we cannot be certain that there is no invalidating prior art, of which we and the patent examiner were unaware during prosecution. If a defendant were

to prevail on a legal assertion of invalidity and/or unenforceability, we would lose at least part, and perhaps all, of the patent protection on our therapeutics or current or future therapeutic candidates. Such a loss of patent protection could have a material adverse impact on our business.

Litigation or interference proceedings may fail and, even if successful, may result in substantial costs and distract our management and other employees. 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. In addition, there could be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be unsuccessful, it could have an adverse effect on the price of our common stock.

Changes in United States patent law could diminish the value of patents in general, thereby impairing our ability to protect our therapeutics.

As is the case with other biopharmaceutical companies, our success is heavily dependent on intellectual property, particularly patents. Obtaining and enforcing patents in the biopharmaceutical industry involves both technological and legal complexity. Therefore, obtaining and enforcing biopharmaceutical patents is costly, time-consuming and inherently uncertain. In addition, the United States has recently enacted and is currently implementing wide-ranging patent reform legislation. The Supreme Court has ruled on several patent cases in recent years, either narrowing the scope of patent protection available in certain circumstances or weakening the rights of patent owners in certain situations. In addition to increasing uncertainty with regard to our ability to obtain patents in the future, this combination of events has created uncertainty with respect to the value of patents, once obtained. Depending on decisions by the United States Congress, the federal courts, and the United States PTO, the laws and regulations governing patents could change in unpredictable ways that would weaken our ability to obtain new patents or to enforce our existing owned or licensed patents and patents that we might obtain in the future.

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Obtaining and maintaining our or our licensors' patent protection depends on compliance with various procedural, document submission, fee payment and other requirements imposed by governmental patent agencies, and our patent protection could be reduced or eliminated for non-compliance with these requirements.

If our or our licensors' patent positions do not adequately protect our product candidates or any future products, others could compete with us more directly, which would harm our business.

Our commercial success will depend in part on our and our licensors' ability to obtain additional patents and protect our existing patent positions, particularly those patents for which we have secured exclusive rights, as well as our ability to maintain adequate protection of other intellectual property for our product candidates and any future products in the U.S. and other countries. If we or our licensors do not adequately protect our intellectual property, competitors may be able to use our technologies and erode or negate any competitive advantage we may have, which could materially harm our business, negatively affect our position in the marketplace, limit our ability to commercialize our product candidates and delay or render impossible our achievement of profitability. The laws of some foreign countries do not protect our proprietary rights to the same extent as the laws of the U.S., and we may encounter significant problems in protecting our proprietary rights in these countries.

The United States PTO, the European Patent Office and various other foreign governmental patent agencies require compliance with a number of procedural, documentary, fee payment and other provisions during the patent process. There are situations in which noncompliance can result in abandonment or lapse of a patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. In such an event, competitors might be able to enter the market earlier than would otherwise have been the case, which would have an adverse effect on our business.

We have pending trademark applications for our company name in the United States and certain other countries, and we have pending trademark applications in the United States for certain therapeutic candidates, and we have pending trademark applications for these therapeutic candidates in certain other countries; however, registration is not yet complete for certain of these filings, and failure to finally secure these registrations could adversely affect our business.

We have obtained six trademark registrations in the United States for our company name and design marks, and we have two pending foreign trademark applications for our company name and design marks and we have obtained twenty foreign registrations for these marks, although we cannot make assurances that the trademark applications will become registered. We have one pending trademark application in the United States for commercial trade names for our current therapeutic candidates, and we have obtained sixteen United States registrations for these candidates, and we have five pending foreign applications and we have obtained thirty-nine foreign registrations for these candidates, although we cannot make assurances that the trademark applications will become registered. During trademark registration proceedings, we have in the past and may in the future receive rejections. Although we are given an opportunity to respond to those rejections, we may be unable to overcome such rejections. In addition, in the USPTO and in comparable agencies in many foreign jurisdictions, third parties are given an opportunity to oppose pending trademark applications and/or to seek to cancel registered trademarks. Opposition or cancellation proceedings have in the past and may in the future be filed against our trademark applications and/or registrations, and our trademark applications and/or registrations may not survive such proceedings. Additionally, we may need to enforce our trademark rights against third parties and expend significant additional resources to enforce such rights against infringements. Moreover, any name we propose to use with our therapeutic candidates in the United States must be approved by the CVM, the USDA and for use in Europe, by the EMA, regardless of whether we have registered it, or applied to register it, as a trademark. The CVM typically conducts a review of proposed product names, including an

evaluation of potential for confusion with other product names. If the CVM, the USDA or the EMA object to any of our proposed proprietary product names (which they have done in the past done and may do in the future), we may be required to expend significant additional resources in an effort to identify a suitable substitute name that would qualify under applicable trademark laws, not infringe the existing rights of third parties and be acceptable to the CVM, the USDA or the EMA.

We may not be able to protect our intellectual property rights throughout the world.

Filing, prosecuting and defending patents on therapeutics or therapeutic candidates throughout the world would be prohibitively expensive. Competitors may use our technologies in jurisdictions where we have not obtained patent protection to develop their own products and, further, may export otherwise infringing products to territories where we have patent protection, but where enforcement is not as strong as that in the United States. These products may compete with our therapeutics in jurisdictions where we do not have any issued or licensed patents and our patent claims or other intellectual property rights may not be effective or sufficient to prevent them from so competing.

Many companies have encountered significant problems in protecting and defending intellectual property rights in foreign jurisdictions, including in Europe. The legal systems of certain countries, particularly certain developing countries, do not favor the enforcement of patents and other intellectual property protection, particularly those relating to biopharmaceuticals, which could make it difficult for us to stop the infringement of our patents or marketing of competing products in violation of our proprietary rights generally. Proceedings to enforce our patent rights in foreign jurisdictions could result in substantial cost and divert our efforts and attention from other aspects of our business.

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

We have received confidential and proprietary information from third parties. In addition, we employ individuals who were previously employed at other biotechnology, pharmaceutical or animal health companies. We may be subject to claims that we or our employees, consultants or independent contractors have inadvertently or otherwise improperly used or disclosed confidential information of these third parties or our employees' former employers. Litigation may be necessary to defend against these claims. Even if we are successful in defending against these claims, litigation could result in substantial cost and be a distraction to our management and employees.

Risks Related to Government Regulation

The regulatory approval process is uncertain, requires us to utilize significant resources, and may prevent us from obtaining approvals for the commercialization of some or all of our therapeutic candidates.

The research, testing, manufacturing, labeling, approval, selling, import, export, marketing and distribution of pet therapeutics are subject to extensive regulation by the CVM, the USDA or the EMA and other regulatory authorities in the United States and other countries, which regulations differ from country to country. While it is unclear whether the recent political and regulatory uncertainty in the United States would have any impact on animal health industry in particular, because we make active in-licensing effort focused on identifying human therapeutics for development and commercialization as pet therapeutics, we may face similar regulatory risks that human pharmaceutical companies face in this current regulatory environment.

We are not permitted to market any of our current or future therapeutic candidates in the United States until we receive approval of an NADA from the CVM or a product license from the USDA. Obtaining approval of an NADA from CVM or a product license from the USDA can be an uncertain process that requires us to utilize significant resources. The CVM, the USDA or any foreign regulatory bodies can delay, limit or deny approval of any of our therapeutic candidates for many reasons, including:

- we are unable to demonstrate to the satisfaction of the CVM, the USDA, the EMA or the applicable foreign regulatory body that the therapeutic candidate is safe and effective for the requested indication;
- the CVM, the USDA or the applicable foreign regulatory body may disagree with our interpretation of data from our target animal studies and other development efforts;
- we may be unable to demonstrate that the therapeutic candidate's benefits outweigh any safety or other actual or perceived risks;
- the CVM, the USDA or the applicable foreign regulatory body may require additional studies;
- the CVM, the USDA or the applicable foreign regulatory body may not approve of the formulation, labeling and/or the specifications of our current and future therapeutic candidates;
-

the CVM, the USDA or the applicable foreign regulatory body may fail to approve our manufacturing processes or facilities, or the manufacturing processes or facilities of third-party manufacturers with which we contract; and

- the approval policies or regulations of the CVM, USDA or the applicable foreign regulatory body may significantly change in a manner rendering the data from our studies insufficient for approval.

Failure to comply with CVM and other applicable United States and foreign regulatory requirements may subject us to administrative or judicially imposed sanctions, including: warning letters, civil and criminal penalties, injunctions, withdrawal of approved products from the market, product seizure or detention, product recalls, total or partial suspension of production, and refusal to approve pending NADAs or product licenses or supplements to approved NADAs or product licenses.

Regulatory approval of an NADA or supplement NADA, or of a product license, is not guaranteed, and the approval process requires us to utilize significant resources, may take several years, and is subject to the substantial discretion of the CVM, the USDA or the EMA. Despite the time and expense exerted, failure can occur at any stage, and we could encounter problems that cause us to abandon or repeat studies, or perform additional studies. If any of our current or future product candidates fails to demonstrate safety and efficacy in our studies, or for any other reason does not gain regulatory approval, our business and results of operations will be materially and adversely harmed.

Our therapeutics will be subject to ongoing CVM, USDA or EMA obligations and continued regulatory review even after the initial approval for commercialization, which may result in significant additional expense. Additionally, our therapeutics will be subject to labeling and manufacturing requirements and could be subject to other restrictions. Failure to comply with these regulatory requirements or the occurrence of unanticipated problems with our products could result in significant penalties.

Our therapeutics may be subject to conditions of approval or limitations on the approved indicated uses for which the product may be marketed, or may contain requirements for potentially costly surveillance to monitor the safety and efficacy of the therapeutics. In

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addition, if the CVM, the USDA or the EMA approves any of our current or future therapeutic candidates, the manufacturing processes, labeling, packaging, distribution, adverse event reporting, storage, advertising, promotion and recordkeeping for the therapeutic will be subject to extensive and ongoing regulatory requirements. These requirements include submissions of safety and other post-marketing information and reports, registration, as well as continued compliance with cGMP, GLP and cGCP, for any studies that we conduct post-approval. For example, in February 2017, we received a response from the CVM in connection with our PAS to transfer the manufacturing of ENTYCE to a new vendor to produce ENTYCE at commercial scale. The CVM requested additional information regarding the proposed transfer to complete the supplemental application, which delayed our commercialization of ENTYCE. Later discovery of previously unknown problems with a product, including adverse events of unanticipated severity or frequency, or with our third-party manufacturers or manufacturing processes, or failure to comply with regulatory requirements, may result in, among other things:

- restrictions on the marketing or manufacturing of the product, withdrawal of the product from the market, or voluntary or mandatory product recalls;
- fines, warning letters or holds on target animal studies;
- refusal by the CVM, the USDA or the EMA to approve pending applications or supplements to approved applications filed by us or our strategic collaborators, or suspension or revocation of product license approvals;
- product seizure or detention, or refusal to permit the import or export of products; and
- injunctions or the imposition of civil or criminal penalties.

The CVM's, USDA's or the EMA's policies may change and additional government regulations may be enacted that could prevent, limit or delay commercialization of our therapeutics or regulatory approval of our therapeutic candidates. We cannot predict the likelihood, nature or extent of government regulation that may arise from future legislation or administrative action, either in the United States or abroad. If we are slow or unable to adapt to changes in existing requirements or the adoption of new requirements or policies, or if we are not able to maintain regulatory compliance, we may lose any marketing approval that we may have obtained and we may not achieve or sustain profitability, which would adversely affect our business.

Failure to obtain regulatory approvals in foreign jurisdictions for our therapeutic candidates would prevent us from marketing our therapeutics internationally.

To market any product outside of the United States, including in the EEA (which is comprised of the 28 member states of the European Union plus Norway, Iceland and Liechtenstein) and many other foreign jurisdictions, separate regulatory approvals are required. More concretely, in the EEA, pet therapeutics can only be commercialized after obtaining a Marketing Authorization ("MA"). Before granting the MA, the EMA or the competent national authorities of the member states of the EEA make an assessment of the risk-benefit balance of the product on the basis of scientific criteria concerning its quality, safety and efficacy.

The approval procedures vary among countries and can involve additional studies and testing, and the time required to obtain approval may differ from that required to obtain CVM or USDA approval. Animal studies conducted in one country may not be accepted by regulatory authorities in other countries. Approval by the CVM or USDA does not ensure approval by regulatory authorities in other countries, and approval by one or more foreign regulatory authorities does not ensure approval by regulatory authorities in other foreign countries or by the CVM or the USDA.

However, a failure or delay in obtaining regulatory approval in one country may have a negative effect on the regulatory process in others. The foreign regulatory approval process may include all of the risks associated with obtaining CVM or USDA approval. We may not be able to file for regulatory approvals or to do so on a timely basis and, even if we do file them, we may not receive necessary approvals to commercialize our therapeutics in any market.

If approved, any of our current or future therapeutics may cause or contribute to adverse medical events that we are required to report to the CVM, USDA and regulatory authorities in other countries and, if we fail to do so, we could be subject to sanctions that would materially harm our business.

If we are successful in commercializing any of our current or future therapeutics, regulations of the CVM, the USDA and of the regulatory authorities in other countries require that we report certain information about adverse medical events if those products may have caused or contributed to those adverse events. The timing of our obligation to report would be triggered by the date we become aware of the adverse event as well as the nature of the event. We may fail to report adverse events we become aware of within the prescribed time frame. We may also fail to appreciate that we have become aware of a reportable adverse event, especially if it is not reported to us as an adverse event or if it is an adverse event that is unexpected or removed in time from the use of our therapeutics. If we fail to comply with our reporting obligations, the CVM, USDA and regulatory authorities in other countries could take action including criminal prosecution, the imposition of civil monetary penalties, seizure of our therapeutics, or delay in approval or clearance of future therapeutics.

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Legislative or regulatory reforms with respect to pet therapeutics may make it more difficult and costly for us to obtain regulatory clearance or approval of any of our current or future therapeutic candidates and to produce, market, and distribute our therapeutics after clearance or approval is obtained.

From time to time, legislation is drafted and introduced in the United States Congress that could significantly change the statutory provisions governing the testing, regulatory clearance or approval, manufacture, and marketing of regulated products. In addition, CVM and USDA regulations and guidance are often revised or reinterpreted by the CVM and USDA in ways that may significantly affect our business and our therapeutics. Similar changes in laws or regulations can occur in other countries. Any new regulations or revisions or reinterpretations of existing regulations in the United States or in other countries may impose additional costs or lengthen review times of any of our current or future therapeutic candidates. We cannot determine what effect changes in regulations, statutes, legal interpretation or policies, when and if promulgated, enacted or adopted may have on our business in the future. Such changes could, among other things, require:

- changes to manufacturing methods;
- recall, replacement, or discontinuance of certain products; and
- additional record keeping.

Each of these would likely entail substantial time and cost and could materially harm our financial results. In addition, delays in receipt of or failure to receive regulatory clearances or approvals for any future products would harm our business, financial condition, and results of operations.

Our research and development relies on evaluations in animals, which may become subject to bans or additional regulations.

As a biopharmaceutical company with a focus on pet therapeutics, the evaluation of our existing and new products in animals is required to register our therapeutics. Animal testing in certain industries has been the subject of controversy and adverse publicity. Some organizations and individuals have attempted to ban animal testing or encourage the adoption of additional regulations applicable to animal testing. To the extent that the activities of such organizations and individuals are successful, our research and development, and by extension our operating results and financial condition, could be materially adversely affected. In addition, negative publicity about us or our industry could harm our reputation.

Risks Related to Our Common Stock

Our stock price may be volatile and you may not be able to resell shares of our common stock at or above the price you paid.

The trading price of our common stock is volatile with trading prices ranging from $2.56 per share to $29.32 per share since our initial public offering in June 2013. The price of our common stock has been and could continue to be subject to wide fluctuations, including due to results from, and any delays in, our current and future target animal studies, delays in obtaining regulatory approval or commercial launches. For example, on September 25, 2015, following our announcement that we did not believe that BLONTRESS or TACTRESS would capture the desired

lymphoma market opportunity, the price of our common stock fell from $17.49 on September 24, 2015 to $10.67 on September 25, 2015, a 39% reduction. And on February 6, 2017, following our announcement that we anticipated ENTYCE would be commercially available by late-2017 because of ongoing interactions with the FDA on our PAS to transfer manufacturing to a new vendor for commercial scale-up, the price of our common stock fell from $8.03 on February 3, 2017 to $6.59 on February 6, 2017, an 18% reduction. The price of our common stock could be volatile in the future in response to various factors, some of which are beyond our control. These factors include those discussed in this “Risk Factors” section and others, such as:

- delays in the commercialization of our therapeutics or current or future therapeutic candidates;
- manufacturing and supply issues related to our therapeutics or current or future therapeutic candidates for our development programs and commercialization;
- the termination of any of our existing license agreements;
- announcements relating to future licensing or development agreements;
- announcements of regulatory approval or disapproval of any of our current or future therapeutic candidates;
- acquisitions and sales of new therapeutics, therapeutic candidates, technologies or businesses;
- failure or discontinuation of any of our research programs;
- quarterly variations in our results of operations or those of our future competitors;
- changes in earnings estimates or recommendations by securities analysts;
- announcements by us or our competitors of new therapeutics or therapeutic candidates, significant contracts, commercial relationships, acquisitions or capital commitments;

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- developments with respect to intellectual property rights;
- our commencement of, or involvement in, litigation;
- any major changes in our Board of Directors or management;
- new legislation in the United States or other countries relating to the sale or pricing of pet therapeutics;
- CVM or USDA or other United States or foreign regulatory actions affecting us or our industry;
- product liability claims, other litigation or public concern about the safety of our therapeutics or therapeutic candidates or future therapeutics;
- market conditions in the animal health sector and in the pet therapeutics market;
- low daily trading volumes in our stock; and
- general economic conditions in the United States and abroad.

In addition, the stock market in general, or the market for stocks in our industry or industries related to our industry, may experience extreme volatility unrelated to the operating performance of the issuer. These broad market fluctuations may adversely affect the trading price or liquidity of our common stock. When the market price of a stock has been volatile, holders of that stock have sometimes instituted securities class action or other litigation against the issuer. If any of our stockholders were to bring such a lawsuit against us, such as the purported class action lawsuits filed as described under Item 3. “Legal Proceedings,” we could incur substantial costs defending the lawsuit and the attention of our management would be diverted from the operation of our business.

We are no longer an emerging growth company and the additional requirements we must comply with may strain our resources and divert management’s attention from other business concerns.

Commencing January 1, 2019, we are no longer an “emerging growth company” as it is defined in the JOBS Act and the additional requirements we must comply with may strain our resources and divert management’s attention from other business concerns.

While we were an “emerging growth company,” we were able to take advantage of certain exemptions from reporting requirements that are applicable to other public companies. Compliance with these additional laws, rules and regulations has and will continue to increase our legal and financial compliance costs, make some activities more difficult, time consuming or costly and increase demand on our systems and resources. As a result, management’s attention may be diverted from other business concerns and our costs and expenses will increase, which could harm our business and operating results. We may also need to hire more employees in the future or engage additional outside consultants to comply with these requirements, which will increase our costs and expenses.

If we sell shares of our common stock in future financings, stockholders may experience immediate dilution and, as a result, our stock price may decline.

We may from time to time issue additional shares of common stock at the market price or at a discount from the current trading price of our common stock. As a result, our stockholders would experience immediate dilution upon the sale of any shares of our common stock. In addition, as opportunities present themselves, we may enter into financing or similar arrangements in the future, including the issuance of debt securities, preferred stock or common stock. If we issue common stock or securities convertible into common stock, our common stockholders would experience additional dilution and, as a result, our stock price may decline.

Our principal stockholders and management own a significant percentage of our stock and will be able to influence matters subject to stockholder approval.

As of March 8, 2019, our executive officers, directors, holders of 5% or more of our common stock and their respective affiliates beneficially owned approximately 25% of our voting stock. These stockholders will have the ability to influence us through this ownership position. For example, these stockholders may be able to influence elections of directors, amendments of our organizational documents, or approvals of any merger, sale of assets or other major corporate transaction. This may prevent or discourage unsolicited acquisition proposals or offers for our common stock that stockholders may believe to be in their best interest. Some stockholders may have shortened time horizons for their desired returns and may attempt to influence the company’s strategy, including internal and external influences.

Provisions in our charter documents and under Delaware law could discourage a takeover that stockholders may consider favorable and may lead to entrenchment of management.

Our restated certificate of incorporation and amended and restated bylaws 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:

- a classified Board of Directors with three-year staggered terms, which may delay the ability of stockholders to change the membership of a majority of our Board of Directors;

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- no cumulative voting in the election of directors, which limits the ability of minority stockholders to elect director candidates;

- the exclusive right of our Board of Directors to elect 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 prevents stockholders from being able to fill vacancies on our Board of Directors;

- the ability of our Board of Directors to authorize the issuance of shares of preferred stock and to determine the terms of those shares, including preferences and voting rights, without stockholder approval, which could be used to significantly dilute the ownership of a hostile acquirer;

- the ability of our Board of Directors to alter our bylaws without obtaining stockholder approval;

- the required approval of the holders of at least two-thirds of the shares entitled to vote at an election of directors to adopt, amend or repeal our bylaws or repeal the provisions of our restated certificate of incorporation regarding the election and removal of directors;

- a prohibition on stockholder action by written consent, which forces stockholder action to be taken at an annual or special meeting of our stockholders;

- the requirement that a special meeting of stockholders may be called only by the chairman of the Board of Directors, the chief executive officer, the president or the Board of Directors, which may delay the ability of our stockholders to force consideration of a proposal or to take action, including the removal of directors; and

- advance notice procedures that stockholders must comply with in order to nominate candidates to our Board of Directors or to propose matters to be acted upon at a stockholders' meeting, which may discourage or deter a potential acquirer from conducting a solicitation of proxies to elect the acquirer's own slate of directors or otherwise attempting to obtain control of us.

In addition, these provisions would apply even if we were to receive an offer that some stockholders may consider beneficial.

We are also subject to the anti-takeover provisions contained in Section 203 of the Delaware General Corporation Law. Under Section 203, a corporation may not, in general, engage in a business combination with any holder of 15% or more of its capital stock unless the holder has held the stock for three years or, among other exceptions, the Board of Directors has approved the transaction.

We do not currently intend to pay dividends on our common stock, and, consequently, your ability to achieve a return on your investment will depend on appreciation in the price of our common stock.

We do not currently intend to pay any cash dividends on our common stock for the foreseeable future. We currently intend to invest our future earnings, if any, to fund our growth. Additionally, the terms of our Loan and Security Agreement restrict our ability to pay dividends. Therefore, you are not likely to receive any dividends on your common stock for the foreseeable future. Since we do not intend to pay dividends, your ability to receive a return on your investment will depend on any future appreciation in the market value of our common stock. There is no guarantee that our common stock will appreciate or even maintain the price at which our holders have purchased it.

Item 1B. Unresolved Staff Comments

Not applicable.

Item 2. Properties

Our corporate headquarters is located in Leawood, Kansas, where we lease and occupy approximately 17,600 square feet of office space pursuant to a lease that expires on February 28, 2021.

We believe that our current facilities are adequate to support our existing operations. We also believe that we will be able to obtain suitable additional facilities on commercially reasonable terms on an “as needed basis.”

Item 3. Legal Proceedings

From time to time, we may become involved in legal proceedings arising in the ordinary course of our business. We are not presently a party to any litigation that we believe to be material and we are not aware of any pending or threatened litigation against us that we believe could have a material adverse effect on our business, operating results, financial condition or cash flows.

Item 4. Mine Safety Disclosures

Not applicable.

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PART II

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

Market Information

Our common stock has been publicly traded on the Nasdaq Global Select Market under the symbol "PETX" since our initial public offering on June 26, 2013. The following table sets forth, for the periods indicated, the high and low intraday sale prices of our common stock as reported by the Nasdaq Global Select Market.

	High	Low
2018		
Fourth quarter	$ 7.16	$ 5.08
Third quarter	$ 6.25	$ 4.04
Second quarter	$ 5.60	$ 4.05
First quarter	$ 5.40	$ 3.67

	High	Low
2017		
Fourth quarter	$ 7.28	$ 4.85
Third quarter	$ 7.67	$ 5.18
Second quarter	$ 7.45	$ 5.02
First quarter	$ 8.63	$ 4.97

As of March 8, 2019, there were approximately 71 holders of record and 48,974,228 shares of our common stock outstanding.

Dividend Policy

We have never declared or paid any cash dividends on our common stock. We intend to retain future earnings, if any, to finance the operation and expansion of our business and do not anticipate paying any cash dividends in the foreseeable future. Any future determination related to dividend policy will be made at the discretion of our Board of Directors after considering our financial condition, results of operations, capital requirements, business prospects and other factors the Board of Directors deems relevant, and subject to the restrictions contained in our current or future financing instruments.

Unregistered Sales of Equity Securities

None.

Repurchases of Common Stock

The repurchase activity for the three months ended December 31, 2018, was as follows:

	Total Number of Shares Purchased		Average Price Paid Per Share	Total Number of Shares Purchased as Part of Publicly Announced Plan or Program	Maximum Number of Shares That May Yet Be Purchased Under the Plan or Program
October 1, 2018 - October 31, 2018	784	(1)	$ 5.99	—	N/A
November 1, 2018 - November 30, 2018	1,224	(1)	6.60	—	N/A
December 1, 2018 - December 31, 2018	—		—	—	N/A
	2,008				

(1) Consists of shares of restricted stock that were withheld to satisfy employee tax withholding obligations arising in conjunction with the vesting of restricted stock pursuant to our 2013 Incentive Award Plan.

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Stock Performance Graph

This performance graph shall not be deemed “soliciting material” or to be “filed” with the United States Securities and Exchange Commission (“SEC”) for purposes of Section 18 of the Securities Exchange Act of 1934, as amended the (“Exchange Act”), or otherwise subject to the liabilities under that Section, and shall not be deemed to be incorporated by reference into any of our filings under the Securities Act of 1933, as amended, or the Exchange Act.

The following graph shows a comparison from December 31, 2013 through December 31, 2018 of the cumulative total return for our common stock, the Nasdaq Composite Index (the “Nasdaq Composite”), the Standard & Poor’s 500 Stock Index (the “S&P 500”), and the Nasdaq Biotechnology Index (the “NBI”). The graph assumes that $100 was invested at the market close on December 31, 2013 in the common stock of Aratana Therapeutics, Inc., the Nasdaq Composite, the S&P 500 and the NBI and data for the Nasdaq Composite, the S&P 500, and the NBI assumes reinvestments of dividends. The stock price performance of the following graph is not necessarily indicative of future stock price performance.

	2013	2014	2015	2016	2017	2018
Aratana Therapeutics, Inc.	$ 100.00	$ 93.30	$ 29.21	$ 37.59	$ 27.54	$ 32.09
Nasdaq Composite	$ 100.00	$ 114.75	$ 122.74	$ 133.62	$ 173.22	$ 168.30
S&P 500	$ 100.00	$ 113.69	$ 115.26	$ 129.05	$ 157.22	$ 150.33
NBI	$ 100.00	$ 134.40	$ 150.22	$ 118.15	$ 143.71	$ 130.97

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Item 6. Selected Financial Data

The following tables set forth selected consolidated financial data of our company as of and for each of the years in the five-year period ended December 31, 2018, and should be read in conjunction with Item 7. “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and our consolidated financial statements and notes thereto included elsewhere in this Annual Report on Form 10-K for the year ended December 31, 2018 (“2018 Annual Report”) and previously filed Annual Reports on Form 10-K.

We have derived the consolidated statements of operations for the years ended December 31, 2018, 2017 and 2016 and the consolidated balance sheet data as of December 31, 2018 and December 31, 2017 from our audited consolidated financial statements included in this 2018 Annual Report in Item 8. “Financial Statements and Supplementary Data.” The selected historical consolidated balance sheet data as of December 31, 2016, December 31, 2015 and December 31, 2014, presented below has been derived from our audited consolidated financial statements not included in this 2018 Annual Report. The revenues data for the years ended December 31, 2015 and 2014 is derived from our audited combined financial statements not included in this 2018 Annual Report.

For a discussion of certain factors that materially affect the comparability of the selected consolidated financial data or cause the data reflected herein not to be indicative of our future results of operations or financial condition, see Item 1A. “Risk Factors,” Item 7. “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and notes to our consolidated financial statements included elsewhere in this report.

	Year Ended December 31,				
	2018	2017	2016	2015	2014
	(Dollars in thousands)				
Revenues:					
Licensing and collaboration revenue (1)	$ 23,326	$ 5,913	$ 38,233	$ —	$ 500
Product sales (2)	12,086	19,660	318	678	267
Total revenues	35,412	25,573	38,551	678	767
Costs and expenses					
Cost of product sales	6,783	16,387	3,139	365	333
Royalty expense	3,865	1,821	106	84	72
Research and development	6,855	15,126	30,462	24,964	19,985
Selling, general and administrative	28,780	28,897	27,342	19,819	17,938
Amortization of intangible assets	517	350	379	1,544	1,891
Impairment of intangible assets	—	7,448	7,942	43,398	—
In-process research and development	500	—	—	—	2,157
Total costs and expenses	47,300	70,029	69,370	90,174	42,376
Loss from operations	(11,888)	(44,456)	(30,819)	(89,496)	(41,609)
Other income (expense)					
Interest income	666	449	385	189	123
Interest expense	(3,391)	(3,481)	(3,396)	(1,585)	(1,060)
Other income (expense), net	(109)	(22)	255	5,140	2,287
Total other income (expense)	(2,834)	(3,054)	(2,756)	3,744	1,350
Loss before income taxes	(14,722)	(47,510)	(33,575)	(85,752)	(40,259)

Income tax benefit	—	—	—	1,698	1,443
Net loss	$ (14,722)	$ (47,510)	$ (33,575)	$ (84,054)	$ (38,816)
Net loss per share, basic and diluted	$ (0.32)	$ (1.17)	$ (0.95)	$ (2.45)	$ (1.30)
Weighted average shares outstanding, basic and diluted	46,606,855	40,494,301	35,273,228	34,355,525	29,767,429

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(1) Licensing and collaboration revenue reflects the impact of the following:

- revenues recognized related to GALLIPRANT sales milestone earned from Elanco in the third quarter of 2018 ($15,000);

- revenues recognized related to withdrawal of BLONTRESS from the market in the fourth quarter of 2017 ($480);

- revenues recognized related to the assumption of manufacturing responsibility for GALLIPRANT by Elanco in the third quarter of 2017 ($1,000);

- product launch of GALLIPRANT which commercial sales began in the first quarter of 2017; and

- revenues recognized related to the upfront payment from the Collaboration Agreement for GALLIPRANT in the second quarter of 2016 ($38,000).

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(2) Product sales reflect the impact of the following product launches:

- commercial sales of ENTYCE, which began in the fourth quarter of 2017;

- commercial sales of GALLIPRANT, which began in the first quarter of 2017 and ended in the fourth quarter of 2017 upon the assumption of manufacturing responsibility by Elanco ($15,526); and

- commercial sales of NOCITA, which began in the third quarter of 2016.

	As of December 31,				
	2018	2017	2016	2015	2014
	(Dollars in thousands)				
Consolidated Balance Sheet Data:					
Cash, cash equivalents and short-term investments	$ 42,671	$ 67,615	$ 88,303	$ 86,202	$ 98,072
Working capital (1)	52,570	49,743	66,854	83,335	90,441
Total assets	106,436	135,192	151,406	147,066	207,903
Total long-term debt, net of current portion	—	19,492	25,775	39,710	14,963
Total stockholders' equity	$ 100,822	$ 80,134	$ 90,403	$ 101,550	$ 181,832

(1) We define working capital as current assets less current liabilities.

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

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

Overview

We are a pet therapeutics company focused on the development and commercialization of innovative therapeutics for dogs and cats. As a pioneer in pet therapeutics, Aratana's mission is to deliver safe and effective therapeutics that elevate the standard of care in veterinary medicine. We work with companion animal veterinarians to bring new therapeutics to market that support the needs of pets and their owners.

We have three marketed therapeutics in the U.S., including NOCITA® (bupivacaine liposome injectable suspension) as a local post-operative analgesia for cranial cruciate ligament surgery in dogs and as a peripheral nerve block to provide regional post-operative analgesia following onychectomy in cats; ENTYCE® (capromorelin oral solution) for appetite stimulation in dogs; and GALLIPRANT® (grapiprant tablets) for the control of pain and inflammation associated with osteoarthritis in dogs, which we co-promote under an agreement with Elanco Animal Health, Inc. ("Elanco"). Our Canine Osteosarcoma Vaccine, Live Listeria Vector (AT-014) is conditionally licensed and is available at approximately two dozen study sites across the United States.

We have incurred significant net losses since our inception. We incurred net losses of $14.7 million, $47.5 million and $33.6 million for the years ended December 31, 2018, 2017, and 2016, respectively. These losses have resulted principally from costs incurred in connection with in-licensing our therapeutic candidates, research and development activities, and selling, general and administrative costs associated with our operations. As of December 31, 2018, we had a deficit accumulated since inception of $241.2 million, and cash, cash equivalents, restricted cash and short-term investments of $43.0 million.

We expect to continue to incur operating losses for the foreseeable future as we work to develop and commercialize our therapeutics and therapeutic candidates. If we cannot generate sufficient cash from operations in the future, we will seek to fund our operations through collaborations and licensing arrangements, or other sources, such as public or private equity and further debt financings. If we are not able to raise additional capital on terms acceptable to us, or at all, as and when needed, we would be forced to delay, reduce, or eliminate certain research and development programs, reduce or eliminate discretionary operating expenses or grant rights to develop and market therapeutics or therapeutic candidates that we would otherwise prefer to develop and market ourselves, which could otherwise adversely affect our business prospects. As of the date of the filing of this 2018 Annual Report, we believe that our existing cash, cash equivalents and short-term investments of $42.7 million at December 31, 2018, will allow us to fund our operations for at least one year from the issuance of these consolidated financial statements.

For more information regarding our business and the animal health industry, see Item 1. "Business."

Recent Developments

For more information regarding research and development, manufacturing and sales and marketing refer to applicable sections in Item 1. “Business.”

Financial Overview

Revenues

Licensing and collaboration revenue consists primarily of revenues recognized related to our GALLIPRANT collaboration, license, development and commercialization agreement (the “Collaboration Agreement”) and co-promotion agreement (the “Co-Promotion Agreement,” and together with the Collaboration Agreement, the “Elanco Agreements”) with Elanco.

Product sales in 2018 consist of net sales of our therapeutics NOCITA and ENTYCE. Additionally, product sales in 2017 include sales of GALLIPRANT finished goods to Elanco under the supply terms of the Collaboration Agreement prior to the assumption of manufacturing responsibility by Elanco. Product sales in 2016 consist of net sales of NOCITA, BLONTRESS and TACTRESS.

Costs and expenses

Cost of product sales consists primarily of the cost of direct materials, direct labor and overhead costs associated with the manufacturing of our products. Cost of product sales also includes inventory valuation adjustment losses from the application of the lower of cost and net realizable value.

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Royalty expense consists of royalty expenses associated with third-party intellectual property. Royalty expense includes third-party royalties for licensed technologies primarily pertaining to GALLIPRANT, NOCITA and ENTYCE. Royalties are either a minimum amount per year or a percentage of net product sales.

Research and development ("R&D") expenses consist primarily of costs associated with our product development efforts (new product R&D and product lifecycle development), overhead costs associated with R&D and expenses related to regulatory approval of our products. Product development costs consist primarily of contracted development costs, manufacturing costs, wages, stock-based compensation, employee benefits for all employees engaged in scientific research and development functions and milestone payments made under our licensing agreements. Overhead costs associated with R&D consists of other operational costs related to our research and development activities, including facility-related expenses, regulatory, professional and consulting fees, travel costs, and allocated corporate costs.

We have been developing our lead programs in parallel and typically use our employee and infrastructure resources across multiple development programs. We track contracted development costs by development compound but do not allocate personnel or other internal costs related to development to specific programs or development compounds. These expenses are included in personnel costs and other internal costs, respectively.

Selling, general and administrative expenses consist primarily of personnel costs, including salaries, related benefits and stock-based compensation for employees in commercial, administration, finance, information technology, human resources, legal, and business development. Selling, general and administrative expenses also include allocated rent and other facilities costs; conference and sponsorship activities, information technology services, professional and consulting fees for general and commercial business purposes, for accounting and tax services, business development activities, general legal services; and travel and other costs.

Amortization of intangible assets consists primarily of the amortization expense for intangible assets capitalized in conjunction with approval/post-approval milestone payments made under our license agreements. These assets consist of intellectual property rights for currently marketed products.

Impairment of intangible assets consists solely of impairment charges for intangible assets that have been acquired through business combinations whose carrying amounts exceeded their fair value.

In-process research and development expense consists solely of an initial upfront license fee of $0.5 million pursuant to the exclusive license agreement with AskAt Inc. ("AskAt") relating to AT-019.

Other income (expense)

Interest income consists of interest earned on our cash, cash equivalents and short-term investments.

Interest expense consists of interest incurred on our borrowings.

A more detailed description of our Loan Agreement (as defined below) is available under the caption "Liquidity and Capital Resources."

Critical Accounting Policies and Significant Judgments and Estimates

Our management's discussion and analysis of financial condition and results of operations is based on our consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States of America. The preparation of our consolidated financial statements and related disclosures requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities, revenues, costs and expenses and related disclosures during the reporting periods. On an ongoing basis, we evaluate our estimates and judgments, including those described below. We base our estimates on historical experience and on various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying value of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions.

While our significant accounting policies are more fully described in Note 2,"Summary of Significant Accounting Policies," to our consolidated financial statements appearing elsewhere in this filing, we believe that the estimates and assumptions involved in the following accounting policies may have the greatest potential impact on our consolidated financial statements.

Revenue from Contracts with Customers

Effective January 1, 2018, we adopted the Accounting Standards Codification Topic ("ASC") 606 "Revenue from Contracts with Customers" ("ASC 606") using the modified retrospective transition method. Prior to January 1, 2018, we recognized revenue using the guidance of ASC 605 "Revenue Recognition" ("ASC 605").

We recognize revenue when our customer obtains control of the promised goods or services, in an amount that reflects the consideration which we expect to be entitled to in exchange for those goods or services.

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We determine revenue recognition from contracts with customers as follows:

- identify the contract(s);
- identify the performance obligations in the contract(s);
- determine the transaction price;
- allocate the transaction price to the performance obligations in the contract; and
- recognize revenue when (or as) we satisfy a performance obligation.

Our principal revenue streams and their respective accounting treatments are discussed below and further in Note 3, "Revenue," to our consolidated financial statements appearing elsewhere in this filing:

(i) Product Sales, Net

We sell our products to our customers who could either be the end users (such as veterinarians, clinics, or animal hospitals) of the product or distributors who subsequently resell our products to end users. Revenues from product sales are recognized when the customer obtains control of our product, which occurs at a point in time, upon delivery to the customer. Our delivery of our products to customers constitutes a single performance obligation as there are no other promises to deliver goods or services beyond what is specified in each accepted customer order.

Product sales are recorded net of applicable reserves for variable consideration, including product returns, allowances, discounts, and rebates.

Reserves for Variable Consideration

Revenues from product sales are recorded at the net sales price (transaction price) which includes estimates of variable consideration for which reserves are established. Components of variable consideration include product returns, allowances, discounts, and rebates. These reserves, as detailed below, are based on the amounts earned, or to be claimed on the related sales, and are classified as reductions of accounts receivable (generally, for credits that we issue for free goods provided by distributors to end customers in conjunction with promotional programs) or a current liability (generally, reserves for products that remained in the distribution channel inventories at each reporting period end that we expect the distributors will provide to end customers free of charge in conjunction with promotional programs). These estimates take into consideration a range of possible outcomes for the expected value (probability-weighted estimate) or relevant factors such as current contractual and statutory requirements, specific known market events and trends, industry data, and forecasted customer buying and payment patterns. Overall, these reserves reflect our best estimates of the amount of consideration to which we are entitled based on the terms of the respective underlying contracts.

The amount of variable consideration included in the transaction price may be constrained and is included in the net sales price only to the extent that it is probable that a significant reversal in the amount of the cumulative revenue recognized under the contract will not occur in a future period. Actual amounts of consideration ultimately received may differ from our estimates. If actual results in the future vary from our estimates, we will adjust these estimates, which would affect net product revenue and earnings in the period such variances become known.

Product Returns

Consistent with the industry practice, we generally offer customers a limited right of return of damaged or expired product that has been purchased from us or our distributors in exchange for an unexpired product or credit, depending

on contractual arrangements with distributors and terms and conditions of the sale of our products. Exchanges or credit due to expiry are typically allowed for a period of six months after the product's expiration date. We estimate the amount of our product sales that may be returned by our customers and record these estimates as a reduction of product revenues in the period in which the related product revenues are recognized, as well as within accrued expenses and other current liabilities in the consolidated balances sheets. We currently estimate product return liabilities using available industry data, our own sales data and data provided by our distributors such as the inventories remaining in the distribution channel. We have received an immaterial amount of returns to date and believe that returns of our products in future periods will be minimal. We do not record a return asset associated with the returned damaged or expired goods because such asset is deemed to be fully impaired at the time of product return.

Sales Discounts and Allowances

We compensate our distributors for sales order management, data and distribution and other services through sales discounts and allowances. However, such services are not distinct from our sale of products to distributors and, therefore, these discounts and allowances are recorded as a reduction of revenue in the consolidated statements of operations, as well as a reduction to accounts receivable, net in the consolidated balance sheets.

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(ii) Licensing and Collaboration Revenues

Revenues derived from product out-licensing arrangements typically consist of an initial non-refundable, up-front payment at inception of the license, subsequent milestone payments contingent on the achievement of certain regulatory, development and commercial milestones, and royalties on the net sales of our products.

Licenses of Intellectual Property

If the license to our intellectual property is determined to be distinct from the other performance obligations identified in the contract, we recognize revenue from non-refundable, up-front fees allocated to the license when the license is transferred to the customer and the customer is able to use and benefit from the license. For licenses that are bundled with other promises, we utilize judgment to assess the nature of the combined performance obligation to determine whether the combined performance obligation is satisfied over time or at a point in time and, if over time, the appropriate method of measuring progress for purposes of recognizing revenue from non-refundable, up-front fees. We evaluate the measure of progress each reporting period and, if necessary, adjust the measure of performance and related revenue recognition.

Milestones

Revenues from achievement of milestones generally represent a form of variable consideration as the payments are likely to be contingent on the occurrence of future events. We estimate milestones probable to be achieved and include in the transaction price based on either the expected value (probability-weighted estimate) method or most likely amount method. The most likely amount method is used by us for milestone payments with a binary outcome (i.e., we receive all or none of the milestone payment). Milestone payments that are not within our control or control of the customer, such as regulatory approvals, are not considered probable of being achieved until those approvals are received. The estimated milestone-related variable consideration is only recognized as revenue when the related performance obligation is satisfied and we determine that it is probable that there will not be a significant reversal of cumulative revenue recognized in future periods (i.e. variable consideration constraint). At the end of each subsequent reporting period, we re-evaluate the probability of achievement of such milestones and any related constraint, and if necessary, adjusts our estimate of the overall transaction price. Any such adjustments are recorded on a cumulative catch-up basis, which would affect licensing and collaboration revenues and earnings in the period of adjustment.

For milestones that are not able to overcome the variable consideration constraint, that are not considered probable or that are determined to be sales-based or usage royalties, as described later, we recognize revenue when the milestones are achieved.

Sales-Based Royalty Revenues

Our sales-based royalty revenues consist of sales-based milestones or a percentage of net sales royalties. We recognize sales-based royalties related to our out-licensed intellectual property when (or as) the later of the following events occurs:

- the sale occurs; or
- the performance obligation to which some or all of the sales-based or usage-based royalty has been allocated has been satisfied (or partially satisfied).

Sales-based royalty revenues recorded by us are based on the licensee's or sub-licensee's sales that occurred during the relevant period. To the extent the licensee's or sub-licensee's actual sales are not known at the time we report our financial results, we estimate the amount of royalty revenue earned during the relevant period. Differences between actual and estimated royalty revenues, if any, are adjusted in the period in which they become known. To date, royalty revenues reported by us have been based on actual sales information received by us, and no material adjustments have been made in subsequent periods. Royalty revenue is included in licensing and collaboration revenue in the consolidated statements of operations.

We recognize revenue from sales-based milestones when the milestones are achieved.

Research and Development

As part of the process of preparing our consolidated financial statements, we are required to estimate accrued research and development expenses. Examples of estimated accrued expenses include fees paid to clinical research organizations ("CROs"), in connection with target animal studies, to investigative sites in connection with target animal studies, to contract manufacturers in connection with the production of active pharmaceutical ingredient, and formulated drug, and to other parties for outsourced chemistry services.

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We review new and open contracts and communicate with applicable internal and vendor personnel to identify services that have been performed on our behalf and estimate the level of service performed and the associated costs incurred for the service when we have not yet been invoiced or otherwise notified of the actual cost for accrued expenses. The majority of our service providers invoice us monthly in arrears for services performed or as milestones are achieved in relation to our contract manufacturers. We make estimates of our accrued expenses as of each consolidated balance sheet date.

We base our accrued expenses related to target animal studies on our estimates of the services received and efforts expended pursuant to contracts with CROs that conduct and manage target animal studies on our behalf. The financial terms of these agreements are subject to negotiation, vary from contract to contract and may result in uneven payment flows. Payments under some of these contracts depend on factors such as the successful enrollment of animals and the completion of development milestones. We estimate the time period over which services will be performed and the level of effort to be expended in each period. If the actual timing of the performance of services or the level of effort varies from our estimate, we adjust the related expense accrual accordingly on a prospective basis. If we do not identify costs that have been incurred or if we underestimate or overestimate the level of services performed or the costs of these services, our actual expenses could differ from our estimates. To date, we have not made any material adjustments to our estimates of accrued research and development expenses or the level of services performed in any reporting period presented in this document.

Impairment of Intangible Assets and Goodwill

Indefinite-lived in-process research and development (“IPR&D”) intangible assets are assessed for impairment at least annually. In addition, all intangible assets are reviewed for impairment whenever events or changes in business circumstances indicate that the carrying amount of the assets may not be fully recoverable. Factors that we consider in deciding when to perform an impairment review include significant underperformance of the business in relation to expectations, significant negative industry or economic trends, and significant changes or planned changes in the use of the assets. If an impairment review is performed to evaluate a long-lived asset for recoverability, we compare forecasts of undiscounted cash flows for definite-lived intangible assets and discounted cash flows for indefinite-lived IPR&D intangible assets expected to result from the use and eventual disposition of the long-lived asset to its carrying value. An impairment loss would be recognized when estimated undiscounted (definite-lived) or discounted (indefinite-lived) future cash flows expected to result from the use of an asset are less than its carrying amount. The impairment loss would be based on the excess of the carrying value of the impaired asset over its fair value, determined based on discounted cash flows. In the years ended December 31, 2018, 2017, 2016 and to date, we recorded $0.0 million, $7.4 million, $7.9 million and $58.8 million, respectively, of impairment losses on intangible assets (see Note 9 to our consolidated financial statements). All previously capitalized IPR&D intangible assets had been fully impaired as of December 31, 2018.

We completed our annual goodwill impairment testing during the third quarter of 2018. We elected to bypass the qualitative assessment. We determined as of the testing date that we consisted of one operating segment, which is comprised of one reporting unit. In performing the quantitative goodwill impairment test, we determined that our fair value, determined to be our market capitalization, was greater than our carrying value, determined to be stockholders’ equity. Based on this result, we determined there was no impairment of goodwill during the third quarter of 2018.

Stock-Based Compensation

We measure stock-based awards granted to employees and directors at fair value on the date of grant and recognize the corresponding compensation expense of those awards over the requisite service period, which is generally the

vesting period of the respective award. Stock-based compensation related to restricted stock awards is based on the market value of our common stock on the date of grant and is recognized as expense ratably over the requisite service period. Generally, we issue stock-based awards with only service-based vesting conditions and record compensation expense for these awards using the straight-line method. We grant stock-based awards with exercise prices equivalent to the fair value of our common share as of the date of grant.

We account for all stock-based awards issued to non-employees based on the fair value of the award on each measurement date. Stock-based awards granted to non-employees are subject to revaluation at each reporting date over their vesting terms. As a result, the charge to operations for non-employee awards with vesting conditions is affected each reporting period by changes in the fair value of our common stock.

The fair value of each stock-based award is estimated using the Black-Scholes option-pricing model. The risk-free interest rate is determined by reference to the United States Treasury yield curve in effect at the time of grant of the award for time periods approximately equal to the expected term of the award. The expected term of our awards has been determined utilizing the “simplified” method as we do not have sufficient historical experience for option grants overall, rendering existing historical experience irrelevant to expectations for current grants. Expected volatility for our awards is based on the historical volatility of our common stock. Expected dividend yield is based on the fact that we have never paid cash dividends and do not expect to pay any cash dividends in the foreseeable future.

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The assumptions we used to determine the fair value of stock-based compensation attributable to stock options granted in each period were as follows, presented on a weighted average basis:

	Year Ended December 31,		
	2018	2017	2016
Risk-free interest rate	2.53 %	1.99 %	1.52 %
Expected term (in years)	6.0	6.0	6.2
Expected volatility	72 %	75 %	77 %
Expected dividend yield	— %	— %	— %

These assumptions represent our best estimates, but the estimates involve inherent uncertainties and the application of our judgment. As a result, if factors change and we use significantly different assumptions or estimates, our stock-based compensation expense could be materially different. We had an aggregate of $3.6 million and $2.3 million of unrecognized stock-based compensation expense for options outstanding and restricted stock awards, respectively, as of December 31, 2018, which is expected to be recognized over a weighted-average period of 2.36 years for stock options and 1.65 years for restricted stock.

Income Taxes

We account for income taxes using the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of events that have been recognized in our consolidated financial statements or in our tax returns. Deferred taxes are determined based on the difference between the financial statement and tax basis of assets and liabilities using enacted tax rates in effect in the years in which the differences are expected to reverse. Changes in deferred tax assets and liabilities, other than those arising from business combinations, are recorded in the provision for income taxes. We assess the likelihood that our deferred tax assets will be recovered from future sources of taxable income and, to the extent we believe, based upon the weight of available evidence, that it is more likely than not that all or a portion of deferred tax assets will not be realized, a valuation allowance is established through a charge to income tax expense. Potential for recovery of deferred tax assets is evaluated by estimating the future taxable profits expected and considering prudent and feasible tax planning strategies.

We account for uncertainty in income taxes recognized in our consolidated financial statements by applying a two-step process to determine the amount of tax benefit to be recognized. First, the tax position must be evaluated to determine the likelihood that it will be sustained upon external examination by the taxing authorities. If the tax position is deemed more-likely-than-not to be sustained, the tax position is then assessed to determine the amount of benefit to recognize in our consolidated financial statements. The amount of the benefit that may be recognized is the largest amount that has a greater than 50% likelihood of being realized upon ultimate settlement. The provision for income taxes includes the effects of any resulting tax reserves, or unrecognized tax benefits, that are considered appropriate as well as the related net interest and penalties.

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Results of Operations

Comparison of the Years Ended December 31, 2018 and 2017

	Year Ended December 31,		
	2018	2017	% Change
	(Dollars in thousands)		
Revenues			
Licensing and collaboration revenue	$ 23,326	$ 5,913	>100.0 %
Product sales	12,086	19,660	(38.5) %
Total revenues	35,412	25,573	38.5 %
Costs and expenses			
Cost of product sales	6,783	16,387	(58.6) %
Royalty expense	3,865	1,821	>100.0 %
Research and development	6,855	15,126	(54.7) %
Selling, general and administrative	28,780	28,897	(0.4) %
Amortization of intangible assets	517	350	47.7 %
Impairment of intangible assets	—	7,448	(100.0) %
In-process research and development	500	—	NA
Total costs and expenses	47,300	70,029	(32.5) %
Loss from operations	(11,888)	(44,456)	(73.3) %
Other income (expense)			
Interest income	666	449	48.3 %
Interest expense	(3,391)	(3,481)	(2.6) %
Other expense, net	(109)	(22)	>100.0 %
Total other expense	(2,834)	(3,054)	(7.2) %
Net loss	$ (14,722)	$ (47,510)	(69.0) %

Revenues

During the year ended December 31, 2018, total revenues increased by $9.8 million as compared to 2017, as a result of an increase of $17.4 million in licensing and collaboration revenue, partially offset by a decrease in net product sales of $7.6 million. The increase in licensing in collaboration revenue was due to an increase of $17.9 million recognized from the Elanco Agreements, partially offset by a decrease of $0.5 million due to the derecognition of the remaining balance of a liability related to BLONTRESS in 2017. The decrease in net product sales was primarily a result of transferring GALLIPRANT manufacturing to Elanco in 2017. Licensing and collaboration revenue for the year ended December 31, 2018, included a $15.0 million GALLIPRANT sales milestone earned from Elanco. During

the year ended December 31, 2018, product sales consisted of net sales of NOCITA and ENTYCE. During the year ended December 31, 2017, product sales consisted of net sales of GALLIPRANT, NOCITA, ENTYCE, BLONTRESS and TACTRESS.

We believe that product sales in 2019 will consist primarily of a combination of sales of ENTYCE and NOCITA. Any licensing and collaboration revenue in 2019 will be substantially dependent on Elanco's ability to successfully commercialize GALLIPRANT in accordance with the Elanco Agreements. Due to an increased demand exceeding supply capacity, GALLIPRANT was backordered at the end of 2018, and the backorders are anticipated to clear by the end of the first quarter or early second quarter of 2019. If these availability issues are resolved as planned, we do not anticipate an impact on our overall 2019 revenues.

Cost of product sales

During the year ended December 31, 2018, cost of product sales decreased by $9.6 million as compared to 2017, primarily due to cost of product sales of GALLIPRANT, which we sold to Elanco during 2017, partially offset by an increase in cost of product sales of ENTYCE and NOCITA. During the year ended December 31, 2018, we recognized in cost of product sales an inventory valuation loss of $2.7 million from the application of the lower of cost and net realizable value. These losses are primarily related to certain SKUs of ENTYCE finished goods that were written down to net realizable value. During the year ended December 31, 2017, we recognized in cost of product sales an inventory valuation loss of $0.4 million as a result of GALLIPRANT inventories that were written down to net realizable value.

Prior to the launch of ENTYCE, we made a considerable investment in ENTYCE inventories. The majority of our ENTYCE inventories consist of API, which has a shelf life of several years. Our current inventory levels represent our market expectations. As we are in the early stages of commercialization of our products, we will continue to evaluate the net realizable value of our inventories and may experience future inventory valuation adjustment losses. We anticipate cost of product sales as a percentage of product sales will improve in 2019 as compared to 2018 as we normalize our inventory levels based on product performance and future forecasts.

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Royalty expense

During the year ended December 31, 2018, royalty expense increased by $2.0 million as compared to 2017. The increase was a result of our product sales of NOCITA and ENTYCE, and Elanco's product sales of GALLIPRANT. We believe royalty expense in 2019 will be substantially dependent on Elanco's ability to successfully commercialize GALLIPRANT in accordance with the Elanco Agreements, and our continuing efforts to commercialize NOCITA and ENTYCE.

Research and development expense

	Year Ended December 31,			
	2018	2017	% Change	
	(Dollars in thousands)			
Contracted development costs	$ 2,764	$ 11,086	(75.1)	%
Milestones	—	250	(100.0)	%
Personnel costs	3,125	3,259	(4.1)	%
Other costs	966	531	81.9	%
Total research and development	$ 6,855	$ 15,126	(54.7)	%

During the year ended December 31, 2018, research and development expense decreased by $8.3 million as compared to 2017. This decrease was primarily due to a decrease of $8.3 million in contracted development costs due to the prioritization of spending for ongoing programs, a decrease of $0.3 million in milestone payments which in 2017 were related to AT-016 program, and a $0.1 million decrease in personnel costs, partially offset by an increase in other costs of $0.4 million primarily from an initial upfront option fee of $0.5 million pursuant to the collaboration and option agreement with AskAt.

We expect that our 2019 development efforts will be focused on completing the capromorelin cat study, fully enrolling our AT-018 atopic dermatitis pilot study and advancing our AT-019 EP4 antagonist therapeutic candidate. We anticipate research and development costs to increase slightly in 2019 as compared to 2018 as we move these programs forward.

Selling, general and administrative expense

During the year ended December 31, 2018, selling, general and administrative expense decreased by $0.1 million as compared to 2017, primarily as a result of a decrease in stock-based compensation expense of $1.9 million, which was partially offset by an increase in expenses primarily related to additional product-focused sales and marketing initiatives as well as audit, tax and other professional fees. We anticipate overall selling, general and administrative expenses to remain relatively consistent in 2019 as compared to 2018 as we have our sales organization and corporate

infrastructure in place to support the continued commercialization of our marketed therapeutics.

In-process research and development

During the year ended December 31, 2018, in-process research and development expense increased by $0.5 million as compared to 2017. The increase was solely due to an initial upfront license fee of $0.5 million pursuant to the exclusive license agreement with AskAt with respect to AT-019.

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Comparison of the Years Ended December 31, 2017 and 2016

	Year Ended December 31,			
	2017	2016	% Change	
	(Dollars in thousands)			
Revenues				
Licensing and collaboration revenue	$ 5,913	$ 38,233	(84.5)	%
Product sales	19,660	318	>100.0	%
Total revenues	25,573	38,551	(33.7)	%
Costs and expenses				
Cost of product sales	16,387	3,139	>100.0	%
Royalty expense	1,821	106	>100.0	%
Research and development	15,126	30,462	(50.3)	%
Selling, general and administrative	28,897	27,342	5.7	%
Amortization of intangible assets	350	379	(7.7)	%
Impairment of intangible assets	7,448	7,942	(6.2)	%
Total costs and expenses	70,029	69,370	0.9	%
Loss from operations	(44,456)	(30,819)	44.2	%
Other income (expense)				
Interest income	449	385	16.6	%
Interest expense	(3,481)	(3,396)	2.5	%
Other income (expense), net	(22)	255	<(100.0)	%
Total other income (expense)	(3,054)	(2,756)	10.8	%
Net loss	$ (47,510)	$ (33,575)	41.5	%

Revenues

During the year ended December 31, 2017, total revenues decreased by $13.0 million as compared to 2016. The decrease was primarily due to a decrease of $32.8 million of licensing and collaboration revenue from the Elanco Agreements, partially offset by an increase of $19.3 million in net product sales primarily due to net sales of GALLIPRANT, NOCITA and ENTYCE and an increase of $0.5 million in licensing and collaboration revenue due to the derecognition of the remaining balance of a liability related to BLONTRESS. Total revenues for the year ended December 31, 2016, included $38.0 million of licensing and collaboration revenue recognized from the Elanco Agreements. During the year ended December 31, 2017, product sales consisted of net sales of GALLIPRANT, NOCITA, ENTYCE, BLONTRESS and TACTRESS. GALLIPRANT product sales during the year ended December 31, 2017, consisted of $15.5 million of product sales of finished goods prior to the assumption of manufacturing responsibility by Elanco under the supply terms of the Collaboration Agreement as compared to $0.0 million in 2016. During the years ended December 31, 2017 and 2016, NOCITA net sales were $2.8 million and $0.1 million, and ENTYCE net sales were $1.3 million and $0.0 million, respectively.

Cost of product sales

During the year ended December 31, 2017, cost of product sales increased by $13.2 million as compared to 2016, primarily as a result of cost of product sales of GALLIPRANT, NOCITA, BLONTRESS, and TACTRESS. During the year ended December 31, 2017, we recognized in cost of product sales an inventory valuation loss of $0.4 million as a result of GALLIPRANT inventories that were written down to net realizable value. During the year ended December 31, 2016, we recognized in cost of product sales an inventory valuation loss in the amount of $2.5 million from the write-off of BLONTRESS and TACTRESS inventories and pre-launch GALLIPRANT inventories written down to market value due to terms agreed upon in the Collaboration Agreement.

During the year ended December 31, 2017, cost of product sales as a percentage of product sales was largely impacted by the sale of GALLIPRANT inventories to Elanco which had lower margins as compared to ENTYCE and NOCITA margins. However, cost of product sales as a percentage of product sales improved in the fourth quarter of 2017 as a result of the sale of ENTYCE process validation batches, which were previously written down.

Royalty expense

During the year ended December 31, 2017, royalty expense increased by $1.7 million as compared to 2016, primarily as a result of the sales of GALLIPRANT, NOCITA and ENTYCE.

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Research and development expense

	Year Ended December 31,		
	2017	2016	% Change
	(Dollars in thousands)		
Contracted development costs	$ 11,086	$ 18,349	(39.6) %
Milestones	250	6,950	(96.4) %
Personnel costs	3,259	4,456	(26.9) %
Other costs	531	707	(24.9) %
Total research and development	$ 15,126	$ 30,462	(50.3) %

During the year ended December 31, 2017, research and development expense decreased by $15.3 million as compared to 2016. This decrease was primarily due to a decrease of $6.7 million in milestone payments relating to GALLIPRANT, ENTYCE, NOCITA, and AT-016, and a decrease of $7.3 million in contracted development costs due to the prioritization of spending for ongoing programs, a $1.2 million decrease in personnel costs primarily due to a lower R&D headcount in 2017, and a $0.2 million decrease in other costs. During the year ended December 31, 2017, research and development expenses also included an inventory valuation loss of $0.4 million from the application of lower of cost and net realizable value related to raw materials purchased for future validation batches of GALLIPRANT that have been assumed by Elanco.

Selling, general and administrative expense

During the year ended December 31, 2017, selling, general and administrative expense increased by $1.6 million as compared to 2016. The increase was primarily due to an increase of $2.8 million in personnel expenses primarily as a result of higher sales and marketing headcount, partially offset by a decrease of $1.2 million in other expenses due to the substantial completion of the implementation of our commercial infrastructure including systems and market preparation materials.

Impairment of intangible assets

During the year ended December 31, 2017, impairment of intangible assets expense decreased by $0.5 million as compared to 2016. The impairment of intangible assets in 2017 was related to impairment charges for AT-006 and AT-008, and in 2016 it was related to impairment charges for TACTRESS ($0.5 million), BLONTRESS ($5.2 million) and AT-007 ($2.2 million). The impairment charges related to AT-006 and AT-008 resulted from our decision to further delay the development of AT-006 and AT-008 due to our development program prioritization review, which included our consideration of a number of factors, including our inability to raise additional capital in

November 2017, reducing the carrying values of both AT-006 and AT-008 to $0.0 million. The impairment charge related to TACTRESS resulted from updated sales expectations and resulted in a carrying value of $0.0 million for TACTRESS. The impairment charge related to AT-007 was the result of our decision to discontinue the development of AT-007 due to the return of global rights of AT-006 and ensuing development program portfolio prioritization, including consideration of our focus on commercial launch activities to support our recently approved products, and resulted in a carrying value of $0.0 million for AT-007. The impairment charge related to BLONTRESS resulted from updated sales expectations as result of the Mini B-CHOMP final study results. For more information regarding the impairment charges see Note 9 to our consolidated financial statements.

Financial Condition, Liquidity and Capital Resources

Our financial condition is summarized as follows:

	December 31, 2018 (Dollars in thousands)	December 31, 2017	Change	%
Financial assets:				
Cash and cash equivalents	$ 41,431	$ 66,868	(38.0)	%
Marketable securities - short-term	1,240	747	66.0	%
Total cash, cash equivalents and marketable securities	$ 42,671	$ 67,615	(36.9)	%
Borrowings:				
Loans payable, net	$ —	$ 36,825	(100.0)	%
Working capital:				
Current assets	$ 58,127	$ 85,239	(31.8)	%
Current liabilities	5,557	35,496	(84.3)	%
Total working capital	$ 52,570	$ 49,743	5.7	%

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We have incurred significant net losses since our inception. We incurred net losses of $14.7 million, $47.5 million and $33.6 million for the years ended December 31, 2018, 2017, and 2016, respectively. These losses have resulted principally from costs incurred in connection with in-licensing our product candidates, research and development activities and selling, general and administrative costs associated with our operations. As of December 31, 2018, we had an accumulated deficit of $241.2 million and cash, cash equivalents and short-term investments of $42.7 million.

We expect to continue to incur operating losses for the foreseeable future as we work to develop and commercialize our therapeutics and therapeutic candidates. If we cannot generate sufficient cash from operations in the future, we will seek to fund our operations through corporate collaborations and licensing arrangements, or other sources, such as public or private equity and further debt financings. If we are not able to raise additional capital on terms acceptable to us, or at all, as and when needed, we would be forced to delay, reduce, or eliminate certain research and development programs, reduce or eliminate discretionary operating expenses or grant rights to develop and market therapeutics or therapeutic candidates that we would otherwise prefer to develop and market ourselves, which could otherwise adversely affect our business prospects. Our failure to raise capital, as and when needed, would have a negative impact on our financial condition and our ability to pursue our business strategies as this capital is necessary for us to perform the research and development and commercial activities required to generate future revenue streams. As of the date of the filing of the 2018 Annual Report, we believe that our existing cash, cash equivalents and short-term investments of $42.7 million at December 31, 2018, will be sufficient to fund our operations at least for at least one year from the issuance of our consolidated financial statements.

Cash, Cash Equivalents and Investments

Until required for another use in our business, we typically invest our cash reserves in bank deposits, certificates of deposit, and other interest bearing debt instruments in accordance with our investment policy. It is our policy to mitigate credit risk in our cash reserves and investments by maintaining a well-diversified portfolio that limits the amount of exposure as to institution, maturity, and investment type. The value of our investments, however, may be adversely affected by increases in interest rates, instability in the global financial markets that reduces the liquidity of securities included in our portfolio, and by other factors which may result in declines in the value of the investments. Each of these events may cause us to record charges to reduce the carrying value of our investment portfolio if the declines are other-than-temporary or we sell investments for less than our acquisition cost, which could adversely impact our financial position and our overall liquidity.

Shelf Registration Statement

On August 4, 2017, we filed a new shelf registration statement on Form S-3 (Reg. No. 333-219681) (the “Shelf Registration Statement”) with the SEC. The Shelf Registration Statement was declared effective by the SEC on August 16, 2017.

The Shelf Registration Statement allows us to offer and sell, from time to time, up to $100.0 million of common stock, preferred stock, debt securities, warrants, units or any combination of the foregoing in one or more future public offerings. The terms of any future offering would be determined at the time of the offering and would be subject to market conditions and approval by our Board of Directors. Any offering of securities covered by the Shelf Registration Statement will be made only by means of a written prospectus and prospectus supplement authorized and filed by us.

Registered Direct Offering

On May 3, 2017, we entered into a Placement Agency Agreement ("PAA") with Barclays Capital, Inc. ("Barclays"), pursuant to which Barclays agreed to serve as placement agent for an offering of shares of common stock. In conjunction with the PAA, on May 3, 2017, we also entered into a Securities Purchase Agreement with certain investors for the sale by us of 5,000,000 shares of common stock at a purchase price of $5.25 per share (the "Offering"). The shares of common stock were offered and sold pursuant to our previously filed and then effective registration statement on Form S-3 (File No. 333-197414) and a related prospectus supplement. We agreed to pay Barclays an aggregate fee equal to 6.0% of the gross proceeds received by us from the Offering. The Offering closed on May 9, 2017. We received aggregate net proceeds from the Offering of approximately $24.4 million, after deducting placement agent fees of $1.6 million and offering expenses of $0.3 million.

At-the-Market Offerings

Cowen and Company, LLC

On December 18, 2017, we entered into a Sales Agreement ("Cowen Sales Agreement") with Cowen and Company, LLC ("Cowen") pursuant to which we may sell from time to time, at our option, up to an aggregate of $50.0 million of shares of our common stock through Cowen, as sales agent. Any sales of the shares of common stock will be made under our effective Registration Statement on Form S-3 (Reg. No. 333-219681), by means of ordinary brokers' transactions on the Nasdaq Global Market or otherwise. Additionally, under the terms of the Cowen Sales Agreement, the shares of common stock may be sold at market prices, at negotiated prices or at prices related to the prevailing market price. We have agreed to pay Cowen a commission of 3% of the gross proceeds from the sale of such shares of common stock.

During the year ended December 31, 2018, we sold 5,144,244 shares of common stock for aggregate net proceeds of $24.2 million, after deducting commission fees of $0.8 million and issuances costs of $0.2 million. As of the date of this filing, approximately $24.9 million of shares of common stock remained available for sale under the Cowen Sales Agreement.

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Barclays Capital, Inc.

On April 28, 2017, we terminated our prior at-the-market offering pursuant to a sales agreement with Barclays. As of that date, we had sold an aggregate of approximately $18.0 million of the $52.0 million available to be sold under the Barclays sales agreement, including 546,926 shares for aggregate net proceeds of $2.8 million in 2017.

Indebtedness

On October 16, 2015, we and Vet Therapeutics (together the "Borrowers") entered into a Loan and Security Agreement, as amended on February 24, 2017 (the "Loan Agreement"), with Pacific Western Bank ("Pacific Western") as collateral agent ("Collateral Agent") and a lender and Oxford Finance LLC as a lender ("Oxford" and together with Pacific Western, the "Lenders"), pursuant to which the Lenders agreed to make available to the Borrowers, a term loan in an aggregate principal amount up to $35.0 million (the "Term Loan"), and a revolving credit facility in an aggregate principal amount up to $5.0 million (the "Revolving Line"). The Borrowers were required to make interest-only payments on the Term Loan for 18 months, and beginning on May 1, 2017, began to make payments of principal and accrued interest on the Term Loan in equal monthly installments over a term of 30 months. The Term Loan and the Revolving Line bear interest per annum at the greater of (i) 6.91% or (ii) 3.66% plus the prime rate, which is customarily defined. Under the Loan Agreement, all principal and accrued interest on the Term Loan was due on October 16, 2019 (the "Term Loan Maturity Date"), and all principal and accrued interest on the Revolving Line was due on October 16, 2017 (the "Prior Revolving Maturity Date").

Effective as of July 31, 2017, we amended the Loan Agreement (the "Second Amendment"). The terms of the Second Amendment, among other things, extend the maturity of the Revolving Line to October 16, 2019 (the "Revolving Line Maturity Date"), with amortized equal repayments of the principal outstanding under the Revolving Line beginning November 1, 2018, and provide a six month interest only period for the Term Loan, starting on the date of the Second Amendment.

On December 21, 2018, we repaid in full all outstanding indebtedness and terminated all commitments and obligations under the Loan Agreement between the Borrowers and the Lenders. Our payment to the Lenders under the Loan Agreement, which included outstanding principal and interest balances as well as the final payment and termination fees, was approximately $20.6 million, and satisfied all of our debt obligations. We did not incur any early termination penalties as a result of the repayment of indebtedness or termination of the Loan Agreement. In connection with repayment of our outstanding indebtedness, we were automatically and permanently released from all security interests, mortgages, liens and encumbrances under the Loan Agreement.

Working Capital

We define working capital as current assets less current liabilities. The increase in working capital from December 31, 2017, reflects a decrease in total current assets of $27.1 million and a decrease in total current liabilities of $29.9 million. The decrease in total current assets was primarily driven by a decrease in cash and cash equivalents due to our scheduled debt payments of principal and interest throughout 2018 as well as repayment of debt in December 2018, payments for our research and development activities related to our programs, payments for inventories, milestones and selling, general and administrative expenses. The decrease in total current liabilities was primarily a result of our scheduled debt payments of principal and interest throughout 2018 as well as repayment of debt in December 2018, payments for inventories and a decrease in licensing and collaboration commitment as a result of the adoption of the ASC 606.

Cash Flows

The following table shows a summary of our cash flows for the periods set forth below:

	Year Ended December 31,		
	2018	2017	2016
	(Dollars in thousands)		
Net cash used in operating activities	$ (11,261)	$ (38,185)	$ (11,323)
Net cash provided by (used in) investing activities	$ (493)	$ (5,752)	$ 57,285
Net cash provided by (used in) financing activities	$ (13,673)	$ 23,471	$ 14,632

Net cash used in operating activities

During the year ended December 31, 2018, net cash used in operating activities was $11.3 million. We had a net loss of $14.7 million which included an adjustment of a non-cash expense for stock-based compensation of $4.9 million, a non-cash depreciation and amortization expense of $1.0 million, a non-cash interest expense of $1.0 million, and market value adjustments to inventories of $2.7 million. Our net loss was primarily attributed to our research and development activities related to our programs and our selling, general and administrative expenses, partially offset by product sales revenues and licensing and collaboration revenues from the Collaboration Agreement. Net cash used in operating assets and liabilities was primarily due to an increase in inventories of $0.5 million, an increase in prepaid expenses and other current assets of $0.2 million, a decrease of accounts payable of $6.5 million

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and a decrease of licensing and collaboration commitment of $0.2 million, partially offset by a decrease in accounts receivable of $0.2 million, a decrease in other assets of $0.2 million, and an increase in accrued expenses and other current liabilities of $0.9 million. The decrease in accounts payable was primarily related to payments for ENTYCE inventories and trade payables.

During the year ended December 31, 2017, net cash used in operating activities was $38.2 million. We had a net loss of $47.5 million which included an adjustment of a non-cash expense for stock-based compensation of $7.1 million, a non-cash depreciation and amortization expense of $1.2 million, a non-cash impairment of intangible assets of $7.4 million, a non-cash interest expense of $0.5 million, and market value adjustments to inventories of $0.7 million. Our net loss was primarily attributed to our research and development activities related to our programs and our selling, general and administrative expenses, partially offset by product sales revenues and licensing and collaboration revenues from the Collaboration Agreement. Net cash used in operating assets and liabilities was primarily due to an increase in inventories of $3.2 million, a decrease in accrued expenses and other liabilities of $2.6 million and an increase in accounts receivable of $2.3 million, partially offset by a decrease in prepaid expenses and other current assets of $0.3 million, a decrease in other assets of $0.1 million, and an increase in accounts payable of $0.1 million. The increase in accounts receivable was primarily due to GALLIPRANT and ENTYCE receivables, the increase in inventories was primarily due to ENTYCE inventories and the decrease in accrued expenses was primarily due to $2.0 million payment of the accrued purchase commitment for ENTYCE inventories.

During the year ended December 31, 2016, net cash used in operating activities was $11.3 million. We had a net loss of $33.6 million which includes an adjustment of a non-cash expense for stock-based compensation of $8.5 million, a non-cash depreciation and amortization expense of $1.0 million, a non-cash impairment of intangible assets of $7.9 million, a non-cash gain on deconsolidation of a variable interest entity of $0.3 million, a non-cash interest expense of $0.5 million, and market value adjustments to inventories of $5.2 million. Our net loss was primarily attributed to our research and development activities related to our programs and our selling, general and administrative expenses, partially offset by licensing and collaboration revenues of $38.0 million from the Collaboration Agreement. Net cash used in operating assets and liabilities consisted primarily of an increase in inventories of $15.0 million and an increase in prepaid expenses and other current assets of $0.8 million, partially offset by an increase in accounts payable of $6.2 million, an increase in accrued expenses and other liabilities of $2.1 million and an increase of $7.0 million in licensing and collaboration commitment under the Collaboration Agreement. The increase in inventories was primarily related to GALLIPRANT and NOCITA inventories, partially offset by a decrease in BLONTRESS and TACTRESS inventories. The increase in accounts payable was primarily related to GALLIPRANT inventories and trade payables.

Net cash provided by (used in) investing activities

During the year ended December 31, 2018, net cash used in investing activities was $0.5 million, which consisted of the purchases of investments of $4.2 million, partially offset by proceeds from the maturities and sales of investments of $3.7 million.

During the year ended December 31, 2017, net cash used in investing activities was $5.8 million, which primarily consisted of $6.0 million in milestone payments for intangible assets for currently marketed products and the purchases of investments of $3.7 million, partially offset by proceeds from the maturities and sales of investments of $4.0 million.

During the year ended December 31, 2016, net cash provided by investing activities was $57.3 million, which primarily consisted of the proceeds from maturities and sales of investments of $288.3 million, partially offset

by purchases of investments $229.8 million, net purchases of property and equipment of $0.1 million, cash contributed as investment in a noncontrolled entity of $0.1 million, and $1.0 million in milestone payments for intangible assets for currently marketed products.

Net cash provided by (used in) financing activities

During the year ended December 31, 2018, net cash used in financing activities was $13.7 million. Net cash used in financing activities consisted of $36.5 million in payments on loans payable, $1.3 million in loans payable final payment fee, termination fee and other fees, $0.1 million in tax payments for awards vested under equity incentive plans and $0.2 million in payments for common stock issuance costs, partially offset by the proceeds, net of commission fees, from the issuance of common stock of $24.4 million.

During the year ended December 31, 2017, net cash provided by financing activities was $23.5 million, which primarily consisted of the net proceeds from issuance of common stock of $27.5 million and proceeds from stock option exercises of $0.2 million, offset by $3.5 million in payments on loans payable, $0.3 million in payments for common stock issuance costs, $0.2 million in payments for debt issuance costs and a $0.2 million payment for the revolving credit facility termination fee.

During the year ended December 31, 2016, net cash provided by financing activities was $14.6 million, which primarily consisted of the net proceeds from issuance of common stock of $14.6 million, offset by $0.1 million in payments for stock issuance costs, and the proceeds of stock option exercises of $0.1 million.

Future Funding Requirements

We anticipate that we will continue to incur net losses for the foreseeable future due to expenses for commercialization of our therapeutics and our development programs, including continuing studies in both cats and dogs for our programs in the United States and Europe and the in-licensing or acquisition of additional compounds for development as pet therapeutics.

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As of the date of the filing of the 2018 Annual Report, we believe that our cash, cash equivalents and short-term investments at December 31, 2018, will fund our operations for at least one year from the issuance of our consolidated financial statements. However, our operating plan may change as a result of many factors currently unknown to us, and we may seek additional funds sooner than planned, such as public or private equity and further debt financings or strategic collaborations. Such financings may result in dilution to stockholders, imposition of debt covenants and repayment obligations, or other restrictions that may affect our business. In addition, we may seek additional capital due to favorable market conditions or strategic considerations even if we believe we have sufficient funds for our current or future operating plans. Our forecast of the period of time through which our financial resources will be adequate to support our operations is a forward-looking statement and involves risks and uncertainties, and actual results could vary as a result of a number of factors, including the factors discussed in the section of this filing titled "Risk Factors."

Our future capital requirements depend on many factors, including, but not limited to:

- the cost of commercialization activities for any of our current therapeutics, current therapeutic candidates or future therapeutic candidates, including marketing, sales and distribution costs;
- the cost of manufacturing our current therapeutics, current therapeutic candidates and future therapeutic candidates and any therapeutics we successfully commercialize as well as the cost of minimum purchase commitments and the potential for funding time lags between purchase commitment and payment from the sale of the therapeutic;
- the scope, progress, results and costs of researching and developing our current or future therapeutic candidates and conducting target animal studies;
- the timing of, and the costs involved in, obtaining regulatory approvals for any of our current or future therapeutic candidates, or for our therapeutics, if any follow-up approval is required;
- the upfront and other payments, and associated costs, related to identifying, acquiring and in-licensing new therapeutic candidates;
- the number and characteristics of the therapeutic candidates we pursue;
- whether we acquire any other companies, assets, intellectual property or technologies in the future;
- our ability to collaborate with companies with an established commercial presence in Europe and/or other countries to provide our therapeutics in those markets;
- our ability to establish and maintain strategic collaborations, licensing or other arrangements and the financial terms of such arrangements, and the potential costs and other financial terms of amending or terminating such arrangements, including litigation costs and the outcome of such litigation;
- whether we are required to repay grant amounts that we received from foreign, United States and/or state governments;
- the expenses needed to attract and retain skilled personnel;
- the costs associated with being a public company;
- the costs involved in preparing, filing, prosecuting, maintaining, defending and enforcing patent rights, including litigation costs;
- any litigation we may be involved in from time to time; and
- demand for our commercialized therapeutics.

Contractual Obligations and Commitments

Contractual Obligations

Our contractual obligations primarily consist of our obligations under our loans payable, contract manufacturer commitments, non-cancellable operating leases, minimum royalties and other purchase obligations, excluding amounts related to other funding commitments, contingent development, regulatory and commercial milestone payments, and off-balance sheet arrangements as described below.

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The following table summarizes our contractual obligations as of December 31, 2018, and the effect such obligations are expected to have on our liquidity and cash flows in future periods:

	Payments Due by Fiscal Year				
	Total	Less Than 1 Year	1-3 Years	3-5 Years	More Than 5 Years
	(Dollars in Thousands)				
Manufacturing and supply chain (1)	$ 1,974	$ 1,974	$ —	$ —	$ —
Operating leases (2)	966	441	525	—	—
Total (3), (4)	$ 2,940	$ 2,415	$ 525	$ —	$ —

(1) The table above includes minimum order commitments based upon an agreed upon minimum demand forecast established each year and binding manufacturing commitments.

(2) The table above includes payments for the lease of the corporate headquarters in Leawood, Kansas, through February 2021.

(3) The table above excludes flat rate royalty payments and/or milestone payments of up to $118.4 million that could become due in connection with various agreements. The milestones payments will become due as we achieve development, regulatory and commercial milestones and the royalty payments will be paid upon product sales. For more information regarding our milestone payments, see “Contingent Development, Regulatory and Commercial Milestone Payments” below.

(4) The table above excludes potential repayments of various government and other incentive programs of up to $0.9 million that could become due if certain criteria are not met or certain actions are taken by the us.

Contingent Development, Regulatory and Commercial Milestone Payments

Based on our development plans as of December 31, 2018, we have committed to make potential future milestone payments to third parties of up to approximately $118.4 million, of which $86.4 million are for commercial milestones, as part of our various collaborations, including licensing and development programs. Approximately $79.4 million of the commercial milestones relate to the achievement of various sales thresholds. Payments under these agreements generally become due and payable only upon achievement of certain development, regulatory or commercial milestones. Because the achievement of these milestones had not occurred or was not considered probable as of December 31, 2018, such contingencies have not been recorded in our consolidated financial statements.

As of December 31, 2018, we anticipate that we may pay approximately $2.0 million during the next 12 months, provided that a certain commercial milestone is achieved. Amounts related to contingent milestone payments are not considered contractual obligations as they are contingent on the successful achievement of certain development, regulatory approval and commercial milestones that may not be achieved.

Other Funding Commitments

As of December 31, 2018, we have several on-going development programs in various stages in the regulatory process. Our most significant expenditures are payments to clinical research and contract manufacturing organizations. The contracts are generally cancellable, with notice, at our option.

Off-Balance Sheet Arrangements

We have not engaged in the use of any off-balance sheet arrangements, such as structured finance entities or special purpose entities.

New Accounting Standards

For discussion of our new accounting standards, see notes to our consolidated financial statements Note 2. “Summary of Significant Accounting Policies-New Accounting Standards.”

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Item 7A. Quantitative and Qualitative Disclosures About Market Risk

Interest Rate Fluctuation Risk

Our cash, cash equivalents and short-term investments as of December 31, 2018, consisted of cash and certificates of deposit. Our primary exposure to market risk for our cash, cash equivalents and short-term investments is interest income sensitivity, which is affected by changes in the general level of United States interest rates. However, because of the short-term nature of the instruments in our portfolio, a sudden change in market interest rates would not be expected to have a material impact on our financial condition or results of operations.

Item 8. Financial Statements and Supplementary Data

The financial statements and supplementary data are listed under Item 15(a) and have been filed as part of this 2018 Annual Report on the pages indicated.

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

Our management, under the supervision of and with the participation of our Chief Executive Officer and Chief Financial Officer, evaluated, as of the end of the period covered by this 2018 Annual Report, the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended). Based on that evaluation, our Chief Executive Officer and Chief Financial Officer concluded that our disclosure controls and procedures were effective at the reasonable assurance level as of December 31, 2018.

Management’s Annual Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Rule 13a-15(f) or 15d-15(f) under the Securities Exchange Act of 1934, as amended.

Our management conducted an assessment of the effectiveness of our internal control over financial reporting as of December 31, 2018, based on the criteria set forth in “Internal Control - Integrated Framework (2013 Framework)” issued by the Committee of Sponsoring Organizations of the Treadway Commission.

Based on this assessment, management concluded that as of December 31, 2018, our internal control over financial reporting was effective.

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

Limitations on Effectiveness of Controls and Procedures

In designing and evaluating our disclosure controls and procedures, management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives. In addition, the design of disclosure controls and procedures must reflect the fact that there are resource constraints and that management is required to apply judgment in evaluating the benefits of possible controls and procedures relative to their costs.

Changes in Internal Control Over Financial Reporting

There was no change in our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Securities Exchange Act of 1934, as amended) identified in connection with the evaluation of our internal control performed during the fiscal quarter ended December 31, 2018, that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information

None.

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PART III

Item 10. Directors, Executive Officers and Corporate Governance

The information concerning the Company's executive officers and directors is contained in Part I of this Annual Report on Form 10-K. The rest of the information required to be disclosed by this item will be contained under the headings "Section 16(a) Beneficial Ownership Reporting Compliance," "Corporate Governance – Code of Ethics," and "Committees of the Board" in the Proxy Statement for the Company's 2019 Annual Meeting of Stockholders and is incorporated herein by reference.

Item 11. Executive Compensation

The information required to be disclosed by this item will be contained under the headings "Executive and Director Compensation" and "Compensation Committee Interlocks and Insider Participation" in the Proxy Statement for the Company's 2019 Annual Meeting of Stockholders and is incorporated herein by reference.

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

The information required to be disclosed by this item will be contained under the headings "Executive and Director Compensation – Equity Compensation Plan Information" and "Security Ownership of Certain Beneficial Owners and Management" in the Proxy Statement for the Company's 2019 Annual Meeting of Stockholders and is incorporated herein by reference.

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

The information required to be disclosed by this item will be contained under the headings "Certain Relationships" and "Corporate Governance – Director Independence" in the Proxy Statement for the Company's 2019 Annual Meeting of Stockholders and is incorporated herein by reference.

Item 14. Principal Accounting Fees and Services

The information required to be disclosed by this item will be contained under the heading "Independent Registered Public Accounting Firm Fees and Other Matters" in the Proxy Statement for the Company's 2019 Annual Meeting of Stockholders and is incorporated herein by reference.

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PART IV

Item 15. Exhibits, Financial Statement Schedules(a)(1), (a)(2) and (c). The response to this portion of Item 15 is submitted as a separate section of this report commencing on page F-1.(a)(3) and (b). Exhibits (numbered in accordance with Item 601 of Regulation S-K).

		Incorporated by Reference				Filed/
Exhibit						Furnished
Number	Exhibit Description	Form	File No.	Exhibit	Filing Date	Herewith
2.1†	Agreement and Plan of Merger, dated October 13, 2013, by and among Aratana Therapeutics, Inc., Vet Therapeutics, Inc., Jayhawk Acquisition Corporation and Jeffrey Miles, as stockholders' representative	8-K	001-35952	10.1	10/16/2013	
2.2	Stock Purchase Agreement, dated January 6, 2014, by and among Aratana Therapeutics, Inc., Wildcat Acquisition BVBA, the Sellers of Okapi Sciences NV listed on Annex A thereto and Thuja Capital Healthcare Fund BV, as the Sellers' representative	8-K	001-35952	10.1	1/7/2014	
3.1	Restated Certificate of Incorporation	8-K	001-35952	3.1	7/3/2013	
3.2	Amended and Restated Bylaws	8-K	001-35952	3.2	7/3/2013	
4.1	Specimen stock certificate evidencing the shares of common stock	S-1/A	333-187372	4.1	6/6/2013	
4.2	Second Amended and Restated Investors' Rights Agreement, dated as of December 28, 2012, as amended May 22, 2013	S-1/A	333-187372	10.1	5/23/2013	
10.1††	Form of Indemnification Agreement for Directors and Officers	S-1	333-187372	10.3	3/20/2013	
10.2††	Employment Agreement, dated September 6, 2012, by and between Steven St. Peter and Aratana Therapeutics, Inc., as amended April 26, 2013	S-1/A	333-187372	10.4	5/23/2013	
10.3††	Employment Agreement, dated March 12, 2013, by and between Ernst Heinen and Aratana Therapeutics, Inc., as amended April 29, 2013	S-1/A	333-187372	10.8	5/23/2013	
10.4††	Employment Agreement, dated November 8, 2013, by and between Craig Tooman and Aratana Therapeutics, Inc.	8-K	001-35952	10.1	11/14/2013	
10.5(a)††	Aratana Therapeutics, Inc. 2010 Equity Incentive Plan	S-1/A	333-193324	10.8(a)	1/28/2014	
10.5(b)††	Amendment No. 1 to 2010 Equity Incentive Plan	S-1	333-187372	10.9(b)	3/20/2013	

10.5(c)††	Amendment No. 2 to 2010 Equity Incentive Plan	S-1	333-187372	10.9(c)	3/20/2013
10.5(d)††	Form of Stock Option Grant Notice and Stock Option Agreement under 2010 Equity Incentive Plan	S-1	333-187372	10.9(d)	3/20/2013
10.6(a)††	Aratana Therapeutics, Inc. 2013 Incentive Award Plan	S-8	333-187372	99.1	1/21/2014
10.6(b)††	Form of Stock Option Grant Notice and Stock Option Agreement under 2013 Incentive Award Plan	S-1/A	333-187372	10.10(b)	4/30/2013

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		Incorporated by Reference				Filed/
Exhibit Number	Exhibit Description	Form	File No.	Exhibit	Filing Date	Furnished Herewith
10.6(c)††	Form of Restricted Stock Grant Notice and Restricted Stock Agreement under 2013 Incentive Award Plan	S-1/A	333-187372	10.10(c)	4/30/2013	
10.7††	Non-Employee Director Compensation Program, as amended	10-Q	001-35952	10.2	8/5/2016	
10.8	Office Building Lease, dated as of October 8, 2015, by and between Academy 1740, Inc. and Aratana Therapeutics, Inc.	8-K	001-35952	10.1	10/13/15	
10.9	Subordination, Non-Disturbance and Attornment Agreement, dated as of January 29, 2016, by and between Aratana Therapeutics, Inc., Academy 1740, Inc., and Commerce Bank	10-K	001-35952	10.11	3/15/2016	
10.10(a)†	Exclusive IP License Agreement for RQ-00000005, dated December 27, 2010, by and between Aratana Therapeutics, Inc. and RaQualia Pharma Inc.	S-1/A	333-187372	10.18	6/6/2013	
10.10(b)	First Amendment to the Exclusive IP License Agreement for RQ-00000005, dated July 12, 2012, by and between Aratana Therapeutics, Inc. and RaQualia Pharma Inc.	S-1/A	333-187372	10.19	4/11/2013	
10.10(c)	Second Amendment to the Exclusive IP License Agreement for RQ-00000005, dated January 2, 2017, by and between Aratana Therapeutics, Inc. and RaQualia Pharma Inc.	10-K	001-35952	10.13(c)	3/14/2017	
10.11(a)†	Exclusive IP License Agreement for RQ-00000007, dated December 27, 2010, by and between Aratana Therapeutics, Inc. and RaQualia Pharma Inc.	S-1/A	333-187372	10.20	6/6/2013	
10.11(b)	First Amendment to the Exclusive IP License Agreement for RQ-00000007, dated July 12, 2012, by and between Aratana Therapeutics, Inc. and RaQualia Pharma Inc.	S-1/A	333-187372	10.21	4/11/2013	
10.11(c)	Second Amendment to the Exclusive IP License Agreement for RQ-00000007, dated January 2, 2017, by and between Aratana Therapeutics, Inc. and RaQualia Pharma Inc.	10-K	001-35952	10.14(c)	3/14/2017	

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Exhibit Number	Exhibit Description	Incorporated by Reference Form	File No.	Exhibit	Filing Date	Filed/ Furnished Herewith
10.12††	Employment Agreement, dated as of June 24, 2016, between Aratana Therapeutics, Inc. and Brent Standridge	8-K	001-35952	10.1	6/30/2016	
10.13(a)†	Collaboration, License, Development and Commercialization Agreement, dated April 22, 2016, by and between Aratana Therapeutics, Inc. and Eli Lilly and Company, acting on behalf of its Elanco Animal Health Division	10-Q	001-35952	10.3	8/5/2016	
10.13(b)†	Amendment, effective as of April 28, 2017, to the Collaboration, License, Development and Commercialization Agreement, dated April 22, 2016, by and between Aratana Therapeutics, Inc. and Eli Lilly and Company, acting on behalf of its Elanco Animal Health Division	10-Q	001-35952	10.3	8/4/2017	
10.14†	Co-Promotion Agreement, dated April 22, 2016, by and between Aratana Therapeutics, Inc. and Eli Lilly and Company, acting on behalf of its Elanco Animal Health Division	10-Q	001-35952	10.4	8/5/2016	
10.15	Securities Purchase Agreement, dated May 3, 2017, by and among Aratana Therapeutics, Inc. and the investors party thereto	8-K	001-35952	10.1	5/4/2017	
10.16	Placement Agency Agreement, dated May 3, 2017, by and between Aratana Therapeutics, Inc. and Barclays Capital, Inc.	8-K	001-35952	10.2	5/4/2017	
10.17	Sales Agreement, dated as of December 18, 2017, by and between Aratana Therapeutics, Inc. and Cowen and Company LLC	8-K	001-35952	10.1	12/18/2017	
10.18	Form of Non-Employee Director Confidentiality Agreement	10-Q	001-35952	10.1	5/4/2018	
10.19	Cooperation Agreement, dated May 18, 2018, by and among Aratana Therapeutics, Inc., Engaged Capital Flagship Master Fund, LP, Engaged Capital Flagship Fund, LP, Engaged Capital Flagship Fund, Ltd., Engaged Capital, LLC, Engaged Capital Holdings, LLC and Glenn W. Welling	8-K	001-35952	10.1	5/21/2018	
10.20†	Amended and Restated Exclusive License, Development and Commercialization Agreement, dated July 5, 2018, by and between Aratana Therapeutics, Inc. and Pacira Pharmaceuticals, Inc.	10-Q	001-35952	10.2	8/3/2018	
10.21†	Amended and Restated Supply Agreement, dated July 5, 2018, by and between Aratana Therapeutics, Inc. and	10-Q	001-35952	10.3	8/3/2018	

	Pacira Pharmaceuticals, Inc.	
21.1	Subsidiaries of Aratana Therapeutics, Inc.	*
23.1	Consent of PricewaterhouseCoopers LLP, Independent Registered Public Accounting Firm	*
31.1	Rule 13a-14(a) / 15d-14(a) Certification of Chief Executive Officer	*

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Exhibit Number	Exhibit Description	Incorporated by Reference				Filed/ Furnished Herewith
		Form	File No.	Exhibit	Filing Date	
31.2	Rule 13a-14(a) / 15d-14(a) Certification of Chief Financial Officer					*
32.1	Section 1350 Certification of Chief Executive Officer					**
32.2	Section 1350 Certification of Chief Financial Officer					**
101.INS	XBRL Instance Document					*
101.SCH	XBRL Taxonomy Extension Schema Document					*
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document					*
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document					*
101.LAB	XBRL Taxonomy Extension Label Linkbase Document					*
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document					*

†Portions of this exhibit (indicated by asterisks) have been omitted pursuant to a confidential treatment order granted by the Securities and Exchange Commission pursuant to Rule 24b-2 under the Securities Exchange Act of 1934.

††Management contract or compensatory plan or arrangement.

* Filed herewith.

** Furnished herewith.

Item 16. Form 10-K Summary

None.

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SIGNATURES

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

ARATANA THERAPEUTICS, INC.

BY: /s/ Craig A. Tooman
Craig A. Tooman

President and Chief Executive Officer
Date: March 13, 2019

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

SIGNATURE	TITLE	DATE
/s/ Craig A. Tooman	President, Chief Executive Officer and Director	March 13, 2019
Craig A. Tooman	(principal executive officer)	
/s/ Rhonda L. Hellums	Chief Financial Officer and Treasurer	March 13, 2019
Rhonda L. Hellums	(principal financial and accounting officer)	
/s/ Wendy L. Yarno	Chairperson of the Board of Directors	March 13, 2019
Wendy L. Yarno		
/s/ Craig A. Barbarosh Craig A. Barbarosh, Esq.	Director	March 13, 2019
/s/ Laura A. Brege	Director	March 13, 2019
Laura A. Brege		
/s/ David L. Brinkley	Director	March 13, 2019
David L. Brinkley		

/s/ Irvine O. Hockaday	Director	March 13, 2019
Irvine “Irv” O. Hockaday, Esq.		
/s/ Merilee Raines	Director	March 13, 2019
Merilee Raines		
/s/ Lowell W. Robinson Lowell W. Robinson	Director	March 13, 2019
/s/ Robert P. Roche	Director	March 13, 2019
Robert P. Roche		
/s/ John Vander Vort	Director	March 13, 2019
John Vander Vort, Esq.		

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Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of Aratana Therapeutics, Inc.

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Aratana Therapeutics, Inc. and its subsidiaries (the "Company") as of December 31, 2018 and 2017, and the related consolidated statements of operations, of comprehensive loss, of changes in stockholders' equity and of cash flows for each of the three years in the period ended December 31, 2018, including the related notes (collectively referred to as the "consolidated financial statements"). We also have audited the Company's internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control - Integrated Framework (2013) issued by the COSO.

Change in Accounting Principle

As discussed in Note 2 to the consolidated financial statements, the Company changed the manner in which it accounts for revenue from contracts with customers in 2018.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in Management's Annual Report on Internal Control Over Financial Reporting appearing under Item 9A. Our responsibility is to express opinions on the Company's consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered

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

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

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

Emphasis of Matter

As discussed in Note 1 to the consolidated financial statements, the Company will require additional financing to fund future operations if the Company cannot generate sufficient cash flows from operations in the future. Management’s plans in regard to this matter are described in Note 1.

Definition and Limitations of Internal Control over Financial Reporting

A company’s internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company’s internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in

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accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

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

/s/ PricewaterhouseCoopers LLP

Boston, Massachusetts

March 13, 2019

We have served as the Company's auditor since 2012.

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ARATANA THERAPEUTICS, INC.

Consolidated Balance Sheets

(Amounts in thousands, except share and per share data)

	December 31, 2018	December 31, 2017
Assets		
Current assets:		
Cash and cash equivalents	$ 41,431	$ 66,868
Short-term investments	1,240	747
Accounts receivable, net	2,204	2,406
Inventories	11,425	13,576
Prepaid expenses and other current assets	1,827	1,642
Total current assets	58,127	85,239
Property and equipment, net	693	1,166
Goodwill	40,846	41,295
Intangible assets, net	6,099	6,616
Restricted cash	351	350
Other long-term assets	320	526
Total assets	$ 106,436	$ 135,192
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable	$ 911	$ 7,451
Accrued expenses and other current liabilities	4,646	3,712
Licensing and collaboration commitment	—	7,000
Current portion – loans payable	—	17,333
Total current liabilities	5,557	35,496
Loans payable, net	—	19,492
Other long-term liabilities	57	70
Total liabilities	5,614	55,058
Commitments and contingencies (Notes 6 and 16)		
Stockholders' equity:		
Common stock, $0.001 par value; 100,000,000 shares authorized at December 31, 2018 and December 31, 2017, and 48,048,914 and 42,532,725 issued and outstanding at December 31, 2018 and December 31, 2017, respectively	48	43
Treasury stock, at cost; 94,107 and 80,916 shares at December 31, 2018 and December 31, 2017, respectively	(1,175)	(1,107)
Additional paid-in capital	350,745	321,599
Accumulated deficit	(241,238)	(233,316)
Accumulated other comprehensive loss	(7,558)	(7,085)
Total stockholders' equity	100,822	80,134

Total liabilities and stockholders' equity	$ 106,436	$ 135,192

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

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ARATANA THERAPEUTICS, INC.

Consolidated Statements of Operations

(Amounts in thousands, except share and per share data)

	Year Ended December 31,		
	2018	2017	2016
Revenues			
Licensing and collaboration revenue	$ 23,326	$ 5,913	$ 38,233
Product sales	12,086	19,660	318
Total revenues	35,412	25,573	38,551
Costs and expenses			
Cost of product sales	6,783	16,387	3,139
Royalty expense	3,865	1,821	106
Research and development	6,855	15,126	30,462
Selling, general and administrative	28,780	28,897	27,342
Amortization of intangible assets	517	350	379
Impairment of intangible assets	—	7,448	7,942
In-process research and development	500	—	—
Total costs and expenses	47,300	70,029	69,370
Loss from operations	(11,888)	(44,456)	(30,819)
Other income (expense)			
Interest income	666	449	385
Interest expense	(3,391)	(3,481)	(3,396)
Other income (expense), net	(109)	(22)	255
Total other expense	(2,834)	(3,054)	(2,756)
Net loss	$ (14,722)	$ (47,510)	$ (33,575)
Net loss per share, basic and diluted	$ (0.32)	$ (1.17)	$ (0.95)
Weighted average shares outstanding, basic and diluted	46,606,855	40,494,301	35,273,228

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

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ARATANA THERAPEUTICS, INC.

Consolidated Statements of Comprehensive Loss

(Amounts in thousands)

	Year Ended December 31,		
	2018	2017	2016
Net loss	$ (14,722)	$ (47,510)	$ (33,575)
Other comprehensive income (loss):			
Foreign currency translation adjustment	(473)	2,777	(542)
Other comprehensive income (loss)	(473)	2,777	(542)
Comprehensive loss	$ (15,195)	$ (44,733)	$ (34,117)

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

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ARATANA THERAPEUTICS, INC.

Consolidated Statements of Changes in Stockholders' Equity

(Amounts in thousands, except share data)

	Common Stock		Additional Paid-In	Accumulated	Accumulated Other Comprehensive	Treasury Stock at	Total Stockholders' Equity
	Shares	Par Value	Capital	Deficit	Loss	at cost	(Deficit)
Balance at December 31, 2015	34,563,816	$ 35	$ 263,941	$ (152,018)	$ (9,320)	$ (1,088)	$ 101,550
At-the-Market issuance of common stock, net of $262 of issuance costs	1,629,408	2	14,323	—	—	—	14,325
Compensation expense related to stock options and restricted awards	—	—	8,476	—	—	—	8,476
Vesting of restricted stock awards	301,559	—	—	—	—	—	—
Vesting of stock awards early exercised	71,021	—	31	—	—	—	31
Issuance of common stock related to option exercises	42,118	—	138	—	—	—	138
Other comprehensive loss	—	—	—	—	(542)	—	(542)
Net loss	—	—	—	(33,575)	—	—	(33,575)
Balance at December 31, 2016	36,607,922	37	286,909	(185,593)	(9,862)	(1,088)	90,403
At-the-Market issuance of common stock, net of $73 of issuance costs	546,926	1	2,714	—	—	—	2,715
Registered direct offering of common stock, net of $273 of issuance costs	5,000,000	5	24,398	—	—	—	24,403
Compensation expense related to stock options and restricted awards	—	—	7,331	(213)	—	—	7,118
Vesting of restricted stock awards	293,978	—	—	—	—	—	—

Repurchase of common stock	(2,690)	—	—	—	—	(19)	(19)
Vesting of stock awards early exercised	438	—	—	—	—	—	—
Issuance of common stock related to option exercises	86,151	—	247	—	—	—	247
Other comprehensive income	—	—	—	—	2,777	—	2,777
Net loss	—	—	—	(47,510)	—	—	(47,510)
Balance at December 31, 2017	42,532,725	43	321,599	(233,316)	(7,085)	(1,107)	80,134
At-the-Market issuance of common stock, net of $171 of issuance costs	5,144,244	5	24,218	—	—	—	24,223
Compensation expense related to stock options and restricted awards	—	—	4,913	—	—	—	4,913
Vesting of restricted stock awards	380,427	—	—	—	—	—	—
Repurchase of common stock	(13,191)	—	—	—	—	(68)	(68)
Issuance of common stock related to option exercises	4,709	—	15	—	—	—	15
ASC 606 adoption adjustment	—	—	—	6,800	—	—	6,800
Other comprehensive loss	—	—	—	—	(473)	—	(473)
Net loss	—	—	—	(14,722)	—	—	(14,722)
Balance at December 31, 2018	48,048,914	$ 48	$ 350,745	$ (241,238)	$ (7,558)	$ (1,175)	$ 100,822

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

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ARATANA THERAPEUTICS, INC.

Consolidated Statements of Cash Flows

(Amounts in thousands)

	Year Ended December 31,		
	2018	2017	2016
Cash flows from operating activities			
Net loss	$ (14,722)	$ (47,510)	$ (33,575)
Adjustments to reconcile net loss to net cash used in operating activities:			
Stock-based compensation expense	4,913	7,118	8,476
Depreciation and amortization expense	990	1,162	991
Impairment of intangible assets	—	7,448	7,942
Gain on deconsolidation of a variable interest entity	—	—	(276)
Non-cash interest expense	1,018	512	478
Market value adjustments to inventories	2,650	741	5,186
(Gain) loss on disposition of property and equipment	—	(30)	2
Changes in operating assets and liabilities:			
Accounts receivable, net	202	(2,319)	(27)
Inventories	(499)	(3,187)	(15,010)
Prepaid expenses and other current assets	(185)	335	(771)
Other assets	188	88	(5)
Accounts payable	(6,540)	62	6,182
Accrued expenses and other liabilities	924	(2,605)	2,084
Licensing and collaboration commitment	(200)	—	7,000
Net cash used in operating activities	(11,261)	(38,185)	(11,323)
Cash flows from investing activities			
Milestone payments for intangible assets	—	(6,000)	(1,000)
Purchases of property and equipment, net	—	(1)	(72)
Purchase of investments	(4,218)	(3,731)	(229,836)
Proceeds from maturities of investments	3,725	3,980	288,287
Cash contributed as investment in a noncontrolled entity	—	—	(94)
Net cash provided by (used in) investing activities	(493)	(5,752)	57,285
Cash flows from financing activities			
Payments for debt issuance costs	—	(210)	—
Payments on loans payable	(36,500)	(3,500)	—
Payment for loans payable final payment fee, termination fee and other fees	(1,343)	(165)	—
Taxes paid for awards vested under equity incentive plans	(68)	(19)	—
Proceeds from stock option exercises	15	247	138
Proceeds from issuance of common stock, net of commissions and underwriter fees	24,394	27,463	14,587
Payments for common stock issuance costs	(171)	(345)	(93)

Net cash provided by (used in) financing activities	(13,673)	23,471	14,632
Effect of exchange rate on cash	(9)	27	(42)
Net decrease in cash, cash equivalents and restricted cash	(25,436)	(20,439)	60,552
Cash, cash equivalents and restricted cash, beginning of period	67,218	87,657	27,105
Cash, cash equivalents and restricted cash, end of period	$ 41,782	$ 67,218	87,657
Supplemental disclosure of cash flow information			
Cash paid for interest	$ 3,965	$ 2,966	$ 2,911
Supplemental disclosure of noncash investing and financing activities:			
Stock issuance costs included in accounts payable	$ —	$ 48	$ —

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

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ARATANA THERAPEUTICS, INC.

Notes to Consolidated Financial Statements

(Amounts in thousands, except share and per share data)

1. The Company and Basis of Presentation

The Company

Aratana Therapeutics, Inc., including its subsidiaries (the "Company," or "Aratana") was incorporated on December 1, 2010 under the laws of the State of Delaware. The Company is a pet therapeutics company focused on the development and commercialization of innovative therapeutics for dogs and cats. The Company has one operating segment: pet therapeutics.

Since its inception, the Company has devoted substantially all of its efforts to research and development, recruiting management and technical staff, building an infrastructure for commercialization of its therapeutics and therapeutic candidates, acquiring operating assets and raising capital.

The Company is subject to risks common to companies in the biotechnology and pharmaceutical industries. There can be no assurance that the Company's licensing efforts will identify viable therapeutic candidates, that the Company's research and development will be successfully completed, that adequate protection for the Company's technology will be obtained, that any therapeutics developed will obtain necessary government regulatory approval or that any approved therapeutics will be commercially viable. The Company operates in an environment of substantial competition from other animal health companies. In addition, the Company is dependent upon the services of its employees and consultants, as the well as third-party contract research organizations and manufacturers and collaborators.

Basis of Presentation

The accompanying consolidated financial statements have been prepared in conformity with accounting principles generally accepted in the United States of America ("GAAP") and on a basis which assumes that the Company will continue as a going concern and which contemplates the realization of assets and satisfaction of liabilities and commitments in the normal course of business.

The Company has incurred recurring losses and negative cash flows from operations and has an accumulated deficit of $241,238 as of December 31, 2018. The Company expects to continue to generate operating losses for the foreseeable future. The Company believes that its cash, cash equivalents and short-term investments at December 31, 2018, will be sufficient to fund operations for at least one year from the issuance of these consolidated financial statements.

The Company expects continued investment related to commercial activities, including procuring of inventories needed to supply the marketplace, investing to further support adoption and awareness of the Company's marketed products and payment of milestones related to approval and commencement of commercial sales. As a result, if the Company cannot generate sufficient cash flow from operations in the future, the Company will seek to fund its operations through corporate collaborations and licensing arrangements, or other sources, such as public or private

equity and further debt financings. If the Company is not able to raise additional capital on terms acceptable to it, or at all, as and when needed, the Company would be forced to delay, reduce, or eliminate certain research and development programs, reduce or eliminate discretionary operating expenses or grant rights to develop and market therapeutics or therapeutic candidates that it would otherwise prefer to develop and market itself, which could otherwise adversely affect its business prospects. The Company's failure to raise capital, as and when needed, would have a negative impact on its financial condition and its ability to pursue its business strategies as this capital is necessary for it to perform the research and development and commercial activities required to generate future revenue streams.

2. Summary of Significant Accounting Policies

Consolidation

The Company's consolidated financial statements include its financial statements, and those of its wholly-owned US subsidiary and a foreign subsidiary through its dissolution date in December 2018, and in prior periods, they also include a consolidated variable interest entity through the deconsolidation date in December 2016. Intercompany balances and transactions are eliminated in consolidation.

In December 2018, the Company's foreign subsidiary was dissolved, and the dissolution did not have a material impact on the consolidated financial statements.

To determine if the Company holds a controlling financial interest in an entity, the Company first evaluates if it is required to apply the variable interest entity ("VIE") model to the entity. Where the Company holds current or potential rights that give it the power to direct the activities of a VIE that most significantly impact the VIE's economic performance combined with a variable interest that gives it the right to receive potentially significant benefits or the obligation to absorb potentially significant losses, the Company is the primary beneficiary of that VIE. When changes occur to the design of an entity, the Company reconsiders whether it is subject to the VIE model. The Company continuously evaluates whether it is the primary beneficiary of a consolidated VIE and upon determination that the Company no longer remains the primary beneficiary, the Company deconsolidates the entity and a gain or loss is recognized upon deconsolidation.

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ARATANA THERAPEUTICS, INC.

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(Amounts in thousands, except share and per share data)

In December 2016, the Company concluded that it was no longer the primary beneficiary of a previously consolidated VIE and no longer consolidates the entity. The Company recognized a gain of $276 on deconsolidation of the VIE in other income (expense) in the quarter ended December 31, 2016. The Company's remaining non-controlling investment in the VIE is not material.

Use of Estimates

The preparation of consolidated financial statements in conformity with GAAP requires management to make estimates, judgments and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities at the date of the consolidated financial statements and the reported amounts of revenues and expenses during the reporting period. Estimates are periodically reviewed in light of changes in circumstances, facts and experience. Actual results could differ from those estimates.

Cash and Cash Equivalents

The Company classifies all highly liquid investments with stated maturities of three months or less from the date of purchase as cash equivalents. Cash equivalents consisted of certificates of deposit ("CDs") at December 31, 2018 and 2017.

Restricted Cash

The Company has posted collateral to Square 1 Bank N.A., a division of the Pacific Western Bank, to collateralize corporate credit card services. The Company classifies the collateral as restricted cash.

Short-term Investments

Short-term investments in 2018 and 2017 included CDs with original maturities greater than three months but less than 12 months.

Marketable Securities

The Company classifies all highly liquid investments with stated maturities of greater than three months from the date of purchase as marketable securities. The Company determines the appropriate classification of investments in marketable securities at the time of purchase and re-evaluates such designation at each consolidated balance sheet date. The Company classifies and accounts for marketable securities as available-for-sale. The Company did not hold securities with stated maturities greater than 12 months as of December 31, 2018 or 2017. The Company reports available-for-sale investments at fair value as of each consolidated balance sheet date and records any unrealized gains and losses as a component of stockholders' equity. The cost of securities sold is determined on a specific identification basis, and realized gains and losses are included in other income (expense) in the consolidated statements of operations. If any adjustment to fair value reflects a decline in the value of the investment, the Company considers available evidence to evaluate the extent to which the decline is "other than temporary" and recognizes the impairment

by releasing other comprehensive income to the consolidated statement of operations. There were no such adjustments necessary during the years ended December 31, 2018 and 2017.

Accounts Receivable, Net

Accounts receivable are uncollateralized customer obligations due under normal trade terms generally requiring payment within 30 days of the invoice date.

The Company provides an allowance for doubtful accounts equal to the estimated losses that will be incurred in collection of accounts receivable. This estimate is based on the current review of existing receivables and historical experience in the industry. The allowance and associated accounts receivable are reduced when the receivables are determined to be uncollectible. To date, the Company's historical reserves and write-offs have not been significant. The Company also provides an allowance for estimated returns which is established based on the Company's analysis of industry standards and its own history of actual returns.

Inventories

The Company states inventories at the lower of cost and net realizable value and consist of raw materials, work-in-process and finished goods. Cost is determined by the average cost method for raw materials and standard cost for work-in-process and finished goods, which approximates actual cost.

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Pre-Launch Inventories

The Company may scale-up and make commercial quantities of certain of its product candidates prior to the date it anticipates that such products will receive final United States Food and Drug Administration ("FDA")/United States Department of Agriculture ("USDA") approval. The scale-up and commercial production of pre-launch inventories involves the risk that such products may not be approved for marketing by the FDA/USDA on a timely basis, or ever. Inventory costs associated with product candidates that have not yet received regulatory approval are capitalized if the Company believes there is probable future commercial use and future economic benefit. If the probability of future commercial use and future economic benefit cannot be reasonably determined, then pre-launch inventory costs associated with such product candidates are expensed as research and development expense during the period the costs are incurred. Specifically, the Company has determined that for FDA-regulated product candidates there is a probable future commercial use and future economic benefit upon the receipt of the three major technical section complete letters from the FDA's Center for Veterinary Medicine ("CVM"). For USDA product candidates, the Company has determined there is a probable future commercial use and future economic benefit upon the receipt of a conditional license from the USDA's Center for Veterinary Biologics. The Company makes at least quarterly reassessments of the probability of regulatory approval and useful life of the pre-launch inventory, and determines whether such inventory continues to have a probable future economic benefit.

Property and Equipment, Net

The Company records property and equipment at historical cost less accumulated depreciation and amortization. Depreciation and amortization expense is recognized using the straight-line method over the following estimated useful lives:

Laboratory and office equipment	3–10 years
Computer software and equipment	3–5 years
Furniture	3–7 years
Vehicles	3–5 years
Leasehold improvements	3–10 years

Leasehold improvements are amortized over the shorter of the life of the related asset or the term of the lease.

Expenditures for repairs and maintenance of assets are charged to expense as incurred. Costs of major additions and betterments are capitalized and depreciated on a straight-line basis over their useful lives. When property and equipment are disposed of, the cost and respective accumulated depreciation and amortization are removed from the accounts. Any gain or loss on disposal is recorded in the consolidated statements of operations in other income

(expense). Depreciation expense and gains or losses on disposal of property and equipment are classified within the corresponding operating expense categories in the consolidated statements of operations.

Goodwill

Goodwill relates to amounts that arose in connection with the Company's business combinations and represents the difference between the purchase price and the estimated fair value of the identifiable tangible and intangible net assets when accounted for using the acquisition method of accounting. Goodwill is not amortized, but is subject to periodic review for impairment.

The Company tests goodwill at the reporting unit level for impairment on an annual basis and between annual tests, if events and circumstances indicate impairment may exist. Events that would indicate impairment and trigger an interim impairment assessment include, but are not limited to, current economic and market conditions, including a decline in market capitalization, a significant adverse change in legal factors, business climate or operational performance of the business and an adverse action or assessment by a regulator.

Intangible Assets, Net

The Company's intangible assets, net consist of intellectual property rights acquired for currently marketed products (amortized intangibles). All of the Company's amortized intangibles were recorded in connection with the Company's business combinations or approval/post-approval milestone payments made under the Company's license agreements. The Company's intangible assets are recorded at fair value at the time of their acquisition. The Company amortizes intangible assets over their estimated useful lives once the acquired technology is developed into a commercially viable product. The estimated useful lives of the individual categories of intangible assets are based on the nature of the applicable intangible asset and the expected future cash flows to be derived from the intangible asset. Amortization of intangible assets with finite lives is recognized over the time the intangible assets are estimated to contribute to future cash flows. The Company amortizes finite-lived intangible assets using the straight-line method as revenues cannot be reasonably estimated.

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Foreign Currency

Since the acquisition of Okapi Sciences in 2014 and through the date of dissolution of the foreign subsidiary in December 2018, the Company was exposed to effects of foreign currency from translation. Prior to July 1, 2018, the functional currency of the Company's foreign subsidiaries was the local currency of the country where the subsidiaries were located. Transactions in foreign currencies were translated into the relevant functional currency at the rate of exchange at the date of the transaction. Transaction gains and losses were recognized in other income (expense) in the consolidated statements of operations. The results of operations for subsidiaries were translated into the United States Dollar, the Company's reporting currency, at the average rates of exchange during the period, with the subsidiaries' balance sheets translated at the rates accumulated at the balance sheet date. The cumulative effect of these exchange rate adjustments was included in a separate component of other comprehensive income (loss) in the consolidated balance sheets. Gains and losses arising from intercompany foreign currency transactions were included in loss from operations unless the gains and losses arose from long-term investments in subsidiaries. Gains and losses from long-term investments in subsidiaries were included in a separate component of other comprehensive income (loss).

Effective July 1, 2018, as a result of significant changes in economic facts and circumstances in the operations of the foreign subsidiary, the functional currency of the Company's foreign subsidiary was changed from the local currency to the United States Dollar. Effective as of the date of the change, translation adjustments for prior periods were not removed from equity and the translated amounts for nonmonetary assets at the end of the prior period became the accounting basis for those assets in the period of the change and subsequent periods. Subsequent gains or losses from the remeasurement of monetary assets and liabilities of the foreign subsidiary were recorded in earnings through the date of its dissolution.

Deferred Public Offering and At-the-Market Offering Costs

The Company capitalizes certain legal, accounting and other third-party fees that are directly associated with in-process equity financings as other assets until such financings are consummated. After consummation of the equity financing, these costs are recorded in stockholders' equity as a reduction of additional paid-in capital generated as a result of the offering. Should it no longer be considered probable that the equity financing will be consummated, the deferred offering costs would be expensed immediately as a charge to operating expenses in the consolidated statements of operations. The Company recorded $0 and $76 of deferred equity offering costs as of December 31, 2018 and 2017, respectively.

Debt Issuance Costs, Net

Debt issuance costs, net represent legal and other direct costs related to the Company's Loan and Security Agreement which was terminated in December 2018 upon full repayment of outstanding obligations (Note 10). These costs were recorded as an offset to the carrying value of loans payable in the consolidated balance sheet at the time they were incurred and were amortized to interest expense through the scheduled final principal payment date. Upon the Company's repayment of its loans payable, all remaining debt issuance costs were recognized in interest expense in the consolidated statements of operations.

Revenue from Contracts with Customers

Effective January 1, 2018, the Company adopted the Accounting Standards Codification Topic ("ASC") 606 "Revenue from Contracts with Customers" ("ASC 606") using the modified retrospective transition method. Prior to January 1, 2018, the Company recognized revenue using the guidance of ASC 605 "Revenue Recognition" ("ASC 605").

The Company recognizes revenue when its customer obtains control of the promised goods or services, in an amount that reflects the consideration which the Company expects to be entitled to in exchange for those goods or services.

The Company determines revenue recognition from contracts with customers as follows:

- identify the contract(s);
- identify the performance obligations in the contract(s);
- determine the transaction price;
- allocate the transaction price to the performance obligations in the contract; and
- recognize revenue when (or as) the Company satisfies a performance obligation.

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The Company's principal revenue streams and their respective accounting treatments are discussed below and further in Note 3, "Revenue":

(i) Product Sales, Net

The Company sells its products to its customers who could either be the end users (such as veterinarians, clinics, or animal hospitals) of the product or distributors who subsequently resell the Company's products to end users.

Revenues from product sales are recognized when the customer obtains control of the Company's product, which occurs at a point in time, upon delivery to the customer. The Company's delivery of its products to customers constitutes a single performance obligation as there are no other promises to deliver goods or services beyond what is specified in each accepted customer order.

Product sales are recorded net of applicable reserves for variable consideration, including product returns, allowances, discounts, and rebates.

Reserves for Variable Consideration

Revenues from product sales are recorded at the net sales price (transaction price) which includes estimates of variable consideration for which reserves are established. Components of variable consideration include product returns, allowances, discounts, and rebates. These reserves, as detailed below, are based on the amounts earned, or to be claimed on the related sales, and are classified as reductions of accounts receivable (generally, for credits that the Company issues for free goods provided by distributors to end customers in conjunction with promotional programs) or a current liability (generally, reserves for products that remained in the distribution channel inventories at each reporting period end that the Company expects the distributors will provide to end customers free of charge in conjunction with promotional programs). These estimates take into consideration a range of possible outcomes for the expected value (probability-weighted estimate) or relevant factors such as current contractual and statutory requirements, specific known market events and trends, industry data, and forecasted customer buying and payment patterns. Overall, these reserves reflect the Company's best estimates of the amount of consideration to which it is entitled based on the terms of the respective underlying contracts.

The amount of variable consideration included in the transaction price may be constrained and is included in the net sales price only to the extent that it is probable that a significant reversal in the amount of the cumulative revenue recognized under the contract will not occur in a future period. Actual amounts of consideration ultimately received may differ from the Company's estimates. If actual results in the future vary from the Company's estimates, the Company will adjust these estimates, which would affect net product revenue and earnings in the period such variances become known.

Product Returns

Consistent with the industry practice, the Company generally offers customers a limited right of return of damaged or expired product that has been purchased from the Company or the Company's distributors in exchange for an unexpired product or credit, depending on contractual arrangements with distributors and terms and conditions of the sale of its products. Exchanges or credit due to expiry are typically allowed for a period of six months after the product's expiration date. The Company estimates the amount of its product sales that may be returned by its customers and records these estimates as a reduction of product revenues in the period in which the related product revenues are recognized, as well as within accrued expenses and other current liabilities in the consolidated balances sheets. The Company currently estimates product return liabilities using available industry data, its own sales data and data provided by the Company's distributors such as the inventories remaining in the distribution channel. The Company has received an immaterial amount of returns to date and believes that returns of its products in future periods will be minimal. The Company does not record a return asset associated with the returned damaged or expired goods because such asset is deemed to be fully impaired at the time of product return.

Sales Discounts and Allowances

The Company compensates its distributors for sales order management, data and distribution and other services through sales discounts and allowances. However, such services are not distinct from the Company's sale of products to distributors and, therefore, these discounts and allowances are recorded as a reduction of revenue in the consolidated statements of operations, as well as a reduction to accounts receivable, net in the consolidated balance sheets.

(ii) Licensing and Collaboration Revenues

Revenues derived from product out-licensing arrangements typically consist of an initial non-refundable, up-front payment at inception of the license, subsequent milestone payments contingent on the achievement of certain regulatory, development and commercial milestones, and royalties on the net sales of the Company's products.

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Licenses of Intellectual Property

If the license to the Company's intellectual property is determined to be distinct from the other performance obligations identified in the contract, the Company recognizes revenue from non-refundable, up-front fees allocated to the license when the license is transferred to the customer and the customer is able to use and benefit from the license. For licenses that are bundled with other promises, the Company utilizes judgment to assess the nature of the combined performance obligation to determine whether the combined performance obligation is satisfied over time or at a point in time and, if over time, the appropriate method of measuring progress for purposes of recognizing revenue from non-refundable, up-front fees. The Company will evaluate the measure of progress each reporting period and, if necessary, adjust the measure of performance and related revenue recognition.

Milestones

Revenues from achievement of milestones generally represent a form of variable consideration as the payments are likely to be contingent on the occurrence of future events. The Company estimates milestones probable to be achieved and includes in the transaction price based on either the expected value (probability-weighted estimate) method or most likely amount method. The most likely amount method is used by the Company for milestone payments with a binary outcome (i.e., the Company receives all or none of the milestone payment). Milestone payments that are not within the control of the Company or the customer, such as regulatory approvals, are not considered probable of being achieved until those approvals are received. The estimated milestone-related variable consideration is only recognized as revenue when the related performance obligation is satisfied and the Company determines that it is probable that there will not be a significant reversal of cumulative revenue recognized in future periods (i.e. variable consideration constraint). At the end of each subsequent reporting period, the Company re-evaluates the probability of achievement of such milestones and any related constraint, and if necessary, adjusts its estimate of the overall transaction price. Any such adjustments are recorded on a cumulative catch-up basis, which would affect licensing and collaboration revenues and earnings in the period of adjustment.

For milestones that are not able to overcome the variable consideration constraint, that are not considered probable or that are determined to be sales-based or usage royalties, as described later, the Company recognizes revenue when the milestones are achieved.

Sales-Based Royalty Revenues

The Company's sales-based royalty revenues consist of sales-based milestones or a percentage of net sales royalties. The Company recognizes sales-based royalties related to the Company's out-licensed intellectual property when (or as) the later of the following events occurs:

- the sale occurs; or
- the performance obligation to which some or all of the sales-based or usage-based royalty has been allocated has been satisfied (or partially satisfied).

Sales-based royalty revenues recorded by the Company are based on the licensee's or sub-licensee's sales that occurred during the relevant period. To the extent the licensee's or sub-licensee's actual sales are not known at the time the Company reports its financial results, the Company estimates the amount of royalty revenue earned during the relevant period. Differences between actual and estimated royalty revenues, if any, are adjusted in the period in which they become known. To date, royalty revenues reported by the Company have been based on actual sales information received by the Company, and no material adjustments have been made in subsequent periods. Royalty revenue is included in licensing and collaboration revenue in the consolidated statements of operations.

The Company recognizes revenue from sales-based milestones when the milestones are achieved.

Research and Development Costs

Research and development costs are expensed as incurred. Included in research and development costs are wages, stock-based compensation and employee benefits, and other operational costs related to the Company's research and development activities, including facility-related expenses, external costs of outside contractors engaged to conduct both preclinical and clinical studies and allocation of corporate costs. If IPR&D is acquired in an asset purchase, then the acquired IPR&D is expensed on its acquisition date. Future costs to develop these assets are recorded to research and development expense as they are incurred.

Patent Costs

All patent-related costs incurred in connection with filing and prosecuting patent applications are recorded as selling, general and administrative expenses as incurred, as recoverability of such expenditures is uncertain.

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ARATANA THERAPEUTICS, INC.

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(Amounts in thousands, except share and per share data)

Shipping

Shipping costs are included in cost of product sales.

Sales Tax

The Company collects and remits taxes assessed by various governmental authorities. These taxes may include sales, use and value added taxes. These taxes are recorded on a net basis and are excluded from revenues.

Accounting for Stock-Based Compensation

The Company's stock-based compensation program grants awards that may consist of stock options and restricted stock awards. The fair values of stock option grants are determined as of the date of grant using the Black-Scholes option pricing method. This method incorporates the fair value of the Company's common stock at the date of each grant and various assumptions such as the risk-free interest rate, expected volatility based on the volatility of the Company's common stock price, expected dividend yield, and expected term of the options. The fair values of restricted stock awards are determined based on the fair value of the Company's common stock. The fair values of the stock-based awards are then expensed over the requisite service period, which is generally the award's vesting period. The Company classifies stock-based compensation expense in the consolidated statements of operations in the same manner in which the respective award recipient's payroll costs are classified.

For stock-based awards granted to consultants and nonemployees, compensation expense is recognized over the period during which services are rendered by such consultants and nonemployees until completed. At the end of each financial reporting period prior to completion of the service, the value of these awards is re-measured using the then-current fair value of the Company's common stock and updated assumption inputs in the Black-Scholes option pricing model.

Comprehensive Loss

In addition to the Company's net loss, comprehensive loss for the years ended December 31, 2018, 2017 and 2016, includes foreign currency translation adjustments related to the translation of foreign subsidiaries' balance sheets.

Net Loss Per Share

The Company follows the two-class method when computing net loss per share, as the Company has issued shares that meet the definition of participating securities. The two-class method determines net loss per share for each class of common and participating securities according to dividends declared or accumulated and participation rights in undistributed earnings. The two-class method requires income available to common stockholders for the period to be allocated between common and participating securities based upon their respective rights to receive dividends as if all income for the period had been distributed.

Restricted stock awards granted by the Company entitle the holder of such awards to dividends declared or paid by the Board of Directors, regardless of whether such awards are unvested, as if such shares were outstanding common shares at the time of the dividend. However, the unvested restricted stock awards are not entitled to share in the residual net assets (deficit) of the Company. Accordingly, in periods in which the Company reports a net loss or a net loss attributable to common stockholders resulting from preferred stock dividends, accretion or modifications, net losses are not allocated to participating securities. The Company reported a net loss in each of the years ended December 31, 2018, 2017 and 2016.

Basic net loss per share is computed by dividing the net loss by the weighted average number of shares of common stock outstanding for the period. Diluted net loss is computed by adjusting net loss to reallocate undistributed earnings based on the potential impact of dilutive securities, including outstanding stock options. Diluted net loss per share is computed by dividing the diluted net loss by the weighted average number of shares of common stock, including potential dilutive shares of common stock assuming the dilutive effect of potentially dilutive securities. For periods in which the Company has reported net losses, diluted net loss per share is the same as basic net loss per share, since their impact would be anti-dilutive to the calculation of net loss per share. Diluted net loss per share is the same as basic net loss per share for each of the years ended December 31, 2018, 2017 and 2016.

Concentration of Credit Risk and of Significant Suppliers and Customers

Financial instruments that potentially subject the Company to concentrations of credit risk consist principally of cash, cash equivalents, short-term investments and accounts receivable. At December 31, 2018 and 2017, all of the Company’s fixed income marketable securities were invested in CDs insured by the Federal Deposit Insurance Corporation. The Company also generally maintains balances in various operating accounts in excess of federally insured limits at two accredited financial institutions. The Company does not believe that it is subject to unusual credit risk beyond the normal credit risk associated with commercial banking relationships.

Concentrations of credit risk with respect to accounts receivable, which are typically unsecured, are somewhat mitigated due to the wide variety of customers (large animal health companies, distributors, and veterinarians) purchasing the Company’s products. All of the Company’s accounts receivable arise from product sales sold by the Company in the United States and have standard payment terms which generally require payment within 30 days and licensing and collaboration revenue which require payment within 60 days.

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ARATANA THERAPEUTICS, INC.

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(Amounts in thousands, except share and per share data)

The Company monitors the financial health performance and credit worthiness of its customers so it can properly assess and respond to changes in their credit profile. The Company continues to monitor these conditions and assess their possible impact on it business. As of December 31, 2018 and 2017, accounts receivable from Elanco Animal Health, Inc. (“Elanco”) accounted for 52% and 64% of the Company’s accounts receivable, net, respectively. As of December 31, 2017, accounts receivable from one distributor accounted for 15% of the Company’s accounts receivable, net.

Revenues from one customer, Elanco, accounted for all licensing and collaboration revenue for the years ended December 31, 2018 and 2017, and approximately 66% and 23% of total revenues for the years ended December 31, 2018 and 2017, respectively. During the year ended December 31, 2017, sales of finished goods to Elanco accounted for 79% of the Company’s net product sales.

The Company is dependent on a combination of national and regional distributors for its product sales of ENTYCE. The Company’s product sales to two distributors accounted for more than 10% each and 26% collectively of the Company’s net product sales for the year ended December 31, 2018.

The Company is also dependent on a small number of third-party manufacturers to supply active pharmaceutical ingredients (“API”) and formulated drugs for research and development activities in its programs and commercial supply, which would be adversely affected by a significant interruption in supply.

Fair Value Measurements

Certain assets and liabilities are carried at fair value under GAAP. Fair value is defined as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants on the measurement date. Valuation techniques used to measure fair value must maximize the use of observable inputs and minimize the use of unobservable inputs. A fair value hierarchy based on three levels of inputs, of which the first two are considered observable and the last is considered unobservable, is used to measure fair value:

- Level 1—Quoted prices in active markets for identical assets or liabilities.
- Level 2—Observable inputs (other than Level 1 quoted prices) such as quoted prices in active markets for similar assets or liabilities, quoted prices in markets that are not active for identical or similar assets or liabilities, or other inputs that are observable or can be corroborated by observable market data.
- Level 3—Unobservable inputs that are supported by little or no market activity and that are significant to determining the fair value of the assets or liabilities, including pricing models, discounted cash flow methodologies and similar techniques.

Segment and Geographic Information

Segment Assets

The Company manages its operations as a single segment for the purposes of assessing performance and making operating decisions. The Company is a pet therapeutics company developing compounds to address unmet and under-served medical needs in companion animals. All assets were held in the United States and Belgium as of December 31, 2018, 2017 and 2016. Total assets were $106,436, $135,192 and $151,406 at December 31, 2018, 2017 and 2016, respectively.

Revenues by Geographic Region

	Year Ended December 31,		
	2018	2017	2016
	(Dollars in thousands)		
Revenues			
United States	$ 35,412	$ 25,573	$ 38,318
Belgium	—	—	233
Total revenues	$ 35,412	$ 25,573	$ 38,551

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Long-Lived Assets, Net by Geographic Region

	Year Ended December 31,		
	2018	2017	2016
	(Dollars in thousands)		
Long-lived assets, net			
United States	$ 693	$ 1,166	$ 1,947
Belgium	—	—	1
Total long-lived assets, net	$ 693	$ 1,166	$ 1,948

New Accounting Standards

Revenue from Contracts with Customers

In May 2014, the Financial Accounting Standards Board (“FASB”) issued guidance on recognizing revenue in contracts with customers. The guidance affects any entity that either enters into contracts with customers to transfer goods or services or enters into contracts for the transfer of nonfinancial assets unless those contracts are within the scope of other standards (e.g., insurance contracts or lease contracts). This guidance superseded the revenue recognition requirements in ASC 605 and most industry-specific guidance. The core principle of the guidance is that an entity should recognize revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. The Company adopted this guidance on January 1, 2018. The impact of adoption is described further in Note 3, “Revenue.”

Leases

In February 2016, the FASB issued guidance which requires, for operating leases, a lessee to recognize a right-of-use (“ROU”) asset and a lease liability, initially measured at the present value of the lease payments, in its balance sheet. The standard also requires a lessee to recognize a single lease cost, calculated so that the cost of the lease is allocated over the lease term, on a generally straight-line basis. This guidance is effective for financial statements issued for fiscal years beginning after December 15, 2018, and interim periods within those fiscal years. Early adoption is permitted and is to be applied on a modified retrospective transition. The Company adopted this guidance on January 1, 2019, using a modified retrospective approach to be applied to leases existing as of, or entered into after, January 1, 2019. The Company has substantially completed its review of its existing lease contracts and the impact of the new leasing standards on its consolidated financial statements. Upon adoption of the new guidance, the Company expects

to recognize a lease liability and a related ROU asset, which may be material to the consolidated balance sheets. The impact of adoption of the guidance is not expected to have a material impact on the consolidated statements of operations.

Compensation – Stock Compensation: Scope of Modification Accounting

In May 2017, the FASB issued guidance on determining which changes to the terms or conditions of share-based payment awards require an entity to apply modification accounting. This guidance is effective for financial statements issued for fiscal years beginning after December 15, 2017, and interim periods within those fiscal years. The Company adopted this guidance on January 1, 2018, and the adoption did not have a material impact on its consolidated financial statements.

Compensation – Stock Compensation: Improvements to Nonemployee Share-Based Payment Accounting

In June 2018, the FASB issued guidance that largely aligns the accounting for share-based payment awards issued to employees and nonemployees. Under the new guidance, the existing employee guidance generally will apply to nonemployee share-based transactions, with the exception of specific guidance related to inputs to an option pricing model and the attribution of compensation cost. The cost of nonemployee awards will continue to be recorded as if the grantor had paid cash for the goods or services. In addition, the contractual term will be able to be used in lieu of an expected term in the option-pricing model for nonemployee awards. This guidance is effective for financial statements issued for fiscal years beginning after December 15, 2018, and interim periods within those fiscal years. Early adoption is permitted, including in interim periods, but no earlier than an entity’s adoption of ASC 606. The Company adopted this guidance on January 1, 2019, and the adoption did not have a material impact on its consolidated financial statements.

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Intangibles – Goodwill and Other – Internal-Use Software

In August 2018, the FASB issued guidance that largely aligns the requirements for capitalizing implementation costs incurred in a hosting arrangement that is a service contract with the requirements for capitalizing implementation costs incurred to develop or obtain internal-use software (and hosting arrangements that include an internal-use software license). The guidance provides criteria for determining which implementation costs to capitalize as an asset related to the service contract and which costs to expense. The capitalized implementation costs are required to be expensed over the term of the hosting arrangement. The guidance also clarifies the presentation requirements for reporting such costs in the entity's financial statements. The guidance is effective for financial statements issued for fiscal years beginning after December 15, 2019, and interim periods within those fiscal years. Early adoption is permitted, including adoption in any interim period. The Company is currently assessing the effect that adoption of this guidance will have on its consolidated financial statements.

Fair Value Measurements

In August 2018, the FASB issued guidance related to disclosure requirements for fair value measurements. This guidance eliminates, modifies and adds disclosure requirements for fair value measurements. The guidance is effective for fiscal years, and for interim periods within those fiscal years, beginning after December 15, 2019, with early adoption permitted. The Company is currently assessing the effect that adoption of this guidance will have on its consolidated financial statements.

3. Revenue

Adoption of ASC 606

On January 1, 2018, the Company adopted ASC 606 using the modified retrospective method applied to those contracts that were not completed as of January 1, 2018. Results for reporting periods beginning after January 1, 2018 are presented under ASC 606, while prior period amounts are not adjusted and continue to be reported in accordance with the Company's historic accounting under ASC 605.

The Company recorded a net reduction of $6,800, net of $0 tax, to the opening balance of accumulated deficit within stockholders' equity, and a corresponding reduction to licensing and collaboration commitment as of January 1, 2018, due to the cumulative impact of adopting ASC 606, with the impact solely related to the Company's variable consideration within its Collaboration Agreement (as defined below) with Elanco. Under previous guidance of ASC 605, this commitment was fully deferred and recognized as a liability until such time as payments under the obligation were made, or any unpaid portion would have been recognized as revenue when the commitment expired on December 31, 2018. Under ASC 606, this obligation is accounted for as variable consideration. At the adoption date,

the Company recorded a contract liability based on the amount of the obligation expected to be paid, which was $200. This amount was determined based on management estimates, which included consideration of Elanco's development plan. Since inception of the arrangement, no amounts had been paid out or submitted to the Company for reimbursement. Had the Company still applied ASC 605 for the year ended December 31, 2018, revenues would have been $6,800 higher as compared to revenues recognized under ASC 606.

Disaggregated Revenues

The following table presents the Company's revenues disaggregated by revenue source. All product sales are derived from United States sources and sales taxes are excluded from revenues.

	Year Ended December 31,		
	2018	2017 (1)	2016 (1)
Revenues			
Licensing and collaboration revenue			
GALLIPRANT	$ 23,326	$ 5,433	$ 38,000
Other	—	480	233
Total licensing and collaboration revenue	23,326	5,913	38,233
Product sales			
NOCITA	$ 7,511	$ 2,782	$ 148
ENTYCE	4,575	1,311	—
GALLIPRANT	—	15,526	—
Other	—	41	170
Total product sales	12,086	19,660	318
Total revenues	$ 35,412	$ 25,573	$ 38,551

(1) Prior period amounts have not been adjusted under the modified retrospective method of ASC 606 and are reported under ASC 605.

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Product Sales

The Company generates product sales revenues primarily by selling its marketed therapeutics directly to end users (such as veterinarians, clinics, or animal hospitals) and distributors. Direct to end user sales revenues consist primarily of NOCITA sales, and distributor product sales revenues consist primarily of ENTYCE sales.

As of December 31, 2018 and 2017, reserves for product returns related to NOCITA and ENTYCE were $222 and $90, respectively.

Licensing and Collaboration Revenue

The Company generates licensing and collaboration revenue solely from the Elanco Collaboration, License, Development and Commercialization Agreement (as amended, the “Collaboration Agreement”) and Co-Promotion Agreement (collectively, “the Elanco Agreements”) as follows:

- sales-based royalties from the Elanco Agreements consisting of a percentage of net sales of GALLIPRANT by Elanco that are recognized as revenue as the underlying sales of GALLIPRANT are made by Elanco;
- sales-based royalties from the Collaboration Agreement consisting of sales-based milestones of GALLIPRANT by Elanco that are recognized as revenue if and when the sales threshold is achieved by Elanco;
- regulatory milestones from the Collaboration Agreement that are recognized as revenue if and when achieved; and
- variable consideration related to the Collaboration Agreement licensing and collaboration commitment (contract liability) that is recognized as revenue when it is not subject to variable consideration constraint.

Reconciliation of Contract Balances

The change in contract liability balances for the year ended December 31, 2018, was as follows:

Licensing and Collaboration Commitment

	2018
As of January 1,	$ 7,000
ASC 606 adoption	(6,800)
Revenue recognized	(200)
Payments made	—
As of the end of period,	$ —

The Company recorded a net reduction of $6,800, net of $0 tax, to the opening balance of accumulated deficit within stockholders' equity as of January 1, 2018, due to the cumulative impact of adopting ASC 606.

Unsatisfied Performance Obligations

As of the adoption date of ASC 606 and December 31, 2018, the Company had no unsatisfied performance obligations.

Significant Judgments

The Company's significant judgments relate to the updating of the transaction price and variable consideration of the Collaboration Agreement. The Company used current facts and circumstances to calculate the updated transaction price using the expected value (probability-weighted estimate). Facts and circumstances considered included the status of the Elanco development plan for GALLIPRANT as of December 31, 2018.

Practical Expedients and Exemptions

The Company has deemed that there is no significant financing component present in the agreements with the Company's customers as trade payment terms with its customers do not exceed one year. The Company expenses sales commissions when incurred because the amortization period would have been one year or less. These costs are recorded within selling, general and administrative expenses.

4. Fair Value of Financial Assets and Liabilities

Financial Assets and Liabilities Measured at Fair Value on a Recurring Basis

The carrying values and estimated fair values of the Company's financial assets which are measured at fair value on a recurring basis was as follows:

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	Carrying Value	Fair Value Measurements as of December 31, 2018 Using: Level 1	Level 2	Level 3	Total
Assets:					
Cash equivalents:					
Certificates of deposit	$ 9,424	$ —	$ 9,424	$ —	$ 9,424
Short-term investments:					
Short-term marketable securities - certificates of deposit	1,240	—	1,240	—	1,240
	$ 10,664	$ —	$ 10,664	$ —	$ 10,664

	Carrying Value	Fair Value Measurements as of December 31, 2017 Using: Level 1	Level 2	Level 3	Total
Assets:					
Cash equivalents:					
Certificates of deposit	$ 8,964	$ —	$ 8,964	$ —	$ 8,964
Short-term investments:					
Short-term marketable securities - certificates of deposit	747	—	747	—	747
	$ 9,711	$ —	$ 9,711	$ —	$ 9,711

The financial assets above are measured at fair value using quoted prices in active markets for identical assets (Level 1); significant other observable inputs (Level 2); and significant unobservable inputs (Level 3). Certain estimates and judgments are required to develop the fair value amounts shown above. The fair value amounts shown above are not necessarily indicative of the amounts that the Company would realize upon disposition, nor do they indicate the Company’s intent or ability to dispose of the financial instrument.

The following methods and assumptions were used to estimate the fair value of each material class of financial instrument:

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Cash equivalents – the fair value of the cash equivalents has been determined to be amortized cost given the short duration of the securities.

- Marketable securities (short-term) – the fair value of marketable securities has been determined to be amortized cost given the short duration of the securities.

The Company had no financial liabilities measured at fair value on a recurring basis as of December 31, 2018 and 2017.

Financial Assets and Liabilities that are not Measured at Fair Value on a Recurring Basis

The carrying values and estimated fair values of the Company's financial liabilities which are not measured at fair value on a recurring basis was as follows:

	December 31, 2017	
	Carrying Value	Fair Value
Liabilities:		
Loans payable (Level 2)	$ 36,825	$ 36,973

The Company had no financial liabilities not measured at fair value on a recurring basis as of December 31, 2018.

The financial liabilities above were measured at fair value using quoted prices in active markets for identical assets (Level 1); significant other observable inputs (Level 2); and significant unobservable inputs (Level 3). Certain estimates and judgments were required to develop the fair value amounts. The fair value amount shown above is not necessarily indicative of the amounts that the Company would realize upon disposition, nor does it indicate the Company's intent or ability to dispose of the financial instrument.

The fair value of loans payable was estimated using discounted cash flow analysis discounted at current rates.

The Company had no financial assets not measured at fair value on a recurring basis as of December 31, 2018 and 2017.

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The carrying value of intellectual property rights acquired for in-process research and development was $0 as of December 31, 2018, and no impairment was recognized for the year ended December 31, 2018. The Company had intangible assets that were written down to fair value during the years ended December 31, 2017 and 2016. Fair value was determined using an income approach, specifically, the multi-period excess earnings method, a form of a discounted cash flow method. The Company started with a forecast of all the expected net cash flows associated with the asset and then it applied an asset-specific discount rate to arrive at a net present value amount. Some of the more significant estimates and assumptions inherent in this approach include: the amount and timing of the projected net cash flows, which includes the expected impact of competitive legal and/or regulatory forces on the product and the impact of technological risk associated with IPR&D intangible assets; the discount rate, which seeks to reflect the various risks inherent in the projected cash flows; and the tax rate, which seeks to incorporate the geographic diversity of the projected cash flows.

5. Investments

Marketable Securities

Marketable securities consisted of the following:

	December 31, 2018			
	Amortized Cost	Gross Unrealized Losses	Gross Unrealized Losses	Fair Value
Short-term marketable securities:				
Certificates of deposit	$ 1,240	$ —	$ —	$ 1,240
Total	$ 1,240	$ —	$ —	$ 1,240

	December 31, 2017			
	Amortized Cost	Gross Unrealized Losses	Gross Unrealized Losses	Fair Value
Short-term marketable securities:				
Certificates of deposit	$ 747	$ —	$ —	$ 747
Total	$ 747	$ —	$ —	$ 747

At December 31, 2018 and 2017, short-term marketable securities consisted of investments that mature within one year. Short-term marketable securities are recorded as short-term investments in the consolidated balance sheets.

6. Inventories

Inventories are stated at the lower of cost and net realizable value and consisted of the following:

	December 31, 2018	December 31, 2017
Raw materials	$ 242	$ 1,132
Work-in-process	8,999	12,322
Finished goods	2,184	122
	$ 11,425	$ 13,576

During the year ended December 31, 2018, the Company recognized inventory valuation adjustment losses in cost of product sales in the amount of $2,650 from the application of the lower of cost and net realizable value. The losses primarily related to ENTYCE inventories that were written down to net realizable value. Unfavorable outcomes of the Company's ENTYCE commercialization efforts could result in additional inventory write downs in future periods. As of December 31, 2018, ENTYCE inventories amounted to $10,708.

As of December 31, 2017, raw materials included $777 of GALLIPRANT inventories. As part of the manufacturing transfer of GALLIPRANT (Note 12), the Company transferred these raw materials to Elanco, and was reimbursed for the raw materials by Elanco during 2018. During the year ended December 31, 2017, the Company recognized an inventory valuation loss related to these

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raw materials in the amount of $347 from the application of lower of cost and net realizable value in the research and development expenses. Additionally, during the year ended December 31, 2017, the Company recognized an inventory valuation loss in the amount of $394 from the application of lower of cost and net realizable value in cost of product sales. The loss related to GALLIPRANT inventories that were written off.

During the year ended December 31, 2016, the Company recognized an inventory valuation loss in the amount of $2,532 from the application of lower of cost and net realizable value in cost of product sales. The loss related to BLONTRESS and TACTRESS inventories that were written off and pre-launch GALLIPRANT inventories written down to market value due to terms agreed upon in the Elanco collaboration agreement (Note 12). Additionally, the Company expensed as research and development expenses $2,639 of previously capitalized process validation batches of ENTYCE intended to be used as commercial launch inventories and $1,983 of costs incurred related to manufacturing of ENTYCE under a firm purchase commitment due to the Company concluding at that time that the future commercial use and future economic benefit could no longer be reasonably determined.

As of December 31, 2018, the Company had non-cancellable open orders for the purchase of inventories of $1,974, which are expected to be paid in the next 12 months.

7. Property and Equipment, Net

Property and equipment, net consisted of the following:

	December 31, 2018	December 31, 2017
Laboratory and office equipment	$ 173	$ 173
Computer equipment and software	2,046	2,046
Furniture	135	135
Total property and equipment	2,354	2,354
Less: Accumulated depreciation and amortization	(1,661)	(1,188)
Property and equipment, net	$ 693	$ 1,166

Depreciation and amortization expense was $473, $812 and $609 for the years ended December 31, 2018, 2017 and 2016, respectively. During the year ended December 31, 2017, the Company recognized impairment charges of $317

related to equipment previously used in its former San Diego, California, property in cost of products sales. No significant gains/losses on disposal of property and equipment were recognized during the years ended December 31, 2018, 2017 and 2016.

8. Goodwill

Goodwill is recorded as an indefinite-lived asset and is not amortized for financial reporting purposes but is tested for impairment on an annual basis or when indications of impairment exist. No goodwill impairment losses have been recognized to date. Goodwill is not expected to be deductible for income tax purposes.

The Company completed its annual goodwill impairment testing during the third quarter of 2018. The Company elected to bypass the qualitative assessment. The Company determined as of the testing date that it consisted of one operating segment which is comprised of one reporting unit. In performing the quantitative goodwill impairment test, the Company determined that its fair value, determined to be its market capitalization, was greater than its carrying value, determined to be stockholders' equity. Based on this result, the Company determined there was no impairment of goodwill as of the annual testing date.

Goodwill as of December 31, 2018, was as follows:

	Gross Carrying Value	Impairment Losses	Net Carrying Value
Goodwill	$ 40,846	$ —	$ 40,846

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The change in the net book value of goodwill for the years ended December 31, 2018 and 2017, was as follows:

	2018	2017
As of January 1,	$ 41,295	$ 39,382
Effect of foreign currency exchange	(449)	1,913
As of the end of the period,	$ 40,846	$ 41,295

9. Intangible Assets, Net

The change in the net book value of intangible assets for the years ended December 31, 2018 and 2017, was as follows:

	2018	2017
As of January 1,	$ 6,616	$ 7,639
Additions (Note 12)	—	6,000
Amortization expense	(517)	(350)
Effect of foreign currency exchange	—	775
Impairment	—	(7,448)
As of the end of the period,	$ 6,099	$ 6,616

The Company recognized amortization expense of $517, $350 and $379 for the years ended December 31, 2018, 2017 and 2016, respectively.

Amortization expense of intangible assets for each of the five succeeding years as of December 31, 2018, was as follows:

Year Ending December 31,	
2019	$ 516
2020	516
2021	516
2022	516
2023	$ 516

Unamortized Intangible Assets

As of both December 31, 2018 and 2017, the net carrying value of the Company's unamortized intangible assets was $0, which includes asset impairment charges of $24,213.

Impairment of Unamortized Intangible Assets

AT-006 (eprociclovir) and AT-008 (rabacfosadine)

During the fourth quarter of 2017, the Company determined that events and changes in circumstances indicated that the IPR&D intangible assets might be impaired. During the Company's development program prioritization review, which included the consideration of a number of factors, including the Company's inability to raise additional capital in November 2017, the Company decided to further delay the development of AT-006 and AT-008. Due to this delay the Company revisited all assumptions used in measuring the fair values of AT-006 and AT-008. This interim review resulted in fair values of these intangibles being less than their carrying values which resulted in an impairment charge of $7,448, which was recorded during the fourth quarter of 2017, reducing the carrying values of both AT-006 and AT-008 to $0.

AT-007 (Feline immunodeficiency virus)

The Company had been considering out-licensing or internally advancing the AT-007 program for feline immunodeficiency virus since an impairment expense of $8,717 was recorded in 2015. Due to the return of the AT-006 global rights from Elanco in May 2016 (Note 12) and ensuing development program portfolio prioritization, including consideration of the Company's focus on commercial launch activities to support its recently approved products, the Company decided to discontinue the development of AT-007 during the second quarter of 2016. This resulted in an impairment charge of $2,229, which was recorded during the second quarter of 2016, reducing the carrying value of AT-007 to $0.

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Amortized Intangible Assets

Amortized intangible assets as of December 31, 2018, were as follows:

	Gross Carrying Value	Accumulated Amortization	Net Carrying Value	Weighted Average Useful Life
Intellectual property rights for currently marketed products	$ 7,000	$ 901	$ 6,099	14.1 Years

Amortized intangible assets as of December 31, 2017, were as follows:

	Gross Carrying Value	Accumulated Amortization	Net Carrying Value	Weighted Average Useful Life
Intellectual property rights for currently marketed products	$ 7,000	$ 384	$ 6,616	14.1 Years
Intellectual property rights for formerly marketed products	38,652	38,652	—	N/A
	$ 45,652	$ 39,036	$ 6,616	

Accumulated amortization includes both amortization expense and asset impairment charges. Asset impairment charges through December 31, 2018 and 2017 were $25,390 and $9,185 for BLONTRESS and TACTRESS, respectively.

Unfavorable estimates of the Company’s therapeutics’ market opportunities or unfavorable outcomes of the Company’s development activities, expected future cash flows and estimated useful lives could result in impairment charges in future periods.

Intellectual Property Rights for Currently Marketed Products

As of December 31, 2018 and 2017, intellectual property rights for currently marketed products relate to intangible assets capitalized for NOCITA, GALLIPRANT and ENTYCE in conjunction with approval/post-approval milestone payments made under the Company's licensing agreements.

Impairment of Amortized Intangible Assets

Since the acquisition of Vet Therapeutics, Inc. (October 2013), the Company performed various scientific and clinical activities to gain further knowledge around the science and efficacy of BLONTRESS and TACTRESS.

BLONTRESS

In the third quarter of 2015, the Company noted that scientific studies suggested that BLONTRESS was not as specific to the target as previously expected. The Company’s market research and interactions with veterinary oncologists indicated that high specificity, including binding and depletion, will likely be necessary to drive wide adoption of monoclonal antibody therapy given that canine B-cell is generally chemotherapy sensitive. Furthermore, the Company was aware of other emerging therapies that would compete in the B-cell lymphoma market, and believed that products with break-through benefit will dominate the market. Given those scientific results and competitive assessment, the Company recorded an impairment expense of $20,228 in 2015. In the fourth quarter of 2016, the Company received final data from the Mini B-CHOMP study, which evaluated an abbreviated chemotherapy (CHOP) protocol in dogs with B-cell lymphoma. The results confirmed that BLONTRESS did not seem to be adding significant progression-free survival in canine B-cell lymphoma.

While BLONTRESS remained commercially available, the Company deemed the results of Mini B-CHOMP study and the updated commercial expectations as a result of the Mini B-CHOMP study results, as indicators of potential impairment of its finite-lived intangible asset BLONTRESS during the fourth quarter of 2016. The Company performed impairment testing for the intangible asset BLONTRESS as of December 31, 2016, and recorded an impairment expense of $5,162 during the fourth quarter of 2016, resulting in a net carrying value of $0 for BLONTRESS.

TACTRESS

In the third quarter of 2015, the Company’s interim analysis of the clinical results indicated that TACTRESS did not seem to be adding significant progression free survival in canine T-cell lymphoma; those results were confirmed in the final study results in July 2016. In addition, scientific studies suggested that TACTRESS was not as specific to the target as expected. Given those clinical and scientific results, the Company no longer believed that TACTRESS would capture the desired T-cell lymphoma market opportunity and recorded an impairment expense of $8,634 in 2015.

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While TACTRESS remained commercially available, the use by oncologists had been more limited than the Company anticipated, resulting in sales during the second quarter of 2016, being significantly lower than forecasted. The Company deemed the events and market projections described above to be indicators of potential impairment of its finite-lived intangible asset TACTRESS during the second quarter of 2016. The Company performed impairment testing for the intangible asset TACTRESS as of June 30, 2016, and recorded an impairment expense of $551 during the second quarter of 2016, resulting in a net carrying value of $0 for TACTRESS.

10. Debt

Loan and Security Agreements

Effective as of October 16, 2015, the Company and Vet Therapeutics, Inc., (the “Borrowers”), entered into a Loan and Security Agreement (“Loan Agreement”), with the Pacific Western Bank, as a collateral agent and Oxford Finance, LLC, (the “Lenders”), pursuant to which the Lenders agreed to make available to the Company term loan in an aggregate principal amount up to $35,000 and a revolving credit facility in an aggregate principal amount up to $5,000 subject to certain conditions to funding. The term loan and the revolving credit facility bore interest per annum at the greater of (i) 6.91% or (ii) 3.66% plus the prime rate.

Effective as of July 31, 2017, the Borrowers and the Lenders entered into a second amendment to the Loan Agreement (the “Second Amendment”). The terms of the Second Amendment, among other things, extended the maturity date of the existing revolving credit facility to October 16, 2019 (the “Revolving Line Maturity Date”), with amortized equal repayments of the principal outstanding under the revolving credit facility beginning November 1, 2018, and provided a six-month interest only period for the term loans, starting on the date of the Second Amendment. At the closing of the Second Amendment, the Company paid the Lenders an amendment fee of $150 and a facility fee of $60. The Company was obligated to pay a new termination fee equal to $165 upon the earliest to occur of the Revolving Line Maturity Date, the acceleration of the revolving credit facility or the termination of the revolving credit facility. The existing termination fee of $165 was due upon the original revolving maturity date, October 16, 2017, and was paid on October 17, 2017. The Company was obligated to pay a final payment fee equal to 3.30% of the principal amount of the term loan upon repayment.

On December 21, 2018, the Company repaid in full all outstanding indebtedness and terminated all commitments and obligations under its Loan Agreement between the Borrowers and the Lenders. The Company's payment to the Lenders under the Loan Agreement, which included outstanding principal and interest balances as well as the final payment fee and the termination fee, was $20,610, and satisfied all of the Company's debt obligations. The Company did not incur any early termination penalties as a result of the repayment of indebtedness or termination of the Loan Agreement. In connection with the repayment of outstanding indebtedness by the Company, the Borrowers were automatically and permanently released from all security interests, mortgages, liens and encumbrances under the Loan Agreement.

During the years ended December 31, 2018, 2017 and 2016, the Company recognized interest expense of $3,391, $3,481 and $3,396, respectively. Amortization of debt issuance costs and accretion of final payment and termination fees, recognized as interest expense, were $994, $513 and $477 for the years ended December 31, 2018, 2017 and 2016, respectively.

11. Accrued Expenses and Other Current Liabilities

Accrued expenses and other current liabilities consisted of the following:

	December 31, 2018	December 31, 2017
Payroll and related expenses	$ 2,587	$ 2,314
Professional fees	353	208
Royalty expense	812	718
Interest expense	—	249
Research and development costs	73	5
Accrued loss on a firm purchase commitment	72	—
Other	749	218
Total	$ 4,646	$ 3,712

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12. Agreements

RaQualia Pharma Inc. (“RaQualia”)

On December 27, 2010, the Company entered into two Exclusive License Agreements with RaQualia (as amended, the “RaQualia Agreements”) that granted the Company global rights, subject to certain exceptions for injectables in Japan, Korea, China and Taiwan for development and commercialization of licensed animal health products for compounds RQ-00000005 (ENTYCE, also known as AT-002) and RQ-00000007 (GALLIPRANT, also known as AT-001). The Company will be required to pay RaQualia remaining milestone payments associated with GALLIPRANT and ENTYCE of up to $4,000 and $3,000, respectively, upon the Company’s achievement of certain development, regulatory and commercial milestones, as the well as mid-single digit royalties on the Company’s or the Company’s sublicensee’s product sales.

The Company achieved milestones totaling $0, $6,000 and $5,500 during the years ended December 31, 2018, 2017, and 2016, respectively. Milestones achieved in 2017 were capitalized as intangible assets and milestones achieved in 2016 were expensed within research and development expenses. As of December 31, 2018, the Company had paid $11,500 in milestone payments since execution of the RaQualia Agreements, and no milestone payments were accrued. It is possible that a milestone related to the RaQualia Agreements will be achieved within the next the twelve months totaling $2,000.

Pacira Pharmaceuticals, Inc. (“Pacira”)

On December 5, 2012, the Company entered into an Exclusive License, Development, and Commercialization Agreement with Pacira (the “Pacira License Agreement”) that granted the Company global rights for development and commercialization of licensed animal health products for NOCITA (also known as AT-003). On the same date, the Company also entered into a supply agreement with Pacira (the “Pacira Supply Agreement”, and together with the Pacira License Agreement, the “Pacira Agreements”).

On July 5, 2018 (the “Effective Date”), the Company and Pacira entered into an amendment and restatement of the Pacira License Agreement (“A&R License Agreement”) and an amendment and restatement of the Pacira Supply Agreement (the “A&R Supply Agreement”).

Under the A&R Supply Agreement, Pacira has agreed to manufacture and supply the licensed product in a 10 mL vial size in addition to the 20 mL vial size that is currently supplied to the Company. The supply price for the 10 mL vial size will remain fixed until December 31, 2021. Prior to December 31, 2021, the Company and Pacira have agreed to negotiate in good faith the applicable terms related to the 10 mL vial, including the price, for after December 31, 2021. If the Company and Pacira are unable to reach agreement, then as of January 1, 2022, and on each anniversary thereafter during the term of the A&R Supply Agreement, the price for the 10 mL vial will be automatically increased by a low single-digit percentage.

The A&R License Agreement amended various sections of the Pacira License Agreement, including milestone payments and royalties, to incorporate the introduction of the 10 mL vial size. Prior to December 31, 2021, the Company will not be obligated to pay any royalty payments to Pacira on the sales of the 10 mL vial and thereafter, the Company and Pacira have agreed to negotiate in good faith the applicable terms relating to the 10 mL vial in accordance with the A&R Supply Agreement. The tiered royalties on the Company's product sales of 20 mL vials remain unchanged. In addition, the A&R License Agreement reduces the annual net sales thresholds for achieving each of the potential commercial milestone payments owed to Pacira. The remaining $40,000 of commercial milestones per the A&R License Agreement begin to be triggered once NOCITA annual net sales reach $50,000 with the final tier being owed to Pacira once NOCITA annual net sales reach $250,000. Further, the A&R License Agreement lowered the minimum annual revenue payment to be provided to Pacira by the Company and delayed by one year the first period in which this minimum annual revenue payment requirement would be triggered such that the period is now expected to commence on January 1, 2023. The definition of a competing product was specified and narrowed to those injectable analgesic products preventing pain for at least forty-eight to seventy-two hours post-surgery as an active pharmaceutical ingredient ("API") labeled for the control of post-operative pain for surgical veterinary use. The term of the A&R License Agreement was extended with the initial term commencing as of the new Effective Date.

The Company achieved milestones totaling $0, $0 and $2,000 during the years ended December 31, 2018, 2017 and 2016, respectively. Of the $2,000 in achieved milestones in 2016, $1,000 was capitalized as intangible assets and the other $1,000 was expensed within research and development expenses. As of December 31, 2018, the Company had paid $2,500 in milestone payments since execution of the Pacira Agreements, and no milestone payments were accrued. The Company does not expect to achieve any milestones related to the A&R Agreement in the next the twelve months.

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Elanco

BLONTRESS

On December 6, 2012, Vet Therapeutics entered into an Exclusive Commercial License Agreement with Elanco (formerly Novartis Animal Health, Inc.) (the “Elanco BLONTRESS Agreement”) under which Vet Therapeutics granted a commercial license to Elanco for BLONTRESS for the United States and Canada.

On January 2, 2015, the Company was granted a full product license from the USDA for BLONTRESS. The approval resulted in a $3,000 milestone payment being earned and due to the Company per the terms of the Elanco BLONTRESS Agreement. During the first quarter of 2015, the Company recognized $3,000 of licensing revenue related to the milestone payment.

On February 24, 2015, the Company and Elanco agreed to terminate the Elanco BLONTRESS Agreement. In consideration for the return of the commercial license granted to Elanco, the Company paid Elanco $2,500 in March 2015, and was to be required to pay an additional $500 upon the first commercial sale by the Company. At that time the Company determined that it was probable that the $500 payment will be paid, and recorded the $500 as a current liability in the first quarter of 2015. The first commercial sale occurred in March 2016. The Company recorded the $3,000 owed to Elanco as a reduction in revenues received from Elanco as the payment was to re-acquire rights that the Company had previously licensed to Elanco.

On February 25, 2016, the Company and Elanco agreed to amend the terms related to the $500 payment due upon the first commercial sale by the Company. Under the amended terms, upon the first commercial sale in March 2016, the Company was required to pay quarterly a royalty per vial sold until $500 in royalties were paid or the end of two years. After two years, the Company would have been required to pay Elanco $500 plus 10% interest, compounded annually against any unpaid balance, less any royalties paid during the two years. If during the two years following the first commercial sale the Company withdrew BLONTRESS from the market and ceased all commercialization, the remaining royalty and related interest would no longer be payable.

On November 13, 2017, the Company withdrew BLONTRESS from the market and ceased all commercialization making the remaining royalty and interest no longer payable. During the year ended December 31, 2017, the Company recognized $480 in licensing and collaboration revenue due to the derecognition of the remaining balance of the liability.

GALLIPRANT

On April 22, 2016, the Company entered into a Collaboration Agreement pursuant to which the Company granted Elanco rights to develop, manufacture, market and commercialize the Company’s products based on licensed grapiprant rights and technology, including GALLIPRANT (collectively, “Grapiprant Products”). Pursuant to the Collaboration Agreement, Elanco will have exclusive rights globally outside the United States and co-promotion rights with the Company in the United States during the term of the Collaboration Agreement.

Under the terms of the Collaboration Agreement, the Company received a non-refundable, non-creditable upfront payment of $45,000. The Company is entitled to a $4,000 milestone payment upon European approval of a Grapiprant Product for the treatment of pain and inflammation, another $4,000 payment upon achievement of a development milestone related to the manufacturing of a Grapiprant Product from an alternate supply source, and payments up to $75,000 upon the achievement of certain sales milestones, of which $15,000 was achieved in 2018. The sales milestone payments are subject to a one-third reduction for each year the occurrence of the milestone is not achieved beyond December 31, 2021, with any non-occurrence beyond December 31, 2023, cancelling out the applicable milestone payment obligation entirely.

The Collaboration Agreement also provides that Elanco will pay the Company royalty payments on a percentage of net sales in the mid-single to low double digits. The Company was responsible for all development activities required to obtain the first registration or regulatory approval for a Grapiprant Product for use in dogs in each of the European Union (“the EU Product Registration”) and the United States, and Elanco was responsible for all other development activities. First registration for a Grapiprant Product in the United States was achieved before the completion of the Collaboration Agreement and EU Product Registration was achieved in January 2018. In addition, the Company and Elanco agreed to pay 25% and 75%, respectively, of all third-party development fees and expenses through December 31, 2018, in connection with preclinical and clinical trials necessary for any additional registration or regulatory approval of Grapiprant Products, provided that the Company’s contribution to such development fees and expenses was capped at $7,000 (“R&D Cap”), which was recorded as licensing and collaboration commitment liability in the consolidated balance sheets at December 31, 2017. Upon adoption of ASC 606 (Note 3), the Company relieved $6,800 of its licensing and collaboration commitment liability. The licensing and collaboration commitment liability balance was updated at each reporting date to reflect current facts and circumstances. The remaining balance of $200 was recognized as licensing and collaboration revenue in the consolidated statements of operations in the fourth quarter of 2018.

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Commencing on the effective date of the Collaboration Agreement, the Company was responsible for the manufacture and supply of all of Elanco's reasonable requirements of API and/or finished Grapiprant Products under the supply terms agreed upon pursuant to the Collaboration Agreement. However, Elanco retained the ability to assume all or a portion of the manufacturing responsibility during the term of the Collaboration Agreement. On April 28, 2017, the Company and Elanco entered into an amendment (the "Amendment") to the Collaboration Agreement. Under the Amendment, Elanco agreed to submit binding purchase orders to the Company, within 15 days of the effective date of the Amendment, for certain finished Grapiprant Products to be produced from certain batches of API the Company had agreed to purchase from its third-party manufacturer (the "API Batches"). In addition, Elanco agreed to pay the Company for the API Batches within 30 days after the Company provides Elanco with proof of payment to the manufacturer for such API Batches. The Amendment provides that, in the event Elanco provided notice of its intent to assume responsibility for manufacturing, Elanco would assume all responsibilities of the Company with respect to any undelivered API, including paying the third-party manufacturer for such undelivered API. In July 2017, pursuant to Sections 8.2.2 and 10.1(c) of the Collaboration Agreement, as amended, Elanco provided the Company notice of its intent to assume responsibility for manufacturing of the Grapiprant Products and its intent to assume the applicable regulatory approvals. In September 2017, the Company and Elanco finalized the transfer of the applicable regulatory approvals in the United States and the responsibility for manufacturing of Grapiprant Products to Elanco. In connection with this assumption of manufacturing responsibility, Elanco compensated the Company $10,832 for certain Grapiprant Product inventories and manufacturing considerations. During the year ended December 31, 2017, the Company recognized $1,000 of licensing and collaboration revenues and $6,099 of product sales related to the assumption of manufacturing responsibility by Elanco.

On April 22, 2016, in connection with the Collaboration Agreement, the Company entered into a Co-Promotion Agreement (the "Co-Promotion Agreement") with Elanco to co-promote Grapiprant Products in the United States.

Under the terms of the Co-Promotion Agreement, Elanco has agreed to pay the Company, as a fee for promotional services performed and expenses incurred by the Company under the Co-Promotion Agreement, (i) 25% of the gross margin on net sales of Grapiprant Product sold in the United States under the Collaboration Agreement prior to December 31, 2018, and (ii) a mid-single digit percentage of net sales of Grapiprant Product in the United States after December 31, 2018 through 2028 (unless extended by mutual agreement).

The Company concluded that the Collaboration Agreement and Co-Promotion Agreement represent a multiple-element arrangement, and evaluated if deliverables in the arrangement represent separate units of accounting. The Company identified the following deliverables under the agreement: (i) a royalty-bearing, sub-licensable, development, manufacturing and commercialization license; (ii) manufacturing and supply services; (iii) participation in a joint manufacturing subcommittee; and (iv) services associated with obtaining the EU Product Registration. The Company performed an assessment and concluded that the license had stand-alone value from the other undelivered elements in the arrangement. The Company's best estimate of the selling price for the manufacturing subcommittee and the EU Product Registration services were immaterial and, therefore, no consideration was allocated to these deliverables. Under the manufacturing and supply services terms, Elanco was obligated to pay for any future orders at a price per unit representative of market value, and, therefore, no upfront consideration was allocated to this deliverable. Under the ASC 605 guidance, the Company allocated $38,000 of the $45,000 upfront payment to the

license, and recognized $38,000 of licensing and collaboration revenue during the quarter ended June 30, 2016. The Company allocated $7,000 of upfront consideration to the R&D Cap, which was recorded as licensing and collaboration commitment liability in the consolidated balance sheet as a current liability at December 31, 2017.

The Company earned sales milestones totaling $15,000, $0 and $0 during the years ended December 31, 2018, 2017, and 2016, respectively. As of December 31, 2018, the Company had been paid $15,000 in milestone payments since the effective date of the Collaboration Agreement, and no milestone payments were accrued. The Company will recognize revenue from any additional milestones if and when they are achieved by Elanco.

Advaxis Inc. (“Advaxis”)

On March 19, 2014, the Company entered into an Exclusive License Agreement with Advaxis (the “Advaxis Agreement”) that granted the Company global rights for development and commercialization of licensed animal health products for Advaxis’ ADXS-cHER2 for the treatment of osteosarcoma in dogs (“AT-014”) and three additional cancer immunotherapy products for the treatment of three other types of cancer. The Company will be required to pay Advaxis remaining milestone payments of up to an additional $6,000 in clinical and regulatory milestones for each of the four products, assuming approvals in both cats and dogs, in both the United States and the European Union. In addition, the Company agreed to pay up to $28,500 in commercial milestones, as the well as tiered royalties ranging from mid-single digit to 10% on the Company’s product sales, if any. As of December 31, 2018, the Company had not accrued or paid any milestone payments since execution of the Advaxis Agreement. The Company does not expect to achieve any milestones related to the Advaxis Agreement in the next the twelve months.

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VetStem BioPharma, Inc. (“VetStem”)

On June 12, 2014, the Company entered into an Exclusive License Agreement with VetStem (as amended, the “VetStem Agreement”) that granted the Company the exclusive United States rights for commercialization and development of VetStem’s allogeneic stem cells being developed for the treatment of pain and inflammation of canine osteoarthritis.

The Company achieved milestones totaling $0, $250 and $450 during the years ended December 31, 2018, 2017 and 2016, respectively, which were expensed within research and development expenses.

In January 2018, the Company exercised its right to terminate the VetStem Agreement, and on April 19, 2018, the termination became effective. During the year ended December 31, 2018, the Company did not incur any development expenses or milestones. As a result of the termination of the VetStem Agreement, the Company does not anticipate having to reimburse any further development expenses or make milestone payments to VetStem. Though the date of the termination of the VetStem Agreement, the Company had paid $1,000 in milestone payments and no royalty payments since execution of the VetStem Agreement and no milestone payments or royalties were accrued.

Atopix Therapeutics Ltd. (“Atopix”)

On October 10, 2014, the Company entered into an Exclusive License Agreement with Atopix (the “Atopix Agreement”) that granted the Company an exclusive global license for development and commercialization of animal health products containing the API included in Atopix’s CRTH2 antagonist product for the treatment of atopic dermatitis. Under the terms of the Atopix Agreement, the Company paid an initial license fee of $1,000. On the date of acquisition, the licensed technology had not reached technological feasibility in animal health indications and had no alternative future use in the field of animal health. Accordingly, in-process research and development of $1,000 was expensed upon acquisition. The Company will be required to pay Atopix remaining milestone payments of up to an additional $4,000 in clinical and regulatory milestones, assuming approvals in both cats and dogs, in both the United States and the European Union, as the well as tiered royalties in the mid-single digits on the Company’s product sales, if any.

The Company achieved no milestones during the years ended December 31, 2018, 2017 and 2016. As of December 31, 2018, the Company had paid $500 in milestone payments and no royalty payments since execution of the Atopix Agreement and no milestone payments or royalties were accrued. The Company does not expect to achieve any milestones related to the Atopix Agreement in the next the twelve months.

AskAt Inc. (“AskAt”)

AT-019

On February 28, 2018, the Company entered into an Exclusive License Agreement with AskAt (the “AskAt Agreement”) that granted the Company an exclusive global license for development and commercialization of

compound AT-019 in the field of animal health. Under the terms of the AskAt Agreement, the Company paid an initial upfront license fee of $500 in the second quarter of 2018. The AskAt Agreement was accounted for as an asset acquisition. On the date of acquisition, the licensed technology had not reached technological feasibility in animal health indications and had no alternative future use in the field of animal health. Accordingly, in-process research and development expense of $500 was recorded upon acquisition in the first quarter of 2018 and paid in the second quarter of 2018.

The Company will be required to pay remaining milestone payments of up to $15,500 upon the Company's achievement of milestones, including $3,000 of development/regulatory milestones and $12,500 of commercial milestones as the well as tiered single digit royalties on the Company's product sales, if any. The commercial milestones owed to AskAt under the AskAt Agreement begin to be triggered upon the first commercial sale with the final tier being owed to AskAt once annual net sales reach $100,000. Milestones, at the discretion of the Company, can be paid 50% in cash and 50% in a number of the Company's shares as determined per the terms of the AskAt Agreement.

The Company achieved no milestones during the year ended December 31, 2018. As of December 31, 2018, the Company had not accrued or paid any milestone or royalty payments since execution of the AskAt Agreement. The Company does not expect to achieve any milestones related to the AskAt Agreement in the next twelve months.

Collaboration and Option Agreement

On February 28, 2018, in connection with the AskAt Agreement, the Company entered into Collaboration and Option Agreement (the "COA") with AskAt for animal health research, including an option agreement for multiple therapeutic candidates with potential in pain, allergy and cancer. During the first quarter of 2018, the Company paid an initial upfront option fee of $500 under the terms of the COA, which was recognized as research and development expense in the consolidated statements of operations.

In December 2018, the Company exercised its right to terminate the COA, and on February 18, 2019, the termination became effective. As a result of the termination of the COA, the Company does not anticipate make any further COA-related payments to AskAt.

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Government and Other Incentive Programs

The Company has received payments from various government and other incentive programs. Generally, under these programs the Company could be obligated to repay any payments received if certain criteria are not met or certain actions are taken by the Company. The Company could be required to repay up to $854 under these incentive programs as of December 31, 2018. The Company has determined these contingencies to be within its control and will only account for repayment(s) if it becomes probable that the Company will be obligated to repay as result of its actions.

13. Common Stock

Authorized Common Stock

As of December 31, 2018 and 2017, the authorized number shares of common stock was 100,000,000, par value $0.001 per share.

Common Stock Outstanding

As of December 31, 2018 and 2017, there were 48,048,914 and 42,532,725 shares of the Company’s common stock outstanding respectively, net of 535,599 and 491,861 shares of unvested restricted common stock, respectively.

Treasury Stock

As of December 31, 2018 and 2017, there were 94,107 and 80,916 shares of the Company’s common stock held as treasury stock at a cost of $1,175 and $1,107, respectively. During the years ended December 31, 2018, 2017 and 2016, 13,191, 2,690 and 0 shares of restricted stock at a cost of $5.17, $6.88 and $0 per share, respectively, were withheld to satisfy employee tax withholding obligations arising in conjunction with the vesting of restricted stock pursuant to the Company’s 2013 Incentive Award Plan (the “2013 Plan”).

Voting Rights

Each share of common stock entitles the holder to one vote on all matters submitted to a vote of the Company’s stockholders. Common stockholders are entitled to receive dividends, as may be declared by the Board of Directors, if any. As of December 31, 2018 and 2017, the Board of Directors had not declared any dividends in any period.

Stock-Based Awards

During the years ended December 31, 2018 and 2017, the Company issued common stock pursuant to the 2013 Plan (Note 14). During the years ended December 31, 2018 and 2017, the Company did not reacquire any unvested shares of common stock from its terminated employees that had been issued upon the exercise of a stock option prior to its vesting.

Shelf Registration Statement

On August 4, 2017, the Company filed a shelf registration statement on Form S-3 (Reg. No. 333-219681) (the "Shelf Registration Statement") with the SEC. The Shelf Registration Statement was declared effective by the SEC on August 16, 2017.

The Shelf Registration Statement allows the Company to offer and sell, from time to time, up to $100,000 of common stock, preferred stock, debt securities, warrants, units or any combination of the foregoing in one or more future public offerings. The terms of any future offering would be determined at the time of the offering and would be subject to market conditions and approval by the Company's Board of Directors. Any offering of securities covered by the Shelf Registration Statement will be made only by means of a written prospectus and prospectus supplement authorized and filed by the Company.

At-the-Market Offerings

Cowen and Company, LLC

On December 18, 2017, the Company entered into a Sales Agreement ("Cowen Sales Agreement") with Cowen and Company, LLC ("Cowen") pursuant to which the Company may sell from time to time, at its option, up to an aggregate of $50,000 of shares of its common stock through Cowen, as sales agent. Any sales of the shares of common stock would be made under the Company's effective Registration Statement on Form S-3 (Reg. No. 333-219681), by means of ordinary brokers' transactions on the Nasdaq Global Market or otherwise. Additionally, under the terms of the Cowen Sales Agreement, the shares of common stock may be sold at market prices, at negotiated prices or at prices related to the prevailing market price. The Company has agreed to pay Cowen a commission of 3% of the gross proceeds from the sale of such shares of common stock.

During the year ended December 31, 2018, the Company sold 5,144,244 shares of common stock for aggregate net proceeds of $24,223, after deducting commission fees of $754 and issuance costs of $171. As of the date of this filing, approximately $24,852 of shares of common stock remained available for sale under the Cowen Sales Agreement.

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Barclays Capital Inc. (“Barclays”)

On October 16, 2015, the Company entered into a sales agreement with Barclays pursuant to which the Company could sell from time to time, at its option, up to an aggregate of $52,000 of shares of its common stock through Barclays, as sales agent. Sales of the shares of common stock were made under the Company’s then effective registration statement on Form S-3 (Reg. No. 333-197414), by means of ordinary brokers’ transactions on the Nasdaq Global Market or otherwise. Additionally, under the terms of the Barclays sales agreement, the shares of common stock could be sold at market prices, at negotiated prices or at prices related to the prevailing market price. The Company paid Barclays a commission of 2.75% of the gross proceeds from the sale of the shares of common stock.

On April 28, 2017, the Company terminated its Barclays sales agreement. As of that date, the Company sold an aggregate of approximately $18,000 of the $52,000 available to be sold under the Barclays sales agreement.

Registered Direct Offering

On May 3, 2017, the Company entered into a Placement Agency Agreement (“PAA”) with Barclays, pursuant to which Barclays agreed to serve as placement agent for an offering of shares of common stock. In conjunction with the PAA, on May 3, 2017, the Company also entered into a Securities Purchase Agreement with certain investors for the sale by the Company of 5,000,000 shares of common stock at a purchase price of $5.25 per share (the “Offering”). The shares of common stock were offered and sold pursuant to the Company’s previously filed and then effective registration statement on Form S-3 (File No. 333-197414) and a related prospectus supplement. The Company agreed to pay Barclays an aggregate fee equal to 6.0% of the gross proceeds received by the Company from the Offering. The Offering closed on May 9, 2017, and the Company received aggregate net proceeds from the Offering of approximately $24,400, after deducting placement agent fees of $1,575 and offering expenses of $273.

14. Stock-Based Awards

2010 Equity Incentive Plan

In 2010, the Company’s Board of Directors adopted the 2010 Equity Incentive Plan (the “2010 Plan”). The 2010 Plan provided for the Company to sell or issue common stock or restricted common stock and to grant incentive stock options or nonqualified stock options for the purchase of common stock with a maximum term of ten years to employees, members of the Board of Directors and consultants of the Company. With the adoption and approval of the 2013 Plan, no further awards will be granted from the 2010 plan.

Stock Options

Activity related to stock options for the year ended December 31, 2018, was as follows:

	Shares Issuable Under Options	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term (In Years)	Aggregate Intrinsic Value
Outstanding as of December 31, 2017	57,394	$ 4.22	5.11	$ 73
Granted	—	—		
Exercised	—	—		
Forfeited	—	—		
Expired	(4,011)	5.57		
Outstanding as of December 31, 2018	53,383	$ 4.12	4.10	$ 107
Options vested and expected to vest as of December 31, 2018	53,383	$ 4.12	4.10	$ 107
Options exercisable as of December 31, 2018	53,383	$ 4.12	4.10	$ 107

For the years ended December 31, 2018, 2017, and 2016, the total intrinsic value of options exercised was $0, $53 and $180, respectively. For the years ended December 31, 2018, 2017 and 2016, the total fair value of awards vested during the period was $0, $8 and $209, respectively. The Company received cash proceeds of $0, $3 and $9 from the exercise of stock options for the years ended December 31, 2018, 2017 and 2016, respectively, none of which were from the early exercise of stock options.

2013 Incentive Award Plan

In 2013, the Company's Board of Directors adopted and stockholders approved the 2013 Plan which became effective upon the day prior to the effective date of the Company's initial public offering. The 2013 Plan as of December 31, 2018 allows for the issuance of up to 6,832,405 shares of common stock, plus any additional shares represented by the 2010 Plan that are forfeited or lapse unexercised. The number of shares of common stock that may be issued under the plan is also subject to an annual increase on

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January 1st of each calendar year beginning in 2014 and ending in 2023, equal to the lesser of (i) 1,203,369 shares, (ii) 4% of the shares of common stock outstanding on the final day of the immediately preceding calendar year and (iii) an amount determined by the Board of Directors. As of December 31, 2018, there were 1,829,915 shares available for future grant under the 2013 Plan. On January 1, 2019, the annual increase was determined to be 1,203,369.

The 2013 Plan is administered by the Compensation Committee of the Board of Directors, which selects the individuals eligible to receive awards, determines or modifies the terms and condition of the awards granted, accelerates the vesting schedule of any award and generally administers and interprets the 2013 Plan. The 2013 Plan permits the granting of incentive and nonqualified stock options, with terms of up to ten years and the granting of restricted stock, restricted stock units, performance stock awards, dividend equivalent rights, stock payments (i.e. unrestricted stock), cash bonuses and stock appreciation rights to employees, consultants, and non-employee directors.

Stock Options

During the year ended December 31, 2018, the Company granted under the 2013 Plan stock options for the purchase of 798,000 shares of common stock to certain employees and non-employee directors. The vesting conditions for most of these awards are time-based, and the awards typically vest 25% after one year and monthly thereafter for the next 36 months. Awards typically expire after 10 years.

Activity related to stock options for the year ended December 31, 2018, was as follows:

	Shares Issuable Under Options	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term (in Years)	Aggregate Intrinsic Value
Outstanding as of December 31, 2017	2,557,143	$ 11.45	7.41	$ 794
Granted	798,000	4.84		
Exercised	(4,709)	3.14		
Forfeited	(151,603)	6.24		
Expired	(84,430)	17.18		
Outstanding as of December 31, 2018	3,114,401	$ 9.86	6.85	$ 2,047
Options vested and expected to vest as of December 31, 2018	3,114,401	$ 9.86	6.85	$ 2,047

Options exercisable as of December 31, 2018	1,961,944	$ 12.40	5.82	$ 755

For the years ended December 31, 2018, 2017 and 2016, the weighted average grant date fair value of stock options granted was $3.16, $5.13 and $2.99, respectively. For the years ended December 31, 2018, 2017 and 2016, the total intrinsic value of options exercised was $9, $185 and $38, respectively. For the years ended December 31, 2018, 2017 and 2016, the total fair value of awards vested during the period was $3,178, $4,424 and $5,380, respectively. The Company received cash proceeds of $15, $244 and $129 from the exercise of stock options for the years ended December 31, 2018, 2017 and 2016, respectively.

Restricted Common Stock

The Company's 2013 Plan provides for the award of restricted common stock. The Company has granted restricted common stock typically with time-based vesting conditions, having terms of between several months and three years. Since 2016, the awards granted to executives typically vest in 12 quarterly installments of 8.33% per quarter for three years. The awards granted to non-executives typically vest in three annual installments of 33.3% each year for three years. Awards granted to consultants typically vest in accordance with the expected length of the consulting arrangement. Unvested shares of restricted common stock may not be sold or transferred by the holder. These restrictions lapse according to the time-based vesting.

Activity related to restricted stock for the year ended December 31, 2018, was as follows:

	Shares	Weighted Average Grant Date Fair Value
Unvested restricted common stock as of December 31, 2017	491,861	$ 7.59
Issued	486,000	4.83
Vested	(380,427)	7.34
Forfeited	(61,835)	5.59
Unvested restricted common stock as of December 31, 2018	535,599	$ 5.50

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For the years ended December 31, 2018, 2017 and 2016, the weighted average grant date fair value of restricted common stock granted was $4.83, $7.85 and $3.95, respectively. For the years ended December 31, 2018, 2017 and 2016, the total fair value of restricted common stock vested was $1,897, $2,065 and $1,559, respectively. The Company received no proceeds for any of the restricted common stock granted during the years ended December 31, 2018, 2017 and 2016.

Stock-Based Compensation

The fair value of each stock option award is estimated using the Black-Scholes option-pricing model. The expected volatility of the Company's common stock is estimated based on historical volatility of the Company's common stock. The expected term of the Company's stock options has been determined utilizing the "simplified" method as the Company has insufficient historical experience for option grants overall, rendering existing historical experience irrelevant to expectations for current grants. The risk-free interest rate is determined by reference to the United States Treasury yield curve in effect at the time of grant of the award for time periods approximately equal to the expected term of the award. Expected dividend yield is based on the fact that the Company has never paid cash dividends and does not expect to pay any cash dividends in the foreseeable future.

The relevant data used to determine the value of the stock option grants, presented on a weighted average basis, was as follows:

	Year Ended December 31,		
	2018	2017	2016
Risk-free interest rate	2.53 %	1.99 %	1.52 %
Expected term (in years)	6.0	6.0	6.2
Expected volatility	72 %	75 %	77 %
Expected dividend yield	— %	— %	— %

Compensation expense related to restricted stock granted to employees and non-employee directors is equal to the fair value of the Company's common stock on date of grant, multiplied by the number of shares of restricted common stock issued. Compensation expense related to restricted stock granted to non-employees is equal to the excess, if any, of the fair value of the Company's common stock on date of vesting over the original purchase price per share, multiplied by the number of shares of restricted common stock vesting.

The Company recorded stock-based compensation expense related to stock options and restricted stock as follows:

	Year Ended December 31,		
	2018	2017	2016
Research and development	$ 655	$ 916	$ 1,069
Cost of product sales and inventories	115	153	116
Selling, general and administrative	4,143	6,049	7,291
	$ 4,913	$ 7,118	$ 8,476

As of December 31, 2018, the Company had an aggregate of $3,562 and $2,308 of unrecognized stock-based compensation expense for options outstanding and restricted stock awards, respectively, which is expected to be recognized over 2.36 years and 1.65 years, respectively.

15. Net Loss Per Share

Basic and diluted net loss per share was calculated as follows:

	Year Ended December 31,		
	2018	2017	2016
Numerator:			
Net loss	$ (14,722)	$ (47,510)	$ (33,575)
Denominator:			
Weighted average shares outstanding, basic and diluted	46,606,855	40,494,301	35,273,228
Net loss per share, basic and diluted	$ (0.32)	$ (1.17)	$ (0.95)

Stock options for the purchase of 3,167,784, 2,614,537 and 2,317,449 shares of common stock and 535,599, 491,861 and 461,463 of unvested restricted stock awards were excluded from the computation of diluted net loss per share for the years ended December 31,

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2018, 2017 and 2016, respectively, because these stock-based awards had an anti-dilutive impact due to the net loss incurred for the period.

16. Commitments and Contingencies

Operating Leases

Future minimum lease payments for operating leases as of December 31, 2018, were as follows:

Year Ending December 31,	
2019	$ 441
2020	450
2021	75
2022	—
2023	—
Thereafter	—
Total	$ 966

The Company leases facilities and certain operating equipment under operating leases expiring through 2021. The Company incurred rent expense of $445, $725 and $726 for the years ended December 31, 2018, 2017 and 2016, respectively.

Litigation

From time to time, the Company may become subject to legal proceedings, claims and litigation arising in the ordinary course of business, including those related to patents, product liability and government investigations. The Company is not presently a party to any litigation which it believes to be material, and is not aware of any pending or threatened litigation against the Company which it believes could have a material effect on its financial statements. The Company accrues contingent liabilities when it is probable that a future liability has been incurred and such liability can be reasonably estimated.

Indemnification Agreements

In the ordinary course of business, the Company may provide indemnifications of varying scope and terms to customers, vendors, lessors, business partners, and other parties with respect to certain matters including, but not limited to, losses arising out of breach of such agreements, from services to be provided by the Company, or from intellectual property infringement claims made by third parties. In addition, the Company has entered into indemnification agreements with all of its executive officers and members of its Board of Directors. These agreements, among other things, require the Company or will require the Company to indemnify each director (and in certain potential scenarios, their applicable venture capital funds) and executive officer to the fullest extent permitted by Delaware law, including indemnification of expenses such as attorneys' fees, judgments, fines and settlement amounts incurred by the director or executive officer in any action or proceeding, including any action or proceeding by or in right of the Company, arising out of the person's services as a director or executive officer. The maximum potential amount of future payments the Company could be required to make under these indemnification agreements is, in many cases, not readily quantifiable. To date, the Company has not incurred any material costs as a result of such indemnifications. The Company does not believe that the outcome of any claims under indemnification arrangements will have a material effect on its financial position, results of operations or cash flows, and it has not accrued any liabilities related to such obligations in its consolidated financial statements as of December 31, 2018 or 2017.

17. Income Taxes

The components of loss from continuing operations before income tax expense or benefit were as follows:

	Year Ended December 31,		
	2018	2017	2016
United States	$ (14,398)	$ (38,920)	$ (29,959)
Non-United States	(324)	(8,590)	(3,616)
Loss from continuing operations	$ (14,722)	$ (47,510)	$ (33,575)

The Company recorded no income tax expense or benefit during years ended December 31, 2018, 2017 and 2016.

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

	Year Ended December 31,		
	2018	2017	2016
Federal statutory income tax rate	21.0 %	34.0 %	34.0 %
State income taxes, net of federal tax benefit	2.4	6.9	3.2
Non-deductible expenses	(1.1)	(0.1)	0.2
Stock-based compensation	(3.9)	(1.8)	(1.5)
Research credits	3.1	1.3	5.0
TCJA	—	(42.8)	—
Other	0.1	(5.0)	—
Change in valuation allowance	(21.6)	7.5	(40.9)
Total	— %	— %	— %

Net deferred tax assets consisted of the following:

	Year Ended December 31,		
	2018	2017	2016
Net operating loss carry forwards	$ 25,811	$ 31,061	$ 27,244
Capitalized start-up costs	4,181	5,052	5,990
Tax credit carry forwards	4,019	3,737	2,996
Intangibles, net	2,633	2,915	2,072
Capitalized research and development, net	4,359	6,083	10,005

Other temporary differences	4,512	5,922	7,940
Total deferred tax assets	45,515	54,770	56,247
Valuation allowance	(45,386)	(54,636)	(56,116)
Net deferred tax assets	129	134	131
Depreciation	(129)	(134)	(131)
Total deferred tax liabilities	(129)	(134)	(131)
Net deferred tax liability	$ —	$ —	$ —

As of December 31, 2018, the Company had net operating loss carryforwards for federal and state income tax purposes of $106,846 and $104,241, respectively, which begin to expire in fiscal year 2031 and 2020, respectively. $13,852 of federal net operating loss carryforward was generated in 2018 and may be carried forward indefinitely.

As of December 31, 2018, the Company had federal and state research and development tax credit carryforwards of $3,206 and $1,029, respectively, which begin to expire in fiscal year 2031 and until utilized, respectively.

Management of the Company has evaluated the positive and negative evidence bearing upon the realizability of its deferred tax assets, which are comprised principally of net operating loss carryforwards and research and development credits. Under the applicable accounting standards, management has considered the Company’s history of losses and concluded that it is more likely than not that the Company will not recognize the benefits of its deferred tax assets. Accordingly, a full valuation allowance of the net deferred tax asset had been established at December 31, 2018 and 2017.

Utilization of the net operating loss and research and development credit carryforwards may be subject to a substantial annual limitation under Section 382 of the Internal Revenue Code of 1986 due to ownership change limitations that have occurred previously or that could occur in the future. These ownership changes may limit the amount of net operating loss and research and development credit carryforwards that can be utilized annually to offset future taxable income and tax, respectively.

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Changes in the valuation allowance for deferred tax assets during the years ended December 31, 2018, 2017 and 2016, were as follows:

	Year Ended December 31,		
	2018	2017	2016
Valuation allowance as of beginning of year	$ 54,636	$ 56,116	$ 46,885
Changes due to operations, TCJA and other tax rates	(9,250)	(1,480)	9,231
Valuation allowance as of end of year	$ 45,386	$ 54,636	$ 56,116

The Company has not recorded any amounts for unrecognized tax benefits as of December 31, 2018 and 2017. The Company files tax returns as prescribed by the tax laws of the jurisdictions in which it operates. The Company's major taxing jurisdiction is the United States (federal and states). In the normal course of business, the Company is subject to examination by federal and state jurisdictions, where applicable. The Company's tax years are still open under statute from 2015 to present, although prior tax years are subject to examination and adjustments to the extent utilized in future years. The Company's policy is to record interest and penalties related to income taxes as part of its income tax expense in the consolidated statements of operations.

The TCJA was enacted on December 22, 2017, a tax reform bill which, amount other items, reduces the current corporate federal tax rate to 21% from 35%. The rate reduction is effective January 1, 2018. ASC Topic 740, Accounting for Income Taxes ("ASC 740"), requires companies to recognize the effect of tax law changes in the period of enactment even though the effective date for most provisions is for tax years beginning after December 31, 2018, or in the case of certain other provisions of the law, January 1, 2018. Accordingly, the Company remeasured its United States deferred tax assets and liabilities as of December 31, 2017, to reflect the reduced rate that is expected to apply in future periods when these deferred taxes will reverse, resulting in an estimated reduction of the Company's net deferred tax assets by approximately $20.3 million, which was offset by a corresponding change in the valuation allowance. The TCJA includes numerous provisions, such as limitation of deduction for executive compensation, that could impact the Company's United States deferred tax assets, which are subject to a full valuation allowance.

The SEC issued Staff Accounting Bulletin No. 118 ("SAB 118") on December 22, 2017. SAB 118 measurement period from a registrant's reporting period that includes the TCJA's enactment date to allow the registrant sufficient time to obtain, prepare and analyze information to complete the accounting required under ASC 740. The Company had completed its accounting for the TCJA in the fourth quarter of 2018, which did not result in a material adjustment to

its deferred tax assets and the related valuation allowance.

18. Selected Quarterly Financial Data (unaudited)

Selected unaudited quarterly financial data for each of the quarters in the years ended December 31, 2018 and 2017 (in thousands, except share and per share data), was as follows:

	2018			
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Net revenues	$ 4,043	$ 4,908	$ 21,555 (1)	$ 4,906
Gross profit (2)	3,507	3,603	19,383	2,136
Net income (loss) (2)	(8,548)	(6,373)	8,833	(8,634)
Weighted average shares outstanding, basic	44,788,068	46,258,395	47,310,408	48,027,220
Weighted average shares outstanding, diluted	44,788,068	46,258,395	47,485,384	48,027,220
Net income (loss) per share, basic and diluted	$ (0.19)	$ (0.14)	$ 0.19	$ (0.18)

(1) Net revenues in the third quarter or 2018 reflect the impact of $15,000 of licensing and collaboration revenue related to GALLIPRANT sales milestone earned from Elanco, as further described in Note 12 to the consolidated financial statements included elsewhere in this 2018 Annual Report.

(2) Net loss in the second and fourth quarter of 2018 and net income in the third quarter of 2018 and gross profit in the second, third and fourth quarter of 2018 reflect the impact of inventory valuation adjustment losses in cost of product sales in the amounts of $335, $883 and $1,432, respectively, as further described in Note 6 to the consolidated financial statements included elsewhere in this 2018 Annual Report.

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	2017 First Quarter	Second Quarter	Third Quarter	Fourth Quarter	
Net revenues (1)	$ 3,795	$ 5,158	$ 6,163 (2)	$ 10,457	(3)
Gross profit	701	1,467	2,473	4,545	
Net loss	(12,612)	(10,380)	(8,920)	(15,598)	(4)
Weighted average shares outstanding, basic and diluted	36,711,601	40,206,042	42,445,553	42,493,514	
Net loss per share, basic and diluted	$ (0.34)	$ (0.26)	$ (0.21)	$ (0.37)	

(1) Net revenues reflect the impact of the product launch of GALLIPRANT which commercial sales began in the first quarter of 2017 and which sales of finished goods in the amount of $15,526 to Elanco ended in the fourth quarter of 2017.

(2) Net revenues in the third quarter or 2017 reflect the impact of $1,000 of licensing and collaboration revenue related to the assumption of manufacturing responsibility by Elanco as further described in Note 12 to the consolidated financial statements included elsewhere in this 2018 Annual Report.

(3) Net revenues in the fourth quarter of 2017 reflect the impact of revenues recognized related to the withdrawal of BLONTRESS from the market and the related derecognition of the remaining balance of the liability of $480 as further described in Note 12 to the consolidated financial statements included elsewhere in this 2018 Annual Report, and the impact of commercial sales of ENTYCE which began in the fourth quarter of 2017.

(4) Net loss in the fourth quarter of 2017 reflects the impact of an intangible asset impairment charge of $7,448 related to AT-006 and AT-008 as further described in Note 9 to the consolidated financial statements included elsewhere in this 2018 Annual Report.