Avinger Inc
Form 10-K
March 06, 2019

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION

WASHINGTON, D.C. 20549

FORM 10-K

(Mark One)

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

For the Fiscal Year Ended December 31, 2018

or

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

Commission File Number: 001-36817

AVINGER, INC.

(Exact name of registrant as specified in its charter)

Delaware	**20-8873453**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification Number)

400 Chesapeake Drive

Redwood City, California 94063

(Address of principal executive offices and zip code)

(650) 241-7900

(Telephone number, including area code)

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

Title of Each Class:	**Name of Each Exchange on which Registered**
Common Stock, par value $0.001 per share	The Nasdaq Capital Market

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

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

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

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

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T 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 registrant’s knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

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

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

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

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

The aggregate market value of the voting and non-voting common equity held by non-affiliates of the registrant, based on the closing price of a share of the registrant's common stock on March 1, 2019 as reported by the Nasdaq Global Market on such date, was approximately $28.8 million. This calculation does not reflect a determination that certain persons are affiliates of the registrant for any other purpose.

As of March 1, 2019, the number of outstanding shares of the registrant's common stock, par value $0.001 per share, was 42,297,117.

DOCUMENTS INCORPORATED BY REFERENCE

None.

AVINGER, INC.

ANNUAL REPORT ON FORM 10-K

FOR THE FISCAL YEAR ENDED DECEMBER 31, 2018

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"Avinger," "Pantheris," and "Lumivascular" are trademarks of our company. Our logo and our other trade names, trademarks and service marks appearing in this Annual Report on Form 10-K are our property. Other trade names, trademarks and service marks appearing in this Annual Report on Form 10-K are the property of their respective owners. Solely for convenience, our trademarks and trade names referred to in this Annual Report on Form 10-K

appear without the ™ symbol, 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 the right of the applicable licensor to these trademarks and trade names.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K contains forward-looking statements concerning our business, operations and financial performance and condition, as well as our plans, objectives and expectations for our business, operations and financial performance and condition. Any statements contained herein that are not statements of historical facts may be deemed to be forward-looking statements. In some cases, you can identify forward-looking statements by terminology such as “anticipate,” “assume,” “believe,” “contemplate,” “continue,” “could,” “due,” “estimate,” “expect,” “goal, “may,” “objective,” “plan,” “predict,” “potential,” “positioned,” “seek,” “should,” “target,” “will,” “would” and other similar e are predictions of or indicate future events and future trends, or the negative of these terms or other comparable terminology. These forward-looking statements include, but are not limited to, statements about:

- the outcome of and expectations regarding our clinical studies, including our INSIGHT trial and plans to conduct further clinical studies;
- our plans to modify our current products, or develop new products, to address additional indications;
- our ability to obtain additional financing through future equity or debt financings;
- the expected timing of 510(k) clearances by FDA, for enhanced versions of Pantheris;
- the expected timing of 510(k) submission to FDA, and associated marketing clearances by FDA, for additional versions of Pantheris designed for use in smaller vessels;
- the expected growth in our business and our organization;
- our expectations regarding government and third-party payor coverage and reimbursement, including the ability of Pantheris to qualify for reimbursement codes used by other atherectomy products;
- our ability to continue as a going concern;
- our ability to retain and recruit key personnel, including the continued development of our sales and marketing infrastructure;
- our ability to obtain and maintain intellectual property protection for our products;

our estimates of our expenses, ongoing losses, future revenue, capital requirements and our needs for, or ability to obtain, additional financing;

our expectations regarding revenue, cost of revenue, gross margins, and expenses, including research and development and selling, general and administrative expenses;

our expectations regarding the time during which we will be an emerging growth company under the Jumpstart Our Business Startups Act;

our ability to identify and develop new and planned products and acquire new products;

our financial performance;

our ability to remain in compliance with laws and regulations that currently apply or become applicable to our business, both in the United States and internationally; and

developments and projections relating to our competitors or our industry.

We believe that it is important to communicate our future expectations to our investors. However, there may be events in the future that we are not able to accurately predict or control and that may cause our actual results to differ materially from the expectations we describe in our forward-looking statements. These forward-looking statements are based on management's current expectations, estimates, forecasts and projections about our business and the industry in which we operate and management's beliefs and assumptions and are not guarantees of future performance or development and involve known and unknown risks, uncertainties and other factors that are in some cases beyond our control. As a result, any or all of our forward-looking statements in this Annual Report on Form 10-K may turn out to be inaccurate. Factors that may cause actual results to differ materially from current expectations include, among other things, those listed in Part I, Item 1A under "Risk Factors" and elsewhere in this Annual Report on Form 10-K. Potential investors are urged to consider these factors carefully in evaluating the forward-looking statements. These forward-looking statements speak only as of the date of this Annual Report on Form 10-K. We assume no obligation to update or revise these forward-looking statements for any reason, even if new information becomes available in the future.

You should not rely upon forward-looking statements as predictions of future events. Although we believe that the expectations reflected in the forward-looking statements are reasonable, we cannot guarantee that the future results, levels of activity, performance or events and circumstances reflected in the forward-looking statements will be achieved or occur. Except as required by law, we undertake no obligation to update publicly any forward-looking statements for any reason after the date of this Annual Report on Form 10-K to conform these statements to actual results or to changes in our expectations.

You should read this Annual Report on Form 10-K and the documents that we reference in this Annual Report on Form 10-K and have filed with the SEC as exhibits to the Annual Report on Form 10-K with the understanding that our actual future results, levels of activity, performance and events and circumstances may be materially different from what we expect.

PART I

ITEM 1. BUSINESS

Overview

We are a commercial-stage medical device company that designs, manufactures and sells image-guided, catheter-based systems that are used by physicians to treat patients with peripheral artery disease, or PAD. Patients with PAD have a build-up of plaque in the arteries that supply blood to areas away from the heart, particularly the pelvis and legs. Our mission is to significantly improve the treatment of vascular disease through the introduction of products based on our Lumivascular platform, the only intravascular image-guided system available in this market. We manufacture and sell a suite of products in the United States and select international markets. Our current products include our Lightbox imaging console, the Ocelot family of catheters, which are designed to allow physicians to penetrate a total blockage in an artery, known as a chronic total occlusion, or CTO, and Pantheris, our image-guided atherectomy device which is designed to allow physicians to precisely remove arterial plaque in PAD patients. In October 2015 we received 510(k) clearance from the U.S. Food and Drug Administration, or FDA, for commercialization of Pantheris, and we received additional 510(k) clearances for enhanced versions of Pantheris in March 2016 and May 2018 and commenced sales of Pantheris in the United States and select European countries promptly thereafter. We also offer the Wildcat and Kittycat catheters, which are used for crossing CTOs but do not contain on-board imaging technology.

Current treatments for PAD, including bypass surgery, can be costly and may result in complications, high levels of post-surgery pain, and lengthy hospital stays and recovery times. Minimally invasive, or endovascular, treatments for PAD include stenting, angioplasty, and atherectomy, which is the use of a catheter-based device for the removal of plaque. These treatments all have limitations in their safety or efficacy profiles and frequently result in recurrence of the disease, also known as restenosis. We believe one of the main contributing factors to high restenosis rates for PAD patients treated with endovascular technologies is the amount of vascular injury that occurs during an intervention. Specifically, these treatments often disrupt the membrane between the outermost layers of the artery, which is referred to as the external elastic lamina, or EEL.

Our Lumivascular platform is the only technology that offers real-time visualization of the inside of the artery during PAD treatment through the use of optical coherence tomography, or OCT, a high resolution, light-based, radiation-free imaging technology. Our Lumivascular platform provides physicians with real-time OCT images from the inside of an artery, and we believe Ocelot and Pantheris are the first products to offer intravascular visualization during CTO crossing and atherectomy, respectively. We believe this approach will significantly improve patient outcomes by providing physicians with a clearer picture of the artery using radiation-free image guidance during treatment, enabling them to better differentiate between plaque and healthy arterial structures. Our Lumivascular platform is designed to improve patient safety by enabling physicians to direct treatment towards the plaque, while

avoiding damage to healthy portions of the artery.

During the first quarter of 2015, we completed enrollment of patients in VISION, a clinical trial designed to support our August 2015 510(k) filing with the FDA for our Pantheris atherectomy device. VISION was designed to evaluate the safety and efficacy of Pantheris to perform atherectomy using intravascular imaging and successfully achieved all primary and secondary safety and efficacy endpoints. We believe the data from VISION allows us to demonstrate that avoiding damage to healthy arterial structures, and in particular disruption of the external elastic lamina, which is the membrane between the outermost layers of the artery, reduces the likelihood of restenosis, or re-narrowing, of the diseased artery. Although the original VISION study protocol was not designed to follow patients beyond six months, we have worked with 18 of the 20 VISION sites to re-solicit consent from previous clinical trial patients in order to evaluate patient outcomes through 12 and 24 months following initial treatment. Data collection for the patients from participating sites was completed in May 2017, and we released the final 12 and 24-month results for a total of 89 patients in July 2017.

We commenced commercialization of Pantheris as part of our Lumivascular platform in the United States and in select international markets in March 2016, after obtaining the required marketing authorizations. During the fourth quarter of 2017, we began enrolling patients in INSIGHT, a clinical trial designed to support a filing with the FDA to expand the indication for our Pantheris atherectomy device to specifically include in-stent restenosis. We received CE Marking in December 2017 and 510(k) clearance in May 2018 for a next-generation version of our Pantheris atherectomy device, which we believe represents a significant improvement over our prior product. This next-generation version of Pantheris includes new features and design improvements to the handle, shaft, balloon and nose cone that we believe improve usability and reliability of the device. The next-generation Pantheris atherectomy device is available for commercial sale in the United States and select international markets. On December 13, 2018 we announced the 500th patient treated with the next-generation Pantheris. All previous versions of Pantheris have been discontinued.

We are developing a line extension of our Pantheris image-guided atherectomy platform, Pantheris SV (Small Vessel), a lower profile version of Pantheris. The lower profile Pantheris has a smaller diameter and longer length that we believe will optimize it for use in smaller vessels. We submitted a 510(k) application for Pantheris SV in August 2018 and received CE Marking approval in October 2018. On November 15, 2018 we announced the successful treatment of the first patients globally with Pantheris SV by a vascular surgeon in Münster, Germany. Pantheris SV is available in limited supply for commercial sale in the EU; it is not available for commercial sale in the United States at this time.

We have assembled a team with extensive medical device development and commercialization capabilities. In addition to the commercialization of Pantheris in the United States and select international markets in March 2016, we began commercializing our initial non-Lumivascular platform products in 2009 and introduced our Lumivascular platform products in the United States in late 2012. We generated revenues of $10.7 million in 2015, $19.2 million in 2016, $9.9 million in 2017 and $7.9 million in 2018.

Our Products

Our current products include our Lightbox imaging console and our various catheters used in PAD treatment. All of our revenues are currently derived from sales of our Lightbox imaging console and our various PAD catheters and related services in the United States and select international markets. Each of our current products is, and our future products will be, designed to address significant unmet clinical needs in the treatment of vascular disease.

LUMIVASCULAR PRODUCTS

Name	Clinical Indication	Size (Length, Diameter)	Regulatory Status	Original Clearance Date
PIPELINE PRODUCTS				
Pantheris SV (Small Vessel)	Atherectomy		FDA 510(k) filed CE Marking	October 2018
PRODUCTS				
Lightbox(1)	OCT Imaging	N/A	FDA Cleared CE Marking	November 2012 September 2011
Pantheris (next-generation)	Atherectomy		FDA Cleared CE Marking	May 2018 December 2017
Ocelot(2)	CTO Crossing	110cm, 6F	FDA Cleared CE Marking	November 2012 September 2011
Ocelot MVRX(2)	CTO Crossing	110cm, 6F	FDA Cleared	December 2012

Ocelot PIXL(2)	CTO Crossing	135/150cm, 5F	FDA Cleared CE Marking	December 2012 October 2012

(1) Lightbox is cleared for use with compatible Avinger products.

(2) The Ocelot system is intended to facilitate the intra-luminal placement of conventional guidewires beyond stenotic lesions including subtotal and chronic total occlusions in the peripheral vasculature prior to further percutaneous interventions using OCT-assisted orientation and imaging. The system is an adjunct to fluoroscopy and provides images of vessel lumen, plaques and wall structures. The Ocelot system is contraindicated for use in the iliac, coronary, cerebral, renal and carotid vasculature.

NON-IMAGING PRODUCTS

Name	**Indication**	**Size (Length, Diameter)**	**Regulatory Status**	**Original Clearance Date**
Wildcat(1)	Guidewire Support	110cm, 6F	FDA Cleared	February 2009(3)
	CTO Crossing	110cm, 6F	FDA Cleared CE Marking	August 2011 May 2011
Kittycat 2(2)	CTO Crossing	150cm, 5F	FDA Cleared CE Marking	October 2011 September 2011

(1) The Wildcat catheter is intended to facilitate the intraluminal placement of conventional guidewires beyond stenotic lesions (including subtotal and chronic total occlusions) in the peripheral vasculature prior to further percutaneous intervention. The Wildcat catheter is contraindicated for use in the iliac, coronary, cerebral, renal and carotid vasculature. The Wildcat catheter is intended to be used to support steerable guidewires in accessing discrete regions of the peripheral vasculature. It may be used to facilitate placement and exchange of guidewires and other interventional devices. It may also be used to deliver saline or contrast.

(2) The Kittycat 2 catheter is intended to facilitate the intraluminal placement of conventional guidewires beyond stenotic lesions (including subtotal and chronic total occlusions) in the peripheral vasculature prior to further percutaneous intervention. The Kittycat 2 catheter is contraindicated for use in the iliac, coronary, cerebral, renal and carotid vasculature.

(3) This original clearance date is for the 7F version of Wildcat. The commercially available version of Wildcat is listed and was cleared in August 2010.

Lumivascular Platform Overview

Our Lumivascular platform integrates OCT visualization with interventional catheters and is the industry's only system that provides real-time intravascular imaging simultaneously with treatment in PAD procedures. Our Lumivascular platform consists of a capital component, Lightbox, and a variety of disposable catheter products, including Ocelot, Ocelot PIXL, Ocelot MVRX and Pantheris.

Lightbox

Lightbox is our proprietary imaging console, which enables the use of Lumivascular catheters during PAD procedures. The console contains an optical transceiver that transmits light into the artery through an optical fiber and displays a cross-sectional image of the vessel to the physician on a high definition monitor during the procedure. Lightbox is configured with two monitors, one for the physicians, and one for the Lightbox technician.

Lightbox displays a cross-sectional view of the vessel, which provides physicians with detailed information about the orientation of the catheter and the surrounding artery and plaque. Layered structures represent relatively healthy portions of the artery and non-layered structures represent the plaque that is blocking blood flow in the artery. Navigational markers allow the physician to orient the catheter toward the treatment area, helping to avoid damage to the healthy arterial structures during a procedure. Lightbox received FDA 510(k) clearance in November 2012 and CE Marking in Europe in September 2011.

Pantheris

We believe Pantheris is the first atherectomy catheter to incorporate real-time OCT intravascular imaging. Pantheris may be used alone or following a CTO crossing procedure using Ocelot or other products. Pantheris is a single-use product and provides physicians with the ability to see a cross-sectional view of the peripheral artery to guide the removal of blockages throughout the procedure. The device restores blood flow by shaving thin strips of plaque using a high-speed directional cutting mechanism that enables physicians to specifically target the portion of the artery where the plaque resides while minimizing disruption to healthy arterial structures. The excised plaque is deposited in the nosecone of the device and removed from the artery within the device.

In October 2015, we received 510(k) clearance from the FDA for commercialization of Pantheris. We made modifications to Pantheris after the completion of the VISION trial and commenced sales in the United States and select international markets following receipt of FDA approval for this version of Pantheris in March 2016. We first

received CE Marking for Pantheris in June 2015. We received CE Marking in December 2017 and 501(k) clearance in May 2018 for a next-generation version of Pantheris, which includes new features and design improvements to the handle, shaft, balloon and nose cone of the device. The next-generation Pantheris atherectomy device is available for commercial sale in the United States and select international markets. All previous versions of Pantheris have been discontinued.

We are developing a line extension of our Pantheris image-guided atherectomy platform, Pantheris SV (Small Vessel), a lower profile version of Pantheris. The lower profile Pantheris has a smaller diameter and longer length and is designed for use in smaller vessels 2 to 4 millimeters in diameter. We submitted a 510(k) application for Pantheris SV in August 2018 and received CE Marking in October 2018. Pantheris SV is available in limited supply for commercial sale in the EU; it is not available for commercial sale in the United States at this time.

Ocelot, Ocelot PIXL and Ocelot MVRX

Ocelot is the first CTO crossing catheter to incorporate real-time OCT imaging, which allows physicians to see the inside of a peripheral artery during a CTO crossing procedure. Physicians have traditionally relied solely on fluoroscopy and tactile feedback to guide catheters through complicated blockages. Ocelot allows physicians to accurately navigate through CTOs by utilizing the OCT images to precisely guide the device through the arterial blockage, while minimizing disruption to the healthy arterial structures. A successful CTO crossing and placement of a guidewire allows the physician to subsequently treat the vessel with a therapeutic device. We received CE Marking for Ocelot in September 2011 and received FDA 510(k) clearance in November 2012.

We also offer Ocelot PIXL, a lower profile CTO crossing device for below-the-knee arteries and Ocelot MVRX, which offers a different tip design for peripheral arteries above the knee. We received CE Marking for Ocelot PIXL in October 2012 and received FDA 510(k) clearance in December 2012. We received FDA 510(k) clearance for Ocelot MVRX in December 2012.

Other Products

Our first-generation CTO crossing catheters, Wildcat and Kittycat, employ a proprietary design that uses a rotational spinning technique, allowing the physician to switch between passive and active modes when navigating across a CTO. Once across the CTO, Wildcat and Kittycat allow for placement of a guidewire and removal of the catheter while leaving the wire in place for additional therapies. Both products require the use of fluoroscopy solely rather than our Lumivascular platform for imaging. Wildcat was our first commercial product and has received both FDA 510(k) clearance in the United States and CE Marking in Europe for crossing peripheral artery CTOs. Kittycat has FDA 510(k) clearance in the United States and CE Marking clearance in Europe for the treatment of peripheral artery CTOs.

Clinical Development

We have conducted several clinical trials to evaluate the safety and efficacy of our products, and we received FDA clearance for Wildcat and Ocelot for CTO crossing in 2011 and 2012, respectively, and for Pantheris in October 2015.

CONNECT (Wildcat)

Our clinical trial for the Wildcat catheter, known as the CONNECT trial, was a prospective, multi-center, non-randomized trial that evaluated the safety and efficacy of Wildcat in crossing CTOs in arteries of the upper leg. The CONNECT trial enrolled 88 patients with CTOs at 15 centers in the United States. Patients were followed for 30 days post-procedure and an independent group of physicians verified the results to determine crossing efficacy and safety endpoints. The CONNECT trial demonstrated that Wildcat was able to cross 89% of CTOs following unsuccessful attempts to cross with standard guidewire techniques. The trial demonstrated a 95% freedom from major adverse events, or MAEs. In the CONNECT trial, MAEs were defined as clinically significant perforations or embolizations and/or Grade C or greater dissections occurring within 30 days of the procedure. These results represent the second-highest reported CTO crossing rate of any published CTO clinical trial, exceeded only by our subsequent CONNECT II clinical trial results.

CONNECT II (Ocelot)

Our clinical trial for Ocelot, known as CONNECT II, was a prospective, multi-center, non-randomized trial that evaluated the safety and efficacy of Ocelot in crossing CTOs in arteries of the upper leg using OCT intravascular imaging. The CONNECT II trial enrolled 100 patients with CTOs at 14 centers in the United States and two centers in Europe. Patients were followed for 30 days post-procedure and an independent group of physicians verified the results to confirm the primary efficacy and safety endpoints. Results from the CONNECT II trial demonstrated that Ocelot surpassed its primary efficacy endpoint by successfully crossing the CTO in 97% of the cases following unsuccessful attempts to cross with standard guidewire techniques. Ocelot achieved these rates with 98% freedom from MAEs.

VISION (Pantheris)

VISION was our pivotal, non-randomized, prospective, single-arm trial to evaluate the safety and effectiveness of Pantheris across 20 sites within the United States and Europe. The objective of the clinical trial was to demonstrate that Pantheris can be used to effectively remove plaque from diseased lower extremity arteries while using on-board visualization as an adjunct to fluoroscopy. Two groups of patients were treated in VISION: (1) optional roll-ins, which are typically the first two procedures at a site, and (2) the primary cohort, which are the analyzable group of patients. The data for these two groups were reported separately in our 510(k) submission to the FDA. Based on final enrollment, the primary cohort included 130 patients. In March 2015, we completed enrollment of patients in the VISION clinical trial and we submitted for 510(k) clearance from the FDA in August 2015. In October 2015, we received 510(k) clearance from the FDA for commercialization of Pantheris. We have made modifications to Pantheris subsequent to the completion of VISION and received 510(k) clearance on the enhanced version of Pantheris in March 2016.

VISION's primary efficacy endpoint required that at least 87% of lesions treated by physicians using Pantheris have a residual stenosis of less than 50%, as verified by an independent core laboratory. The primary safety endpoint required that less than 43% of patients experience an MAE through six-month follow-up as adjudicated by an independent Clinical Events Committee, or CEC. MAEs as defined in VISION included cardiovascular-related death, unplanned major index limb amputation, clinically driven target lesion revascularization, or TLR, heart attack, clinically significant perforation, dissection, embolus, and pseudoaneurysm. Results from the VISION trial demonstrated that Pantheris surpassed its primary efficacy and safety endpoints; residual restenosis of less than 50% was achieved in 96.3% of lesions treated in the primary cohort, while MAEs were experienced in 16.6% of patients.

Although not mandated by the FDA to support the market clearance of Pantheris, the protocol for the VISION trial allowed for routine histopathological analysis of the tissue extracted by Pantheris to be conducted. This process allowed us to determine the amount of adventitia present in the tissue, which in turn indicated the extent to which the external elastic lamina had been disrupted during Pantheris procedures. We completed histopathological analysis on tissue from 129 patients in the primary cohort, representing 162 lesions and determined that the average percent area of adventitia was only 1.0% of the total excised tissue. We believe the low level of EEL disruption will correlate to lower restenosis rates and improved long-term outcomes for patients treated with Pantheris, but we do not intend to make any promotional claims to that effect based on the data from this study. We published the results of the histopathological analysis in conjunction with the primary safety and efficacy endpoint data from the VISION trial.

Final VISION trial data is summarized in the table below.

	Roll-In Cohort	**Primary Cohort**	**Total**
Patients Treated	28	130	158
Lesions treated	34	164	198
Primary Efficacy Endpoint			
Lesions analyzed by core lab	34	164	198
Lesions meeting primary efficacy endpoint criterion of residual restenosis of less than 50% by core lab	100% (34/34)	96.3% (158/164)	97% (192/198)
Primary Safety Endpoint (MAEs through 6 months)			
Total MAEs Reported	3	22	25
Reported MAEs as a percentage of patients enrolled	11.5% (3/26)	17.6% (22/125)	16.6% (25/151)
Histopathology Results (Non-Endpoint Data)			
Lesions with histopathology results	34	162	196
Average percent area of adventitia in all lesions with histopathology results	0.56%	1.02%	0.94%

Although the original VISION study protocol was not designed to follow patients beyond six months, in 2016 we began working with 18 of the VISION sites to re-consent patients in order for them to be evaluated for patient

outcomes through 12 and 24 months following initial treatment. Data collection for patients from participating sites was completed in May 2017, and we released the final 12- and 24-month results for a total of 73 patients and 89 lesions in July 2017. The key metrics reported for this group were freedom from target lesion revascularization, or TLR, at 12 months and 24 months, which were 82% and 74% by patient and 83% and 76% by lesion, respectively, based on Kaplan-Meier curve assessments.

INSIGHT (Pantheris)

INSIGHT is a prospective, global, single-arm, multi-center study to evaluate the safety and effectiveness of Pantheris for treating in-stent restenosis in lower extremity arteries. In-stent restenosis occurs when a blocked artery previously treated with a stent becomes narrowed again, thereby reducing blood flow. Physicians often face challenges when treating in-stent restenosis both in terms of safety and efficacy. From a safety standpoint, limitations in imaging techniques, such X-ray fluoroscopy, and the inability to control the directionality of other atherectomy devices create concerns with impacting the integrity of the stent during the procedure. In terms of efficacy, current therapies for in-stent restenosis, such as balloon angioplasty, have high rates of recurrent narrowing within stents.

The INSIGHT trial allows for up to 140 patients to be treated at up to 20 sites in the United States and Europe. Patient enrollment began in October 2017 and will continue through 2020. Patient outcomes will be evaluated at thirty days, six months and one year following treatment. We plan to submit a 510(k) application with the FDA seeking a specific indication for treating in-stent restenosis with Pantheris once the trial is fully enrolled and follow-up data through six months are analyzed.

Sales and Marketing

We focus our sales and marketing efforts primarily on the approximately 10,000 interventional cardiologists, vascular surgeons and interventional radiologists in the United States that are potential users of our Lumivascular platform products. Our marketing efforts are focused on developing strong relationships with physicians and hospitals that we have identified as key opinion leaders based on their knowledge of our products, clinical expertise and reputation. We also use continuing medical education programs and other opportunities to train interventional cardiologists, vascular surgeons, and interventional radiologists in the use of our Lumivascular platform products and educate them as to the benefits of our products as compared to alternative procedures such as angioplasty, stenting, bypass surgery or other atherectomy procedures. In addition, we work with physicians to help them develop their practices and with hospitals to market themselves as centers of excellence in PAD treatment by making our products available to physicians for treating patients.

Our sales team currently consists of a Vice President, Regional Directors and Territory Sales Managers, Clinical Specialists, and one Director of International Sales. Territory Sales managers are responsible for all product sales, which include disposable catheters and sale and service of our Lightbox console, while Clinical Specialists are primarily responsible for case coverage and account support. We have an extensive hands-on sales training program, focused on our technologies, Lumivascular image interpretation, case management, sales processes, sales tools and implementing our sales and marketing programs and compliance with applicable federal and state laws and regulations. Our sales team is supported by our marketing team, which focuses primarily on clinical training and education, marketing communications and product management. We have partnered with a third-party field service firm for the installation, service and maintenance of our Lightbox consoles.

As of December 31, 2018, we had 24 employees focused on sales and marketing. Our sales, general and administrative expenses for the years ended December 31, 2018 and 2017 were $17.4 million and $25.1 million, respectively. No single customer accounted for more than 10% of our revenues during 2018 or 2017.

Competition

The medical device industry is highly competitive, subject to rapid change and significantly affected by new product introductions, results of clinical research, corporate combinations and other factors relating to our industry. Because of the market opportunity and the high growth potential of the PAD treatment market, competitors and potential competitors have historically dedicated, and will continue to dedicate, significant resources to aggressively develop and commercialize their products.

Our products compete with a variety of products or devices for the treatment of PAD, including other CTO crossing devices, stents, balloons and atherectomy catheters, as well as products used in vascular surgery. Large competitors in the CTO crossing, stent and balloon market segments include Abbott Laboratories, Becton Dickinson, Boston Scientific, Cardinal Health, Cook Medical, Medtronic and Philips. Competitors in the atherectomy market include Boston Scientific, Cardiovascular Systems, Medtronic and Philips. Some competitors have attempted to combine intravascular imaging with atherectomy and although we are not aware of any active initiatives in this area, these and other companies may attempt to incorporate on-board visualization into their products in the future or may have ongoing programs of which we are not aware. Other competitors include pharmaceutical companies that manufacture drugs for the treatment of symptoms associated with mild to moderate PAD and companies that provide products used by surgeons in peripheral and coronary bypass procedures. These competitors and other companies may introduce new products that compete with our solution.

Many of our competitors have substantially greater financial, manufacturing, marketing and technical resources than we do. Furthermore, many of our competitors have well-established brands, widespread distribution channels and broader product offerings, and have established stronger and deeper relationships with target customers.

To compete effectively, we have to demonstrate that our products are attractive alternatives to other devices and treatments on the basis of:

- procedural safety and efficacy;
- acute and long-term outcomes;
- ease of use and procedure time;
- price;
- size and effectiveness of sales force;
- radiation exposure for physicians, hospital staff and patients; and
- third-party reimbursement.

Intellectual property

In order to remain competitive, we must develop and maintain protection of the proprietary aspects of our technologies. We rely on a combination of patents, copyrights, trademarks, trade secret laws and confidentiality and invention assignment agreements to protect our intellectual property rights.

It is our policy to require our employees, consultants, contractors, outside scientific collaborators and other advisors to execute non-disclosure and assignment of invention agreements on commencement of their employment or engagement. Agreements with our employees also forbid them from using the proprietary rights of third parties in their work for us. We also require confidentiality or material transfer agreements from third parties that receive our confidential data or materials.

As of December 31, 2018, we held 23 issued and allowed U.S. patents and had 29 U.S. utility patent applications and 4 PCT applications pending. As of December 31, 2018, we also had 45 issued and allowed patents from outside of the United States. As of December 31, 2018, we had 43 pending patent applications outside of the United States, including in Australia, Canada, China, Europe, India and Japan. As we continue to research and develop our products and technology, we intend to file additional U.S. and foreign patent applications related to the design, manufacture and therapeutic uses of our devices. Our issued patents expire between the years 2028 and 2034.

Our patent applications may not result in issued patents and our patents may not be sufficiently broad to protect our technology. Any patents issued to us may be challenged by third parties as being invalid, or third parties may independently develop similar or competing technology that avoids our patents. The laws of certain foreign countries do not protect our intellectual property rights to the same extent as do the laws of the United States.

As of December 31, 2018, we held five registered U.S. trademarks. In Europe, we hold three registered trademarks. In addition, we held one International Registration under the Madrid Protocol with granted extensions to China, Europe, Japan, and Korea (reflected in the three European registration noted above)..

Research and Development

Our ongoing research and development activities are primarily focused on improving and enhancing our Lumivascular platform, specifically our core competency of integrating OCT intravascular imaging onto therapeutic catheters. Our research objectives target areas of unmet clinical need, increase the utility of the Lumivascular platform and adoption of our products by healthcare providers.

Product line improvements and extensions. We are developing improvements to our Lumivascular platform, including additional catheters for use in different clinical applications. For example, we are developing versions of Pantheris designed to treat smaller vessels, and we are also developing next-generation CTO crossing devices to target both the peripheral and coronary CTO markets.

Additional treatment indications. We intend to seek additional regulatory clearances from FDA to expand the indications for which our products can be marketed within PAD, as well as in other areas of the body. This includes both expanding the marketed indications for our current products, as well as development of new products.

Next-generation console. We are focusing our console development efforts on miniaturization, equipment integration and increased processing power in anticipation of future catheter products. We may also develop a version of our Lumivascular platform that integrates OCT imaging into existing catheterization lab and operating room imaging systems.

Improved software and user interface. We intend to further develop our software to provide more information and control to our end users during a procedure. We use physician and staff feedback to improve the features and user functionality of our Lumivascular platform.

As of December 31, 2018, we had 10 employees focused on research and development. In addition to our internal team, we retain third-party contractors from time to time to provide us with assistance on specialized projects. We also work closely with experts in the medical community to supplement our internal research and development resources. Research and development expenses for the years ended December 31, 2018 and 2017 were $6.0 million and $11.3 million, respectively.

Manufacturing

Prior to the introduction of our Lumivascular platform, our non-imaging catheter products were manufactured by a third-party. All of our products are now manufactured in-house using components and sub-assemblies manufactured both in-house at our facility in Redwood City, California and by outside vendors. We assemble all of our products at our manufacturing facility but certain critical processes such as coating and sterilization are done by outside vendors. We expect our current manufacturing facility will be sufficient through at least 2019.

Order quantities and lead times for components purchased from outside suppliers are based on our forecasts derived from historical demand and anticipated future demand. Lead times for components may vary significantly depending on the size of the order, time required to fabricate and test the components, specific supplier requirements and current market demand for the components and subassemblies. To date, we have not experienced significant delays in obtaining any of our components or subassemblies.

We rely on single and limited source suppliers for several of our components and sub-assemblies. For example, we rely on single vendors for our optical fiber and drive cables that are key components of our catheters, and we rely on single vendors for our laser and data acquisition card that are key components of our Lightbox. These components are critical to our products and there are relatively few alternative sources of supply for them. Identifying and qualifying additional or replacement suppliers for any of the components used in our products could involve significant time and cost. Any supply interruption from our vendors or failure to obtain additional vendors for any of the components used to manufacture our products would limit our ability to manufacture our products and could therefore harm our business, financial condition and results of operations.

Our manufacturing operations are subject to regulatory requirements of 21 CFR part 820 of the Federal Food, Drug and Cosmetic Act, or FFDCA; the Quality System Regulation, or QSR, for medical devices sold in the United States, which is enforced by FDA; the Medical Devices Directive 93/42/EEC, which is required for doing business in the European Union; and applicable requirements relating to the environment, waste management and health and safety matters, including measures relating to the release, use, storage, treatment, transportation, discharge, disposal and remediation of hazardous substances, and the sale, labeling, collection, recycling, treatment and disposal of products containing hazardous substances. We cannot ensure that we will not incur material costs or liability in connection with our operations, or that our past or future operations will not result in claims by or injury to employees or the public.

Other than through accepted purchase orders, our suppliers have no contractual obligations to supply us with, and we are not contractually obligated to purchase from them, any of our supplies. Any supply interruption from our vendors or failure to obtain additional vendors for any of the components would limit our ability to manufacture our products and could have a material adverse effect on our business, financial condition and results of operations.

We have registered with FDA as a medical device manufacturer and have obtained a manufacturing license from the California Department of Public Health, or CDPH. We and our component suppliers are required to manufacture our products in compliance with FDA's QSR in 21 CFR part 820 of the FFDCA. The QSR regulates extensively the methods and documentation of the design, testing, control, manufacturing, labeling, quality assurance, packaging, storage and shipping of our products. FDA enforces the QSR through periodic unannounced inspections that may include the manufacturing facilities of our subcontractors. Our Quality System has undergone 20 external audits by third-parties and regulatory authorities since 2009, the latest of which was a surveillance audit conducted in January 2017 by BSI, our European Notified Body, under the Medical Device Single Audit Program, or MDSAP. The audit resulted in zero observations of non-conformances.

Our failure or the failure of our component suppliers to maintain compliance with the QSR requirements could result in the shutdown of our manufacturing operations or the recall of our products, which would harm our business. In the event that one of our suppliers fails to maintain compliance with our or governmental quality requirements, we may have to qualify a new supplier and could experience manufacturing delays as a result. We have opted to maintain quality assurance and quality management certifications to enable us to market our products in the member states of the European Union, the European Free Trade Association and countries which have entered into Mutual Recognition Agreements with the European Union. Our Redwood City facilities meet the requirements set forth by ISO 13485:2003 Medical devices—Quality management systems—Requirements for regulatory purposes and MDD 93/42/EEC European Union Council Medical Device Directive.

Government Regulation

In general, medical device companies must navigate a challenging regulatory environment. In the United States the FDA regulates the medical device market to ensure the safety and efficacy of these products. The FDA allows for two primary pathways for a medical device to gain approval for commercialization: (i) a pre-market approval, or (ii) PMA application or 510(k) pre-market notification submission. A completely novel product must go through the more rigorous pre-market approval, or PMA, if it cannot receive authorization through a 510(k). The FDA has established three different classes of medical devices that indicate the level of risk associated with using a device and consequent degree of regulatory controls needed to govern its safety and efficacy. Class I and Class II devices are considered lower risk. The lowest risk medical devices can be marketed without a PMA or 510(k) clearance. Other Class I and Class II devices often can gain approval for commercial distribution by submitting an application to the FDA, generally known as the 510(k) process. The devices regarded as the highest risk by the FDA are designated Class III status and generally require the submission of a PMA application for approval to commercialize a product. These generally include life-sustaining, life-supporting, or implantable devices or devices without a known predicate technology already approved by the FDA.

The 510(k) clearance path can be significantly less time-consuming and arduous than PMA approval, making this route generally preferable for a medical device company. A 510(k) application must include documentation that its device is substantially equivalent to a technology already cleared through a 510(k) or in distribution before May 28, 1976 for which the FDA has not required a PMA submission. The FDA has 90 days from the date of the pre-market equivalence acceptance to authorize or decline commercial distribution of the device. However, similar to the PMA process, clearance may take longer than this three-month window, as the FDA can request additional data. If the FDA resolves that the product is not substantially equivalent to a predicate device, then the device acquires a Class III designation, and a PMA must be approved before the device can be commercialized. All of our currently marketed products have received commercial clearance and associated indications for use through the 510(k) regulatory pathway with the FDA, some with the support of clinical data.

After a device receives 510(k) clearance, any modification that could significantly affect its safety or effectiveness, or that would constitute a change in its intended use, will require a new 510(k) submission and clearance before the modified device can be commercialized. The FDA requires each manufacturer to make this determination initially, but the FDA can review any such decision and can disagree with the manufacturer’s determination. If the FDA disagrees with the determination not to seek a new 510(k) clearance or PMA the FDA may retroactively require a new 510(k) clearance or pre-market approval. The FDA could also require a manufacturer to cease marketing and distribution of the modified device and/or recall the modified device until 510(k) clearance or PMA approval is obtained. Also, in these circumstances, a manufacturer may be subject to significant regulatory fines, penalties, and enforcement actions.

A PMA application must include reasonable scientific and clinical data that demonstrates the device is safe and effective for the intended uses and indications being sought. The application must also include preclinical testing, technical, manufacturing and labeling information. If the FDA determines the application can undergo substantive

review, it has 180 days to review the submission, but it can typically take longer (up to several years) as this regulatory body can request additional information or clarifications. The FDA may also impose additional regulatory hurdles for a PMA, including the institution of an advisory panel of experts to assess the application or provide recommendations as to whether to approve the device. Although the FDA in the end approves or disapproves the device, in nearly all cases the FDA follows the recommendation from the advisory panel. As part of this process, the FDA will usually inspect the manufacturing facilities and operations prior to approval to verify compliance with quality control regulations. Significant changes in the manufacturing of a device, or changes in the intended use, indications and labeling or design of a product require new PMA applications or PMA supplements for a product originally approved under a PMA. This creates substantial regulatory risk for devices undergoing the PMA route.

Pervasive and Continuing Regulation

After a device is placed on the market, numerous regulatory requirements continue to apply. These include:

- the FDA's QSR which requires manufacturers, including third-party manufacturers, to follow stringent design, testing, control, documentation and other quality assurance procedures during all aspects of the manufacturing process;

- labeling regulations and FDA prohibitions against the promotion of products for uncleared, unapproved or off-label uses;

- clearance or approval of product modifications that could significantly affect safety or efficacy or that would constitute a major change in intended use;

- medical device reporting, or MDR, regulations, which require that manufacturers report to the FDA if their device may have caused or contributed to a death or serious injury or malfunctioned in a way that would likely cause or contribute to a death or serious injury if the malfunction were to recur; and

- post-market surveillance regulations, which apply when necessary to protect the public health or to provide additional safety and effectiveness data for the device.

The MDR regulations require that we report to the FDA any incident in which our product may have caused or contributed to a death or serious injury or in which our product malfunctioned and, if the malfunction were to recur, would likely cause or contribute to death or serious injury.

We have registered with the FDA as a medical device manufacturer and have obtained a manufacturing license from the CDPH. The FDA has broad post-market and regulatory enforcement powers. We are subject to unannounced inspections by the FDA and the Food and Drug Branch of CDPH to determine our compliance with the QSR and other regulations, and these inspections may include the manufacturing facilities of our suppliers. Our current facility has been inspected by the FDA in 2009, 2011 and 2013, and two, three and zero observations, respectively, were noted during those inspections. In the latest FDA audit in 2013, there were no observations that involved a material violation of regulatory requirements, and no non-conformances were noted. Our responses to the observations noted in 2009 and 2011 were accepted by the FDA, and we believe that we are in substantial compliance with the QSR. BSI, our European Notified Body, inspected our facility several times between 2010 and 2015 and found zero non-conformances. BSI conducted four external audits in 2016 and zero non-conformances were found in all except for one audit, for which four minor non-conformances were found. The BSI audit performed in January 2017 resulted in zero non-conformances.

Failure to comply with applicable regulatory requirements can result in enforcement action by FDA, which may include any of the following sanctions:

- warning letters, adverse publicity, fines, injunctions, consent decrees and civil penalties;
- repair, replacement, refunds, recall or seizure of our products;
- operating restrictions, partial suspension or total shutdown of production;
- refusing our requests for 510(k) clearance or pre-market approval of new products, new intended uses or modifications to existing products;
- withdrawing 510(k) clearance or pre-market approvals that have already been granted; and
- criminal prosecution.

Regulatory System for Medical Devices in Europe

The European Union consists of 28 member states and has a coordinated system for the authorization of medical devices. The E.U. Medical Devices Directive, or MDD, sets out the basic regulatory framework for medical devices in the European Union. This directive has been separately enacted in more detail in the national legislation of the individual member states of the European Union.

The system of regulating medical devices operates by way of a certification for each medical device. Each certificated device is marked with CE marking which shows that the device has a Certificat de Conformité. There are national bodies known as Competent Authorities in each member state which oversee the implementation of the MDD within their jurisdiction. The means for achieving the requirements for CE marking varies according to the nature of the device. Devices are classified in accordance with their perceived risks, similarly to the U.S. system. The class of a product determines the requirements to be fulfilled before CE marking can be placed on a product, known as a conformity assessment. Conformity assessments for our products are carried out as required by the MDD. Each member state can appoint Notified Bodies within its jurisdiction. If a Notified Body of one member state has issued a Certificat de Conformité, the device can be sold throughout the European Union without further conformance tests being required in other member states.

Federal, State and Foreign Fraud and Abuse Laws

Because of the significant federal funding involved in Medicare and Medicaid, Congress and the states have enacted, and actively enforce, a number of laws to eliminate fraud and abuse in federal healthcare programs. Our business is subject to compliance with these laws. In March 2010, the Patient Protection and Affordable Care Act, as amended by the Healthcare and Education Affordability Reconciliation Act, which we refer to collectively as the Affordable Care Act, was enacted in the United States. The provisions of the Affordable Care Act are effective on various dates. The Affordable Care Act expands the government’s investigative and enforcement authority and increases the penalties for fraud and abuse, including amendments to both the Anti-Kickback Statute and the False Claims Act, to make it easier to bring suit under these statutes. The Affordable Care Act also allocates additional resources and tools for the government to police healthcare fraud, with expanded subpoena power for HHS, additional funding to investigate fraud and abuse across the healthcare system and expanded use of recovery audit contractors for enforcement.

Anti-Kickback Statutes. The federal Anti-Kickback Statute prohibits persons from knowingly and willfully soliciting, offering, receiving or providing remuneration, directly or indirectly, in exchange for or to induce either the referral of an individual, or the furnishing or arranging for a good or service, for which payment may be made under a federal healthcare program such as Medicare or Medicaid. Violation of the Anti-Kickback Statue is a criminal felony, and can result in criminal sanctions, civil penalties, enforcement under the False Claims Act, and exclusion from federal healthcare programs.

The definition of "remuneration" has been broadly interpreted to include anything of value, including, for example, gifts, certain discounts, the furnishing of free supplies, equipment or services, credit arrangements, payment of cash and waivers of payments. Several courts have interpreted the statute's intent requirement to mean that if any one purpose of an arrangement involving remuneration is to induce referrals of federal healthcare covered businesses, the statute has been violated. Penalties for violations include criminal penalties and civil sanctions such as fines, imprisonment and possible exclusion from Medicare, Medicaid and other federal healthcare programs. In addition, some kickback allegations have been claimed to violate the Federal False Claims Act, discussed in more detail below.

The Anti-Kickback Statute is broad and prohibits many arrangements and practices that are otherwise lawful in businesses outside of the healthcare industry. Recognizing that the Anti-Kickback Statute is broad and may technically prohibit many innocuous or beneficial arrangements, Congress authorized the Office of Inspector General, or OIG, of HHS to issue a series of regulations known as "safe harbors." These safe harbors set forth provisions that, if all their applicable requirements are met, will assure healthcare providers and other parties that they will not be prosecuted under the Anti-Kickback Statute. The failure of a transaction or arrangement to fit precisely within one or more safe harbors does not necessarily mean that it is illegal or that prosecution will be pursued. However, conduct and business arrangements that do not fully satisfy an applicable safe harbor may result in increased scrutiny by government enforcement authorities such as OIG.

Many states have adopted laws similar to the Anti-Kickback Statute. Some of these state prohibitions apply to referral of recipients for healthcare items or services reimbursed by any source, not only the Medicare and Medicaid programs.

Government officials have focused their enforcement efforts on the marketing of healthcare services and products, among other activities, and recently have brought cases against companies, and certain individual sales, marketing and executive personnel, for allegedly offering unlawful inducements to potential or existing customers in an attempt to procure their business.

Federal False Claims Act. Another development affecting the healthcare industry is the increased use of the federal False Claims Act by federal prosecutors, and in particular, action brought pursuant to the False Claims Act's "whistleblower" or "qui tam" provisions. The False Claims Act imposes liability on any person or entity that, among other things, knowingly presents, or causes to be presented, a false or fraudulent claim for payment by a federal healthcare

program. The qui tam provisions of the False Claims Act allow a private individual to bring actions on behalf of the federal government alleging that the defendant has violated the False Claims Act and to share in any monetary recovery. In recent years, the number of suits brought against healthcare providers by private individuals has increased dramatically. In addition, various states have enacted false claims laws analogous to the False Claims Act, and many of these state laws apply where a claim is submitted to any third-party payor and not just a federal healthcare program.

When an entity is determined to have violated the False Claims Act, it may be required to pay up to three times the actual damages sustained by the government, plus civil penalties of between $11,181-$22,363 for each separate instance of false claim. As part of any settlement, the government may ask the entity to enter into a corporate integrity agreement, which imposes certain compliance, certification and reporting obligations. There are many potential bases for liability under the False Claims Act. Liability arises, primarily, when an entity knowingly submits, or causes another to submit, a false claim for reimbursement to the federal government. The federal government has used the False Claims Act to assert liability on the basis of inadequate care, kickbacks and other improper referrals, and improper use of Medicare numbers when detailing the provider of services, in addition to the more predictable allegations as to misrepresentations with respect to the services rendered. In addition, the federal government has prosecuted companies under the False Claims Act in connection with off-label promotion of products. Our future activities relating to the reporting of wholesale or estimated retail prices of our products, the reporting of discount and rebate information and other information affecting federal, state and third-party reimbursement of our products and the sale and marketing of our products may be subject to scrutiny under these laws.

While we are unaware of any current matters, we are unable to predict whether we will be subject to actions under the False Claims Act or a similar state law, or the impact of such actions. However, the costs of defending such claims, as well as any sanctions imposed, could significantly affect our financial performance.

The Sunshine Act. The Physician Payment Sunshine Act, or the Sunshine Act, which was enacted as part of the Affordable Care Act, requires all United States manufacturers of a prescription drug, device, biologic or other medical supply that has been approved or cleared by the FDA, and is available for coverage by Medicare, Medicaid or the Children's Health Insurance Program to report annually to the Secretary of HHS: (i) payments or other transfers of value made by that entity, or by a third-party as directed by that entity, to physicians and teaching hospitals or to third parties on behalf of physicians or teaching hospitals; and (ii) physician ownership and investment interests in the drug and device manufacturing entity. The payments required to be reported include the cost of meals provided to a physician, travel reimbursements and other transfers of value, including those provided as part of contracted services such as speaker programs, advisory boards, consultation services and clinical trial services. Failure to comply with the reporting requirements can result in significant civil monetary penalties ranging from $1,000 to $10,000 for each payment or other transfer of value that is not reported (up to a maximum per annual report of $150,000) and from $10,000 to $100,000 for each knowing failure to report (up to a maximum per annual report of $1,150,000). Additionally, there are criminal penalties if an entity intentionally makes false statements in such reports. We are subject to the Sunshine Act and the information we disclose may lead to greater scrutiny, which may result in modifications to established practices and additional costs. Additionally, similar reporting requirements have also been enacted on the state level domestically, and an increasing number of countries worldwide either have adopted or are considering similar laws requiring transparency of interactions with healthcare professionals.

Foreign Corrupt Practices Act. The Foreign Corrupt Practices Act, or FCPA, prohibits any United States individual or business from paying, offering, or authorizing payment or offering of anything of value, directly or indirectly, to any foreign official, political party or candidate for the purpose of influencing any act or decision of the foreign entity in order to assist the individual or business in obtaining or retaining business. The FCPA also obligates companies whose securities are listed in the United States to comply with accounting provisions requiring us to maintain books and records that accurately and fairly reflect all transactions of the corporation, including international subsidiaries, if any, and to devise and maintain an adequate system of internal accounting controls for international operations.

International Laws. In Europe, various countries have adopted anti-bribery laws providing for severe consequences, in the form of criminal penalties and/or significant fines, for individuals and/or companies committing a bribery offense. Violations of these anti-bribery laws, or allegations of such violations, could have a negative impact on our business, results of operations and reputation. For instance, in the United Kingdom, under the Bribery Act 2010, which went into effect in July 2011, a bribery occurs when a person offers, gives or promises to give a financial or other advantage to induce or reward another individual to improperly perform certain functions or activities, including any function of a public nature. Bribery of foreign public officials also falls within the scope of the Bribery Act 2010. Under the new regime, an individual found in violation of the Bribery Act of 2010, faces imprisonment of up to 10 years. In addition, the individual can be subject to an unlimited fine, as can commercial organizations for failure to prevent bribery.

There are also international privacy laws that impose restrictions on the access, use, and disclosure of health information. All of these laws may impact our business. Our failure to comply with these privacy laws or significant changes in the laws restricting our ability to obtain required patient information could significantly impact our business and our future business plans.

U.S. Healthcare Reform

Changes in healthcare policy could increase our costs and subject us to additional regulatory requirements that may interrupt commercialization of our current and future solutions. Changes in healthcare policy could increase our costs, decrease our revenues and impact sales of and reimbursement for our current and future solutions. The Affordable Care Act substantially changes the way healthcare is financed by both governmental and private insurers, and significantly impacts our industry principally by moving healthcare reimbursement towards more value-based and quality-based payment methodologies. The Act contains a number of provisions that impact our business and operations, some of which in ways we cannot currently predict, including those governing enrollment in federal healthcare programs and reimbursement changes.

There will continue to be proposals by legislators at both the federal and state levels, regulators and third-party payors to reduce costs while expanding individual healthcare benefits. Certain of these changes could impose additional limitations on the prices we will be able to charge for our current and future solutions or the amounts of reimbursement available for our current and future solutions from governmental agencies or third-party payors. Furthermore, the current presidential administration and Congress may again attempt broad sweeping changes to the current healthcare laws. We face uncertainties that might result from modification or repeal of any of the provisions of the Affordable Care Act, including as a result of current and future executive orders and legislative actions. The impact of those changes on us and potential effect on the medical device industry as a whole is currently unknown. But, any changes to the Affordable Care Act are likely to have an impact on our results of operations, and may have a material adverse effect on our results of operations. We cannot predict what other healthcare programs and regulations will ultimately be implemented at the federal or state level or the effect any future legislation or regulation in the United States may have on our business.

Third-Party Reimbursement

Payment for patient care in the United States is generally made by third-party payors, including private insurers and government insurance programs, such as Medicare and Medicaid. The Medicare program, the largest single payor in the United States, is a federal governmental health insurance program administered by the Centers for Medicare and Medicaid Services, or CMS, and covers certain medical care expenses for eligible elderly and disabled individuals. Because a large percentage of the population with PAD includes Medicare beneficiaries, and private insurers may follow the coverage and payment policies of Medicare, Medicare’s coverage and payment policies are significant to our operations.

Medicare pays PAD treatment facilities, including hospitals and physician office-based labs, pre-determined amounts for each procedure performed. These payment amounts differ based on a variety of factors, including:

- Type of procedure performed—angioplasty, stent or atherectomy;
- Patient-specific complexities and comorbidities;
- Type of facility—hospital, teaching hospital or office-based lab;
- Inpatient or outpatient status; and
- Geographic region.

We receive payment from the treatment facility for our products, and the Medicare reimbursement to the facility is intended to cover the overall cost of treatment, including the cost of products used during the procedure as well as the overhead cost associated with the facility where the procedure is performed. For procedures performed in hospitals, the physician who performs the procedure is reimbursed separately under the Medicare physician fee schedule. Claims for PAD procedures are typically submitted by the treatment facility and physician to Medicare or other health insurers using established billing codes. These codes identify the procedures performed and are relied upon to determine third-party payor reimbursement amounts.

Medicare reimbursement for inpatient PAD procedures that include atherectomy for 2019 went into effect on October 1, 2018 and range between approximately $11,000 and $19,000. These amounts include the cost of disposable catheters such as Ocelot and Pantheris. While reimbursement varies based on the type of procedure performed (*e.g.*, angioplasty, stent or atherectomy), additional device-specific reimbursement is not available. The amount of reimbursement can vary substantially by geographical region and by facility. Payment rates of other third-party payors may follow Medicare rates, or they may be higher or lower, depending on their particular reimbursement methodology. Because of the wide variability, it is not possible to identify an average rate for third-party payors other than Medicare.

Employees

As of December 31, 2018, we had 75 employees, including 22 in manufacturing and operations, 24 in sales and marketing, 10 in research and development and clinical and regulatory affairs, 8 in quality assurance and 11 in finance, general administrative and executive administration. Of these 75 employees, 5 are part time employees. None

of our employees are represented by a labor union or are parties to a collective bargaining agreement and we believe that our employee relations are good.

Corporate and other Information

We were incorporated in Delaware on March 8, 2007. Our principal executive offices are located at 400 Chesapeake Drive, Redwood City, California 94063, and our telephone number is (650) 241-7900. Our website address is www.avinger.com. References to our website address do not constitute incorporation by reference of the information contained on the website, and the information contained on the website is not part of this document.

We make available, free of charge on our corporate website, copies of our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, Proxy Statements, and all amendments to these reports, as soon as reasonably practicable after such material is electronically filed with or furnished to the Securities and Exchange Commission, or the SEC, pursuant to Section 13(a) or 15(d) of the Securities Exchange Act. We also show detail about stock trading by corporate insiders by providing access to SEC Forms 3, 4 and 5. This information may also be obtained from the SEC's on-line database, which is located at www.sec.gov. Our common stock is traded on the Nasdaq Capital Market under the symbol "AVGR".

We are an "emerging growth company," as defined in the Jumpstart Our Business Startups Act of 2012. As such, we are eligible for exemptions from various reporting requirements applicable to other public companies that are not emerging growth companies, including, but not limited to, not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002 and reduced disclosure obligations regarding executive compensation. We will remain an emerging growth company until the earlier of (1) December 31, 2019, (2) the last day of the fiscal year (a) in which we have total annual gross revenue of at least $1.07 billion or (b) in which we are deemed to be a large accelerated filer, which means the market value of our common stock that is held by non-affiliates exceeds $700 million as of the prior June 30th, and (3) the date on which we have issued more than $1.0 billion in non-convertible debt securities during the prior three-year period.

Item 1A. Risk Factors

Investing in our common stock involves a high degree of risk. We have identified the following risks and uncertainties that may have a material adverse effect on our business, financial condition, results of operations and future growth prospects. Our business could be harmed by any of these risks. The risks and uncertainties described below are not the only ones we face. If any of the risks actually occur, our business, financial condition, results of operations, cash flows and prospects could be materially and adversely affected. The trading price of our common stock could decline due to any of these risks, and you may lose all or part of your investment. In assessing these risks, you should also refer to the other information contained in this Annual Report on Form 10-K, including our financial statements and related notes. Please also see "Cautionary Notes Regarding Forward-Looking Statements."

Risks Related to Our Business

Our quarterly and annual results may fluctuate significantly, may not fully reflect the underlying performance of our business and may result in decreases in the price of our common stock.

Our quarterly and annual results of operations, including our revenues, profitability and cash flow, may vary significantly in the future and period-to-period comparisons of our operating results may not be meaningful. Accordingly, the results of any one quarter or period should not be relied upon as an indication of future performance. Our quarterly and annual financial results may fluctuate as a result of a variety of factors, many of which are outside our control and, as a result, may not fully reflect the underlying performance of our business. Fluctuation in quarterly and annual results may decrease the value of our common stock. Factors that may cause fluctuations in our quarterly and annual results include, without limitation:

our ability to obtain and maintain FDA clearance and approval from foreign regulatory authorities for our products, and the timing of such clearances and approvals, particularly with respect to current and future generations of Pantheris;

market acceptance of our Lumivascular platform and products, including Pantheris;

the availability of reimbursement for our Lumivascular platform products;

our ability to attract new customers and increase the amount of business we generate from existing customers;

results of our clinical trials;

the timing and success of new product and feature introductions by us or our competitors or any other change in the competitive dynamics of our industry, including consolidation among competitors, customers or strategic partners;

the amount and timing of costs and expenses related to the maintenance and expansion of our business and operations;

changes in our pricing policies or those of our competitors;

general economic, political, industry and market conditions;

the regulatory environment;

the hiring, training and retention of key employees, including our sales team;

the cost and potential outcomes of existing and future litigation;

our ability to obtain additional financing; and

advances and trends in new technologies and industry standards.

We have a history of net losses and we may not be able to achieve or sustain profitability.

We have incurred significant losses in each period since our inception in 2007. We incurred net losses of $27.6 million in 2018 and $48.7 million in 2017. As of December 31, 2018, we had an accumulated deficit of approximately $328.9 million. These losses and our accumulated deficit reflect the substantial investments we have made to develop our Lumivascular platform and acquire customers.

We expect our losses to continue for the foreseeable future as we continue to make significant future expenditures to develop and expand our business. In addition, as a public company, we will continue to incur significant legal, accounting and other expenses. Accordingly, we cannot assure you that we will achieve profitability in the future or that, if we do become profitable, we will sustain profitability. Our failure to achieve and sustain profitability would negatively impact the market price of our common stock.

We may not be able to secure additional financing on favorable terms, or at all, to meet our future capital needs and our failure to obtain additional financing when needed could force us to delay, reduce or eliminate our product development programs and commercialization efforts or cause us to become insolvent.

We believe that our cash and cash equivalents at December 31, 2018, and expected revenues from operations, will be sufficient to satisfy our capital requirements and fund our operations through at least the third quarter of 2019. Even though we received net proceeds of $10.2 million from the sale of our common stock and Series C convertible preferred stock in our November 2018 offering, net proceeds of $15.5 million from the sales of our Series B convertible preferred stock and warrants in our February 2018 offering, and net proceeds of $3.0 million from the sale of our common stock and warrants in our July 2018 offering, we will need to raise additional funds through future equity or debt financings within the next twelve months to meet our operational needs and capital requirements for product development, clinical trials and commercialization and may subsequently require additional fundraising. We can provide no assurance that we will be successful in raising funds pursuant to additional equity or debt financings or that such funds will be raised at prices that do not create substantial dilution for our existing stockholders. Given the recent decline in our stock price, any financing that we undertake could cause substantial dilution to our existing stockholders.

To date, we have financed our operations primarily through sales of our products and net proceeds from the issuance of our preferred stock and debt financings, our “at-the-market” program, our initial public offering, or IPO, and our follow-on public offerings. The warrants issued in connection with the Series B and Series C preferred stock offering in February 2018 prohibit us from entering into certain transactions involving the issuance of securities for a variable price determined by reference to the trading price of our common stock or otherwise subject to modification following the date of issuance, in each case until February 17, 2021. This prohibition may be waived by holders of two-thirds of the outstanding Series 1 and Series 2 warrants at any time. We do not know when or if our operations will generate sufficient cash to fund our ongoing operations. We cannot be certain that additional capital will be available as needed on acceptable terms, or at all. In the future, we may require additional capital in order to (i) continue to conduct research and development activities, (ii) conduct post-market clinical studies, as well as clinical trials to obtain regulatory clearances and approvals necessary to commercialize our Lumivascular platform products, (iii) expand our sales and marketing infrastructure and (iv) acquire complementary businesses technologies or products; or (v) respond to business opportunities, challenges, a decline in sales, increased regulatory obligations or unforeseen circumstances. Our future capital requirements will depend on many factors, including:

- the degree of success we experience in commercializing our Lumivascular platform products, particularly Pantheris, and any future versions of such products;

the costs, timing and outcomes of clinical trials and regulatory reviews associated with our future products;

the costs and expenses of maintaining or expanding our sales and marketing infrastructure and our manufacturing operations;

the costs and timing of developing variations of our Lumivascular platform products, especially Pantheris and, if necessary, obtaining FDA clearance of such variations;

the extent to which our Lumivascular platform is adopted by hospitals for use by interventional cardiologists, vascular surgeons and interventional radiologists in the treatment of PAD;

the number and types of future products we develop and commercialize;

the costs of defending ourselves against existing and future litigation, including pending stockholder class action claims;

the costs of preparing, filing and prosecuting patent applications and maintaining, enforcing and defending intellectual property-related claims; and

the extent and scope of our general and administrative expenses.

We may raise additional funds in equity or debt financings or enter into credit facilities in order to access funds for our capital needs. Any debt financing obtained by us in the future would cause us to incur additional debt service expenses and could include restrictive covenants relating to our capital raising activities and other financial and operational matters, which may make it more difficult for us to obtain additional capital and pursue business opportunities. In addition, due to our current level of debt, future equity investors may require that we convert all or a portion of our debt to equity, and our debtholders may not agree to such terms. If we raise additional funds through further issuances of equity or convertible debt securities, and/or if we convert all or a portion of our existing debt to equity, our existing stockholders could suffer significant dilution in their percentage ownership of our company, and any new equity securities we issue could have rights, preferences and privileges senior to those of holders of our common stock. If we are unable to obtain adequate financing or financing on terms satisfactory to us when we require it, we may terminate or delay the development of one or more of our products, delay clinical trials necessary to market our products, delay establishment of sales and marketing capabilities or other activities necessary to commercialize our products, and significantly scale back our operations, or we may become insolvent. If this were to occur, our ability to continue to grow and support our business and to respond to business challenges could be significantly limited.

We have a significant amount of debt, which may adversely affect our ability to operate our business and our financial position and our ability to secure additional financing in the future.

As of December 31, 2018, we had $7.5 million in principal and interest outstanding under a Term Loan Agreement, or the Loan Agreement, with CRG Partners III L.P. and certain of its affiliated funds (collectively “CRG”). Our significant amount of debt may:

- increase our vulnerability to adverse changes in general economic, industry and competitive conditions;
- require us to dedicate a substantial portion of our cash flow from operations to make payments on our debt, thereby reducing the availability of our cash flow to fund working capital, capital expenditures and other general corporate purposes;
- limit our flexibility in planning for, or reacting to, changes in our business and the industry in which we operate;
- restrict us from exploiting business opportunities;
- make it more difficult to satisfy our financial obligations, including payments on the Loan Agreement;
- place us at a competitive disadvantage compared to our competitors that have less debt obligations; and

limit our ability to borrow additional funds for working capital, capital expenditures, acquisitions, debt service requirements, execution of our business strategy or other general corporate purposes on satisfactory terms or at all.

The existence of a substantial amount of debt may make it difficult for us to run our business effectively or raise the capital we need to continue our operations.

Covenants under the Loan Agreement will restrict our business in many ways.

The Loan Agreement contains various covenants that limit, subject to certain exceptions, our ability to, among other things:

incur or assume liens;

incur additional debt or provide guarantees in respect of obligations of other persons;

issue redeemable stock and preferred stock;

pay dividends or make distributions on capital stock, repurchase, redeem or make payments on capital stock or repay, repurchase, redeem, retire, defease, acquire or cancel debt prior to the stated maturity thereof;

make loans, investments or acquisitions;

create or permit restrictions on the ability of our subsidiaries to pay dividends or make other distributions to us or to guarantee our debt, limit our or any of our subsidiaries ability to create liens, or make or pay intercompany loans or advances;

enter into certain transactions with affiliates;

sell, transfer, license, lease or dispose of our or our subsidiaries' assets, including the capital stock of our subsidiaries; and

dissolve, liquidate, consolidate or merge with or into, or sell substantially all of our assets to another person.

In particular, the Loan Agreement, as amended, includes a covenant that we maintain a minimum of $3.5 million of cash and certain cash equivalents, and we will have to achieve minimum revenue of $15.0 million in 2020, $20.0 million in 2021 and $25.0 million in 2022. If we fail to meet the applicable minimum revenue target in any calendar year, the Loan Agreement provides a cure right if we prepay a portion of the outstanding principal equal to 2.0 times the revenue shortfall. There can be no assurance as to our future compliance with the covenants under the Loan Agreement, as amended.

The covenants contained in the Loan Agreement could adversely affect our ability to:

finance our operations;

make needed capital expenditures;

make strategic acquisitions or investments or enter into alliances;

withstand a future downturn in our business or the economy in general;

refinance our outstanding indebtedness prior to maturity;

engage in business activities, including future opportunities, that may be in our interest; and

plan for or react to market conditions or otherwise execute our business strategies.

We are also subject to standard event of default provisions under the Loan Agreement that, if triggered, would allow the debt to be accelerated, which could significantly deplete our cash resources, cause us to raise additional capital at unfavorable terms, require us to sell portions of our business or result in us becoming insolvent. The existing collateral pledged under the Loan Agreement may prevent us from being able to secure additional debt or equity financing on

favorable terms, or at all, or to pursue business opportunities, including potential acquisitions. If we default under any of these debt covenants and are unable to cure the default within the relevant cure period, we would need relief from default or else our creditors could exercise their remedies. In addition, potential sources of equity financing may decline to invest in our company given the amount of debt and the rights that debt holders have to get paid before equity holders. In order to facilitate equity investments, future equity investors may require that we convert all or a portion of our debt to equity, and our debtholders may not agree to such terms. The amount of debt could therefore affect our ability to finance our company and prevent us from obtaining necessary operating capital as a result.

We may not be able to generate sufficient cash to service our credit facility with CRG. If we fail to comply with the obligations under our credit facility, the lender may be able to accelerate amounts owed under the facility and may foreclose upon the assets securing our obligations.

Borrowings under our credit facility are secured by substantially all of our personal property, including our intellectual property. Our ability to make scheduled payments or to refinance our debt obligations depends on numerous factors, including the amount of our cash reserves and our actual and projected financial and operating performance. These amounts and our performance are subject to numerous risks, including the risks in this section, some of which may be beyond our control. We cannot assure you that we will maintain a level of cash reserves or cash flows from operating activities sufficient to permit us to pay the principal, premium, if any, and interest on our existing or future indebtedness. If our cash flows and capital resources are insufficient to fund our debt service obligations, we may be forced to reduce or delay capital expenditures, sell assets or operations, seek additional capital or restructure or refinance our indebtedness. We cannot assure you that we would be able to take any of these actions, or that these actions would permit us to meet our scheduled debt service obligations. In addition, in the event of our breach of the Loan Agreement, we may be required to repay any outstanding amounts earlier than anticipated. If we fail to comply with our obligations under the Loan Agreement, the lender would be able to accelerate the required repayment of amounts due and, if they are not repaid, could foreclose upon our assets securing our obligations under the Loan Agreement.

Our limited commercialization experience and number of approved products makes it difficult to evaluate our current business, predict our future prospects, assess the long-term performance of our products, and forecast our financial performance.

We were incorporated in 2007, began commercializing our initial non-Lumivascular platform products in 2009 and introduced our first Lumivascular platform products in the United States in late 2012. We received 510(k) clearance from the FDA, for commercialization of Pantheris in October 2015, an additional 510(k) clearance for an enhanced version of Pantheris in March 2016 and commenced sales of Pantheris in the United States and select international markets promptly thereafter. Our current next-generation version of Pantheris received FDA clearance in May 2018. Our limited commercialization experience and number of approved products make it difficult to evaluate our current business and predict our future prospects. We have encountered and will continue to encounter risks and difficulties frequently experienced by companies in rapidly-changing industries. These risks and uncertainties include the risks inherent in clinical trials, market acceptance of our products, and increasing and unforeseen expenses as we continue to attempt to grow our business.

In addition, we have in the past, and may in the future, become aware of performance issues with our products. For example, prior to becoming commercially available on March 1, 2016, Pantheris had been used in clinical trials mainly in controlled situations. Since its commercialization and as more physicians have used Pantheris, we have received additional feedback on its performance, both positive and negative. We have attempted to address certain of these concerns with our current version of Pantheris. However, there can be no assurance that the changes and improvements will fully address the performance issues that have been raised by earlier versions of Pantheris. Even if these issues are resolved and physician concerns addressed, future product performance issues may occur and our reputation could suffer, which could lead to decreased sales of our products. Our revenue has been and continues to be adversely impacted by these product performance issues. We also had to incur additional expenses to make product changes and improvements, and to replace products in accordance with our warranty policy. This additional expense, and any future expense that we may incur as a result of future product performance issues, will negatively impact our financial performance and results of operations. If we are unable to improve the performance of our products to meet the concerns of physicians our revenue may decline further or fail to increase.

Our short commercialization experience and limited number of approved products also make it difficult for us to forecast our future financial performance and such forecasts are limited and subject to a number of uncertainties, including our ability to obtain FDA clearance for new versions of Pantheris and other Lumivascular platform products we intend to commercialize in the United States. If our assumptions regarding the risks and uncertainties we face, which we use to plan our business, are incorrect or change due to circumstances in our business or our markets, or if we do not address these risks successfully, our operating and financial results could differ materially from our expectations and our business could suffer.

Our success depends in large part on a limited number of products, particularly Pantheris, all of which have a limited commercial history. If these products fail to gain, or lose, market acceptance, our business will suffer.

Ocelot, Ocelot PIXL, Ocelot MVRX, Lightbox, Wildcat, Kittycat 2 and Pantheris are our only products currently cleared for sale, and our current revenues are wholly dependent on them. Sales of Wildcat and Kittycat 2 have declined and are continuing to decline as we focus on the promotion of our Lumivascular platform products. In addition, the long-term viability of our company is largely dependent on the successful commercialization and continued development of Pantheris and we expect that sales of our next-generation Pantheris and our other current and future Lumivascular platform products in the United States will account for substantially all of our revenues for the foreseeable future. Accordingly, our success depends on the continued and growing acceptance and use of Pantheris and our other Lumivascular platform products by the medical community. All of our products have a limited commercial history. For example, we received 510(k) clearance from the FDA to commercialize Pantheris in October 2015 as well as a separate FDA clearance to market enhanced versions of Pantheris in March 2016 and May 2018, and those versions of Pantheris became commercially available in the United States and select international markets promptly thereafter. As such acceptance among physicians of these products may not increase or may decline.

Our ability to successfully market Pantheris will also be limited due to a number of factors including regulatory restrictions in our labeling. We cannot assure you that demand for Pantheris and our other Lumivascular platform products will continue to grow and our products may not significantly penetrate current or new markets. Market demand for Pantheris and physician adoption of this product also may be negatively impacted by product performance issues that we have experienced and the need to replace certain products in accordance with our warranty policy. Utilization of our products has been less than we anticipated historically. If demand for Pantheris and our other Lumivascular platform products does not increase and we cannot sell our products as planned, our financial results will be harmed. In addition, market acceptance may be hindered if physicians are not presented with compelling data from long-term studies of the safety and efficacy of our Lumivascular platform products compared to alternative procedures, such as angioplasty, stenting, bypass surgery or other atherectomy procedures. For example, if patients undergoing treatment with our Lumivascular platform products have retreatment rates higher than or comparable with the retreatment rates of alternative procedures, it will be difficult to demonstrate the value of our Lumivascular platform products. Any studies we may conduct comparing our Lumivascular platform with alternative procedures will be expensive, time consuming and may not yield positive results. Physicians will also need to appreciate the value of real-time imaging in improving patient outcomes in order to change current methods for treating PAD patients. In addition, demand for our Lumivascular platform products may decline or may not increase as quickly as we expect. Failure of our Lumivascular platform products to significantly penetrate current or new markets, or our failure to successfully commercialize Pantheris, would harm our business, financial condition and results of operations.

We are also aware of certain characteristics and features of our Lumivascular platform that may prevent widespread market adoption. For example, in procedures using the current model of Pantheris, some physicians may prefer to have a technician or second physician assisting with the operation of the catheter as well as a separate technician to operate the Lightbox, potentially making it less financially attractive for physicians and their hospitals and medical facilities. It may take significant time and expense to modify our products to allow a single physician to operate the entire system and we can provide no guarantee that we will be able to make such modifications, or obtain any additional and necessary regulatory clearances for such modifications. Although the OCT images created by our Lightbox may make it possible for physicians to reduce the degree to which fluoroscopy and contrast dye are used when using our Lumivascular platform products compared to competing endovascular products, physicians are still using both fluoroscopy and contrast dye. As a result, risks of complications from radiation and contrast dye are still present and may limit the commercial success of our products. Finally, it will require training for technicians and physicians to effectively operate our Lumivascular platform products, including interpreting the OCT images created by our Lightbox, which may affect adoption of our products by physicians. These or other characteristics and features of our Lumivascular platform may cause our products not to be widely adopted and harm our business, financial condition and results of operation.

We rely heavily on our sales professionals to market and sell our products. If we are unable to hire, effectively train, manage, improve the productivity of, and retain our sales professionals, our business will be harmed, which would impair our future revenue and profitability.

Our success largely depends on our ability to hire, train, manage and improve the productivity levels of our sales professionals. We have experienced direct sales employee and sales management turnover in the past. The loss of any member of our sales team's senior management could weaken our sales expertise and harm our business, and we may not be able to find adequate replacements on a timely basis, or at all. The changes in senior management that have occurred over the past several years may continue to create instability in our sales force leading to attrition in sales representatives in the future.

Competition for sales professionals who are familiar with and trained to sell our products continues to be strong. We train our sales professionals to better understand our existing and new product technologies and how they can be positioned against our competitors' products. These initiatives are intended to improve the productivity of our sales professionals and our revenue and profitability. It takes time for the sales professionals to become productive following their hiring and training and there can be no assurance that sales representatives will reach adequate levels of productivity, or that we will not experience significant levels of attrition in the future. Measures we implement to improve the productivity may not be successful and may instead contribute to instability in our operations, additional departures from our sales organization, or further reduce our revenue, profitability, and harm our business and our stock price may be adversely impacted as a result.

If our revenue does not improve, or if our cost of revenue and/or operating expenses increase by a greater percentage than our revenue, our gross margins and operating margins may be adversely impacted, our loss from operations will increase, and our cash used in operating activities will increase, which could reduce our assets and

have a material adverse effect on our stock price.

Our gross margin increased to 17% for the year ended December 31, 2018, compared to -31% for the year ended December 31, 2017. Gross margin for the three months and year ended December 31, 2018 was positively impacted by lower excess and obsolete provisions related to our Lightbox and Pantheris inventories in 2018.

Our gross margin is impacted by the revenue that we generate and the costs incurred to generate the revenue. To the extent that our revenue does not grow or declines, it is difficult to improve our gross margins as our fixed costs must be spread over a lower revenue base. Our future revenue may be adversely affected by a number of factors including the competitive market environment in which we operate, which may result in a decrease in the number of products sold or a decrease in the average selling prices achieved for our product sales. If our revenue does not improve, or if our cost of revenue increases by a greater percentage than our revenue, or if we are not able to reduce expenses in the event of a decline in revenue, we may continue to generate losses from operations and use cash, which could reduce our cash faster than budgeted, cause us to need to obtain additional financing and have a material adverse effect on our operations and stock price.

Our ability to compete is highly dependent on demonstrating the benefits of our Lumivascular platform to physicians, hospitals and patients.

In order to generate sales, we must be able to clearly demonstrate that our Lumivascular platform is both a more effective treatment system and more cost-effective than the alternatives offered by our competitors. If we are unable to convince physicians that our Lumivascular platform leads to significantly lower rates of restenosis, or narrowing of the artery, and leads to fewer adverse events during treatment than those using competing technologies, our business will suffer. In order to use Pantheris or our Ocelot family of catheters, hospitals must make an investment in our Lightbox. Accordingly, we must convince hospitals and physicians that our Lumivascular platform results in significantly better patient outcomes at a competitive overall cost. For example, we may need to demonstrate that the investment hospitals must make when purchasing our Lightbox and the incremental costs of having a technician or a second physician operate Pantheris can be justified based on the benefits to patients, physicians and hospitals. If we are unable to develop robust clinical data to support these claims, we will be unable to convince hospitals and third-party payors of these benefits and our business will suffer.

Our value proposition to physicians and hospitals is largely dependent upon our contention that the rate of arterial damage when physicians are using our imaging products is lower than with non-imaging competing products. If minimizing arterial damage does not significantly impact patient outcomes, meaning either (i) that restenosis is often triggered without disrupting healthy arterial structures, or (ii) arteries can be damaged during treatment without triggering restenosis, then we may be unable to demonstrate our Lumivascular platform's benefits are any different than competing technologies. Furthermore, physicians may find our imaging system difficult to use, and we may not be able to provide physicians with adequate training to be able to realize the benefits of our Lumivascular platform. If physicians do not value the benefits of on-board imaging and the enhanced visualization enabled by our products during an endovascular intervention as compared to our competitors' products, or do not believe that such benefits improve clinical outcomes, our Lumivascular platform products may not be widely adopted.

The use, misuse or off-label use of the products in our Lumivascular platform may result in injuries that lead to product liability suits, which could be costly to our business.

We require limited training in the use of our Lumivascular platform products because we market primarily to physicians who are experienced in the interventional techniques required to use our device. If demand for our Lumivascular platform continues to grow, less experienced physicians will likely use the devices, potentially leading to more injury and an increased risk of product liability claims. The use or misuse of our Lumivascular platform products has in the past resulted, and may in the future result, in complications, including damage to the treated artery, infection, internal bleeding, and limb loss, potentially leading to product liability claims. Our Lumivascular platform products are contraindicated for use in the carotid, cerebral, coronary, iliac, or renal arteries. Our sales force does not promote the use of our products for off-label indications, and our U.S. instructions for use specify that our Lumivascular platform products are not intended for use in the carotid, cerebral, coronary, iliac or renal arteries. However, we cannot prevent a physician from using our Lumivascular platform products for these off-label applications. The application of our Lumivascular platform products to coronary arteries, as opposed to peripheral

arteries, is more likely to result in complications that have serious consequences. For example, if excised plaque were not captured properly in our device, it could be carried by the bloodstream to a more narrow location, blocking a coronary artery, leading to a heart attack, or blocking an artery to the brain, leading to a stroke. If our Lumivascular platform products are defectively designed, manufactured or labeled, contain defective components or are misused, we may become subject to costly litigation initiated by our customers or their patients. Product liability claims are especially prevalent in the medical device industry and could harm our reputation, divert management's attention from our core business, be expensive to defend and may result in sizable damage awards against us. Although we maintain product liability insurance, the amount or breadth of our coverage may not be adequate for the claims that are made against us.

The expense and potential unavailability of insurance coverage for liabilities resulting from our products could harm us and our ability to sell our Lumivascular platform products.

We may not have sufficient insurance coverage for future product liability claims. We may not be able to obtain insurance in amounts or scope sufficient to provide us with adequate coverage against all potential liabilities. Any product liability claims brought against us, with or without merit, could increase our product liability insurance rates or prevent us from securing continuing coverage, harm our reputation in the industry, significantly increase our expenses, and reduce product sales. Product liability claims in excess of our insurance coverage would be paid out of cash reserves, harming our financial condition and operating results.

Some of our customers and prospective customers may have difficulty in procuring or maintaining liability insurance to cover their operations and use of our Lumivascular platform products. Medical malpractice carriers are also withdrawing coverage in certain states or substantially increasing premiums. If this trend continues or worsens, our customers may discontinue using our Lumivascular platform products and potential customers may opt against purchasing our Lumivascular platform products due to the cost or inability to procure insurance coverage.

Our ability to compete depends on our ability to innovate successfully.

The market for medical devices in general, and in the PAD market in particular, is highly competitive, dynamic, and marked by rapid and substantial technological development and product innovation. There are few barriers that would prevent new entrants or existing competitors from developing products that compete directly with ours. Demand for our Lumivascular platform products could be diminished by equivalent or superior products and technologies offered by competitors. If we are unable to innovate successfully, our Lumivascular platform products could become obsolete and our revenues would decline as our customers purchase our competitors' products.

In order to remain competitive, we must continue to develop new product offerings and enhancements to our existing Lumivascular platform products. In particular, we have developed and are currently developing two next-generation versions of our Pantheris atherectomy device, next-generation Pantheris and Pantheris SV (Small Vessel), a lower profile version of Pantheris. We believe these versions will represent significant improvements in reliability and usability compared to prior versions of our products. We anticipate that our next-generation Pantheris and Pantheris SV will translate into revenue growth and achieve increased physician acceptance. Because we believe they are important to our future revenues, we are devoting a significant portion of our resources to their continued development. However, we do not yet know whether these or any other new offerings will be well received and broadly accepted by physicians, and if so, whether sales will be sufficient for us to offset costs of development, implementation, support, operation, sales and marketing. Additionally, new products may subject us to additional risks of product performance, customer complaints and litigation. If sales of our new product offerings, including our next-generation Pantheris and Pantheris SV, are lower than we expect, fail to gain anticipated market acceptance or cause us to expend additional resources to fix unforeseen problems and develop modifications, our revenues and results of operations may not improve and our business will be adversely affected.

Maintaining adequate research and development personnel and resources to meet the demands of the market is essential. If we are unable to develop products, applications or features due to certain constraints, such as insufficient cash resources, inability to raise sufficient cash in future equity or debt financings, high employee turnover, inability to hire sufficient research and development personnel or a lack of other research and development resources, we may miss market opportunities. Furthermore, many of our competitors expend a considerably greater amount of funds on their research and development programs than we do, and those that do not may be acquired by larger companies that would allocate greater resources to our competitors' research and development programs. Our failure or inability to devote adequate research and development resources or compete effectively with the research and development programs of our competitors could harm our business.

We compete against companies that have longer operating histories, more established products and greater resources, which may prevent us from achieving significant market penetration, increasing our revenues or becoming profitable.

Our products compete with a variety of products and devices for the treatment of PAD, including other CTO crossing devices, stents, balloons and atherectomy catheters, as well as products used in vascular surgery. Large competitors in the CTO crossing, stent and balloon markets include Abbott Laboratories, Boston Scientific, Cardinal Health, Cook Medical, CR Bard and Medtronic. Competitors in the atherectomy market include Boston Scientific, Cardiovascular Systems, Medtronic and Philips. Some competitors have previously attempted to combine intravascular imaging with atherectomy and may have current programs underway to do so. These and other companies may attempt to incorporate on-board visualization into their products in the future and may remain competitive with us in marketing traditional technologies. Other competitors include pharmaceutical companies that manufacture drugs for the treatment of symptoms associated with mild to moderate PAD and companies that provide products used by surgeons in peripheral and coronary bypass procedures. These competitors and other companies may introduce new products that compete with our products. Many of our competitors have significantly greater financial and other resources than we do and have well-established reputations, as well as broader product offerings and worldwide distribution channels that are significantly larger and more effective than ours. Competition with these companies could result in

price-cutting, reduced profit margins and loss of market share, any of which would harm our business, financial condition and results of operations.

Our ability to compete effectively depends on our ability to distinguish our company and our Lumivascular platform from our competitors and their products, and includes such factors as:

- procedural safety and efficacy;
- acute and long-term outcomes;
- ease of use and procedure time;
- price;
- size and effectiveness of sales force;
- radiation exposure for physicians, hospital staff and patients; and
- third-party reimbursement.

In addition, competitors with greater financial resources than ours could acquire other companies to gain enhanced name recognition and market share, as well as new technologies or products that could effectively compete with our existing products, which may cause our revenues to decline and would harm our business.

If our clinical trials are unsuccessful or significantly delayed, or if we do not complete our clinical trials, our business may be harmed.

Clinical development is a long, expensive, and uncertain process and is subject to delays and the risk that products may ultimately prove unsafe or ineffective in treating the indications for which they are designed. Completion of clinical trials may take several years or more and failure of the trial can occur at any time. We cannot provide any assurance that our clinical trials will meet their primary endpoints or that such trials or their results will be accepted by the FDA or foreign regulatory authorities. Even if we achieve positive early or preliminary results in clinical trials, these results do not necessarily predict final results, and positive results in early trials may not indicate success in later trials. Many companies in the medical device industry have suffered significant setbacks in late-stage clinical trials, even after receiving promising results in earlier trials or in the preliminary results from these late-stage clinical trials.

We may experience numerous unforeseen events during, or because of, the clinical trial process that could delay or prevent us from receiving regulatory clearance or approval for new products or modifications of existing products, including new indications for existing products, including:

- negative or inconclusive results that may cause us to decide, or regulators may require us, to conduct additional clinical and/or preclinical testing which may be expensive and time consuming;
- trial results that do not meet the level of statistical significance required by the FDA or other regulatory authorities;
- findings by the FDA or similar foreign regulatory authorities that the product is not sufficiently safe for investigational use in humans;
- interpretations of data from preclinical testing and clinical testing by the FDA or similar foreign regulatory authorities that may be different from our own;
- delays or failure to obtain approval of our clinical trial protocols from the FDA or other regulatory authorities;
- delays in obtaining institutional review board approvals or government approvals to conduct clinical trials at prospective sites;

findings by the FDA or similar foreign regulatory authorities that our or our suppliers' manufacturing processes or facilities are unsatisfactory;

changes in the review policies of the FDA or similar foreign regulatory authorities or the adoption of new regulations that may negatively affect or delay our ability to bring a product to market or receive approvals or clearances to treat new indications;

trouble in managing multiple clinical sites;

delays in agreeing on acceptable terms with third-party research organizations and trial sites that may help us conduct the clinical trials; and

the suspension or termination by us, or regulators, of our clinical trials because the participating patients are being exposed to unacceptable health risks.

Failures or perceived failures in our clinical trials will delay and may prevent our product development and regulatory approval process, damage our business prospects and negatively affect our reputation and competitive position.

From time to time, we engage outside parties to perform services related to certain of our clinical studies and trials, and any failure of those parties to fulfill their obligations could increase costs and cause delays.

From time to time, we engage consultants to help design, monitor, and analyze the results of certain of our clinical studies and trials. The consultants we engage interact with clinical investigators to enroll patients in our clinical trials. We depend on these consultants and clinical investigators to help facilitate the clinical studies and trials and monitor and analyze data from these studies and trials under the investigational plan and protocol for the study or trial and in compliance with applicable regulations and standards, commonly referred to as good clinical practices. We may face delays in our regulatory approval process if these parties do not perform their obligations in a timely, compliant or competent manner. If these third parties do not successfully carry out their duties or meet expected deadlines, or if the quality, completeness or accuracy of the data they obtain is compromised due to the failure to adhere to our clinical trial protocols or for other reasons, our clinical studies or trials may be extended, delayed or terminated or may otherwise prove to be unsuccessful, and we may have to conduct additional studies, which would significantly increase our costs, in order to obtain the regulatory clearances that we need to commercialize our products.

We have limited long-term data regarding the safety and efficacy of our Lumivascular platform products, including Pantheris. Any long-term data that is generated by clinical trials involving our Lumivascular platform may not be positive or consistent with our short-term data, which would harm our ability to obtain clearance to market and sell our products.

Our Lumivascular platform is a novel system, and our success depends on its acceptance by the medical community as being safe and effective, and improving clinical outcomes. Important factors upon which the efficacy of our Lumivascular platform products, including Pantheris, will be measured are long-term data on the rate of restenosis following our procedure, and the corresponding duration of patency, or openness of the artery, and publication of that data in peer-reviewed journals. Another important factor that physicians will consider is the rate of reintervention, or retreatment, following the use of our Lumivascular platform products. The long-term clinical benefits of procedures that use our Lumivascular platform products, including Pantheris, are not known.

The results of short-term clinical experience of our Lumivascular platform products, including Pantheris, do not necessarily predict long-term clinical benefit. Restenosis rates typically increase over time. We believe that physicians will compare the rates of long-term restenosis and reintervention for procedures using our Lumivascular platform products against alternative procedures, such as angioplasty, stenting, bypass surgery and other atherectomy procedures. If the long-term rates of restenosis and reintervention do not meet physicians' expectations, our Lumivascular platform products may not become widely adopted and physicians may recommend alternative treatments for their patients. Another significant factor that physicians will consider is acute safety data on complications that occur during the use of our Lumivascular platform products. If the results obtained from any post-market studies that we conduct or post-clearance surveillance indicate that the use of our Lumivascular platform products are not as safe or effective as other treatment options or as current short-term data would suggest, adoption of our product may suffer and our business would be harmed. Even if we believe the data collected from clinical studies or clinical experience indicate positive results, each physician's actual experience with our products will vary.

Physicians who are technically proficient participate in our clinical trials and are high-volume users of our Lumivascular platform products. Consequently, the results of our clinical trials and their experiences using our products may lead to better patient outcomes than those of physicians that are less proficient, perform fewer procedures or who use our products infrequently.

Our ability to market our current products in the United States is limited to use in peripheral vessels, and if we want to market our products for other uses, we will need to file for FDA clearances or approvals and may need to conduct trials to support expanded use, which would be expensive, time-consuming and may not be successful.

Our current products are cleared in the United States only for crossing sub-total and chronic total occlusions and for performing atherectomy in the peripheral vasculature. These FFDCA clearances prohibits us from marketing or advertise our products for any other indication within the peripheral vasculature, which restricts our ability to sell these products and could affect our growth. Additionally, our products are contraindicated for use in the cerebral, carotid, coronary, iliac, and renal arteries. While off-label uses of medical devices are common and the FDA does not regulate physicians' choice of treatments, the FDA does restrict a manufacturer's communications regarding such off-label use. We are not allowed to actively promote or advertise our products for off-label uses. In addition, we cannot make comparative claims regarding the use of our products against any alternative treatments without conducting head-to-head comparative clinical studies, which would be expensive and time consuming. If our promotional activities fail to comply with the FDA's regulations or guidelines, we may be subject to warnings or enforcement action by the FDA and other government agencies. In the future, if we want to market a variation of Ocelot or Pantheris in the United States for use in other applications for which we do not currently have clearance, such as the coronary arteries, we will need to make modifications to these products, conduct further clinical trials and obtain new clearances or approvals from the FDA. There can be no assurance that we will successfully develop these modifications, that future clinical studies will be successful or that the expense of these activities will be offset by additional revenues.

The continuing development of many of our products, including Pantheris, depends upon maintaining strong working relationships with physicians.

The development, marketing, and sale of our products, including Pantheris, depends upon our ability to maintain strong working relationships with physicians. We rely on these professionals to provide us with considerable knowledge and experience regarding the development, marketing and sale of our products. Physicians assist us in clinical trials and as researchers, marketing and product consultants and public speakers. If we cannot maintain our strong working relationships with these professionals and continue to receive their advice and input, the development and marketing of our products could suffer, which could harm our business, financial condition and results of operations. The medical device industry's relationship with physicians is under increasing scrutiny by the Office of Inspector General, or OIG, the Department of Justice, or DOJ, state attorneys general, and other foreign and domestic government agencies. Our failure to comply with laws, rules and regulations governing our relationships with physicians, or an investigation into our compliance by the OIG, DOJ, state attorneys general and other government agencies, could significantly harm our business.

We have limited experience manufacturing our Lumivascular platform products in commercial quantities, which could harm our business.

Because we have only limited experience in manufacturing our Lumivascular platform products in commercial quantities, we may encounter production delays or shortfalls. Such production delays or shortfalls may be caused by many factors, including the following:

- any expansion in our manufacturing capacity, could require changes to our production processes;
- key components and sub-assemblies of our Lumivascular platform products are currently provided by a single supplier or limited number of suppliers, and we do not maintain large inventory levels of these components and sub-assemblies; if we experience a shortage in any of these components or sub-assemblies, we would need to identify and qualify new supply sources, which could increase our expenses and result in manufacturing delays;
- we may experience a delay in completing validation and verification testing for new controlled-environment rooms at our manufacturing facilities; and
- we have limited experience in complying with the FDA's QSR, which applies to the manufacture of our Lumivascular platform products.

If we are unable to keep up with demand for our Lumivascular platform products, our revenues could be impaired, market acceptance for our Lumivascular platform products could be harmed and our customers might instead purchase our competitors' products. Our inability to successfully manufacture our Lumivascular platform products would materially harm our business.

Our manufacturing facilities and processes and those of our third-party suppliers are subject to unannounced FDA and state regulatory inspections for compliance with QSR. Developing and maintaining a compliant quality system is time consuming and expensive. Failure to maintain, or not fully comply with the requirements of, a quality system could result in regulatory authorities initiating enforcement actions against us and our third-party suppliers, which could include the issuance of warning letters, seizures, prohibitions on product sales, recalls and civil and criminal penalties, any one of which could significantly impact our manufacturing supply and impair our financial results.

If our manufacturing facility becomes damaged or inoperable, or we are required to vacate the facility, or our electronic systems are compromised, our ability to manufacture and sell our Lumivascular platform products and to pursue our research and development efforts may be jeopardized.

We currently manufacture and assemble our Lumivascular platform products in-house. Our products are comprised of components sourced from a variety of contract manufacturers, with final assembly completed at our facility in Redwood City, California. Our facility and equipment, or those of our suppliers, could be harmed or rendered inoperable by natural or man-made disasters, including fire, earthquake, terrorism, flooding and power outages. Further, our electronic systems may experience service interruptions, denial-of-service and other cyber-attacks, computer viruses or other events. Any of these may render it difficult or impossible for us to manufacture products, pursue our research and development efforts or otherwise run our business for some period of time. If our facility is inoperable for even a short period of time, the inability to manufacture our current products, and the interruption in research and development of any future products, may result in harm to our reputation, increased costs, lower revenues and the loss of customers. Furthermore, it could be costly and time-consuming to repair or replace our facilities and the equipment we use to perform our research and development work and manufacture our products.

We depend on third-party vendors to manufacture some of our components and sub-assemblies, which could make us vulnerable to supply shortages and price fluctuations that could harm our business.

We currently manufacture some of our components and sub-assemblies at our Redwood City facility and rely on third-party vendors for other components and sub-assemblies used in our Lumivascular platform. Our reliance on third-party vendors subjects us to a number of risks that could impact our ability to manufacture our products and harm our business, including:

- interruption of supply resulting from modifications to, or discontinuation of, a supplier's operations;
- delays in product shipments resulting from uncorrected defects, reliability issues or a supplier's failure to consistently produce quality components;
- price fluctuations due to a lack of long-term supply arrangements with our suppliers for key components;
- inability to obtain adequate supply in a timely manner or on commercially reasonable terms;
- difficulty identifying and qualifying alternative suppliers for components in a timely manner;
- inability of the manufacturer or supplier to comply with QSR as enforced by the FDA and state regulatory authorities;
- inability to control the quality of products manufactured by third parties;
- production delays related to the evaluation and testing of products from alternative suppliers and corresponding regulatory qualifications; and
- delays in delivery by our suppliers due to changes in demand from us or their other customers.

Any significant delay or interruption in the supply of components or sub-assemblies, or our inability to obtain substitute components, sub-assemblies or materials from alternate sources at acceptable prices in a timely manner, could impair our ability to meet the demand of our customers and harm our business.

We depend on single and limited source suppliers for some of our product components and sub-assemblies, and if any of those suppliers are unable or unwilling to produce these components and sub-assemblies or supply them in the quantities that we need, we would experience manufacturing delays.

We rely on single and limited source suppliers for several of our components and sub-assemblies. For example, we rely on single vendors for our optical fiber and drive cables that are key components of our catheters, and we rely on single vendors for our laser and data acquisition card that are key components of our Lightbox. These components are critical to our products and there are relatively few alternative sources of supply. We do not carry a significant inventory of these components. Identifying and qualifying additional or replacement suppliers for any of the components or sub-assemblies used in our products could involve significant time and cost. Any supply interruption from our vendors or failure to obtain additional vendors for any of the components or sub-assemblies incorporated into our products would limit our ability to manufacture our products and could therefore harm our business, financial condition and results of operations.

Our future growth depends on physician adoption of our Lumivascular platform products, which may require physicians to change their current practices.

We educate physicians on the capabilities of our Lumivascular platform products and advances in treatment for PAD patients. We target our sales efforts to interventional cardiologists, vascular surgeons and interventional radiologists because they are often the physicians diagnosing and treating both coronary artery disease and PAD. However, the initial point of contact for many patients may be general practitioners, podiatrists, nephrologists and endocrinologists, each of whom commonly treat patients experiencing complications or symptoms resulting from PAD. If these physicians are not made aware of our Lumivascular platform products, they may not refer patients to interventional cardiologists, vascular surgeons and interventional radiologists for treatment using our Lumivascular platform procedure, and those patients may instead be surgically treated or treated with an alternative interventional procedure. In addition, there is a significant correlation between PAD and coronary artery disease, and many physicians do not routinely screen for PAD while screening for coronary artery disease. If we are not successful in educating physicians about screening for PAD and about the capabilities of our Lumivascular platform products, our ability to increase our revenues may be impaired.

We depend on our senior management team and the loss of one or more key employees or an inability to attract and retain highly skilled employees could harm our business.

Our success largely depends upon the continued services of our executive management team and key employees and the loss of one or more of our executive officers or key employees could harm us and directly impact our financial results. Our employees may terminate their employment with us at any time. Changes in our executive management team resulting from the hiring or departure of executives could disrupt our business.

We must attract and retain highly qualified personnel. Competition for skilled personnel is intense, especially for engineers with high levels of experience in designing and developing medical devices and for sales professionals. We have, from time to time, experienced, and we expect to continue to experience, difficulty in hiring and retaining employees with appropriate qualifications. Many of the companies with which we compete for experienced personnel have greater resources than we have. If we hire employees from competitors or other companies, their former employers may attempt to assert that these employees or we have breached legal obligations, resulting in a diversion of our time and resources and, potentially, damages. In addition, job candidates and existing employees, particularly in the San Francisco Bay Area, often consider the value of the stock awards they receive in connection with their employment. If the perceived value of our stock awards declines, it may harm our ability to recruit and retain highly skilled employees. In addition, we invest significant time and expense in training our employees, which increases their value to competitors who may seek to recruit them. If we fail to attract new personnel or fail to retain and motivate our current personnel, our business would be harmed.

We do not currently intend to devote significant additional resources in the near-term to market our Lumivascular platform internationally, which will limit our potential revenues from our Lumivascular platform products.

Marketing our Lumivascular platform outside of the United States would require substantial additional sales and marketing, regulatory and personnel expenses. As part of our product development and regulatory strategy, we plan to expand into select international markets, but we do not currently intend to devote significant additional resources to market our Lumivascular platform internationally in order to focus our resources and efforts on the U.S. market. Our decision to market our products primarily in the United States in the near-term will limit our ability to reach all of our potential markets and will limit our potential sources of revenue. In addition, our competitors will have an opportunity to further penetrate and achieve market share outside of the United States until such time, if ever, that we devote significant additional resources to market our Lumivascular platform products or other products internationally.

Our ability to utilize our net operating loss carryforwards may be limited.

As of December 31, 2018, we had federal and state net operating loss carryforwards, or NOLs, due to prior period losses of $282.7 million and $199.3 million, respectively, which if not utilized will begin to expire in 2027 for federal purposes and 2018 for state purposes. Out of the total Federal net operating loss carryforwards, $25.2 million were generated post December, 31, 2017 and have no expiration. Generally, subject to certain limitations, NOLs can be used to offset taxable income for U.S. federal income tax purposes. However, Section 382 of the Internal Revenue Code of 1986, as amended, may limit the NOLs we may use in any year for U.S. federal income tax purposes in the event of certain changes in ownership of our company. A Section 382 “ownership change” generally occurs if one or more stockholders or groups of stockholders who own at least 5% of our stock increase their ownership by more than 50 percentage points over their lowest ownership percentage within a rolling three-year period. Similar rules may apply under state tax laws. It is possible that prior transactions with respect to our stock may have caused, and that future issuances or sales of our stock (including certain transactions involving our stock that are outside of our control) could cause, an “ownership change.” A number of our common and preferred stock financings over the past year may affect our ability to use NOLs. If an “ownership change” occurs, Section 382 would impose an annual limit on the amount of pre-ownership change NOLs and other tax attributes we can use to reduce our taxable income, potentially increasing and accelerating our liability for income taxes, and also potentially causing those tax attributes to expire unused. Any limitation on using NOLs could (depending on the extent of such limitation and the NOLs previously used) result in our retaining less cash after payment of U.S. federal income taxes during any year in which we have taxable income (rather than losses) than we would be entitled to retain if such NOLs were available as an offset against such income for U.S. federal income tax reporting purposes, which could harm our profitability. On December 22, 2017, the Tax Cuts and Jobs Act, or Tax Act, was enacted into law with many significant changes to the U.S. tax laws. The Tax Act limits the utilization of NOLs arising in tax years beginning after December 31, 2017 to 80% of taxable income per year. However, existing NOLs that arose in years prior to December 31, 2017 are not affected by these provisions. Our ability to utilize NOLs arising in future tax periods may be limited by the Tax Act.

We may acquire other companies or technologies or be the target of strategic transactions, which could divert our management's attention, result in additional dilution to our stockholders and otherwise disrupt our operations and harm our operating results.

We may in the future seek to acquire or invest in businesses, applications or technologies that we believe could complement or expand our Lumivascular platform, enhance our technical capabilities or otherwise offer growth opportunities. The pursuit of potential acquisitions may divert the attention of management and cause us to incur various costs and expenses in identifying, investigating and pursuing suitable acquisitions, whether or not they are consummated. We may not be able to identify desirable acquisition targets or be successful in entering into an agreement with any particular target or obtain the expected benefits of any acquisition or investment.

To date, our technology and product development efforts have been organic, and we have no experience in acquiring other businesses. In any acquisition, we may not be able to successfully integrate acquired personnel, operations and technologies, or effectively manage the combined business following the acquisition. Acquisitions could also result in dilutive issuances of equity securities, the use of our available cash, or the incurrence of debt, which could harm our operating results. In addition, if an acquired business fails to meet our expectations, our operating results, business and financial condition may suffer.

In addition, we sometimes receive inquiries relating to potential strategic transactions, including from third parties who may seek to acquire us. We will continue to consider and discuss such transactions as we deem appropriate. Such potential transactions may divert the attention of management, and cause us to incur various costs and expenses in investigating and evaluating such transactions, whether or not they are consummated.

If our technology infrastructure is compromised, damaged or interrupted by a cybersecurity incident, data security breach or other security problems, our operating results and financial condition could be adversely affected.

We use technology in substantially all aspects of our business operations, and our ability to serve customers most effectively depends on the reliability of our technology systems. Cybersecurity incidents can include computer viruses, computer denial-of-service attacks, worms, and other malicious software programs or other attacks, covert introduction of malware to computers and networks, impersonation of authorized users, and efforts to discover and exploit any design flaws, bugs, security vulnerabilities or security weaknesses, as well as intentional or unintentional acts by employees or other insiders with access privileges, intentional acts of vandalism by third parties and sabotage.

In addition, our technology infrastructure and systems are vulnerable to damage or interruption from natural disasters, power loss and telecommunications failures. Any such disruption to our systems, or the technology systems of third parties on which we rely, the failure of these systems to otherwise perform as anticipated, or the theft, destruction,

loss, misappropriation, or release of sensitive and/or confidential information or intellectual property, could require us to notify affected individuals, federal or state agencies or media outlets of the incident and could result in business disruption, negative publicity, loss of customers, potential liability, including litigation or other legal actions against us or the imposition of penalties, fines, fees or liabilities, which may not be covered by our insurance policies, and competitive disadvantage, any or all of which would potentially adversely affect our customer service, decrease the volume of our business and result in increased costs and lower profits. Moreover, a cybersecurity breach could require us to devote significant management resources to address the problems associated with the breach and to expend significant additional resources to upgrade further the security measures we employ to protect information against cyber-attacks and other wrongful attempts to access such information, which could result in a disruption of our operations.

While we have invested, and continue to invest, in technology security initiatives and other measures to prevent security breaches and cyber incidents, as well as disaster recovery plans, these initiatives and measures may not be entirely effective to insulate us from technology disruption that could result in adverse effects on our results of operations.

Risks Related to Our Intellectual Property

We may in the future be a party to intellectual property litigation or administrative proceedings that could be costly and could interfere with our ability to sell our Lumivascular platform products.

The medical device industry has been characterized by extensive litigation regarding patents, trademarks, trade secrets, and other intellectual property rights, and companies in the industry have used intellectual property litigation to gain a competitive advantage. It is possible that U.S. and foreign patents and pending patent applications or trademarks controlled by third parties may be alleged to cover our products, or that we may be accused of misappropriating third parties' trade secrets. Additionally, our products include hardware and software components that we purchase from vendors, and may include design components that are outside of our direct control. Our competitors, many of which have substantially greater resources and have made substantial investments in patent portfolios, trade secrets, trademarks, and competing technologies, may have applied for or obtained or may in the future apply for or obtain, patents or trademarks that will prevent, limit or otherwise interfere with our ability to make, use, sell and/or export our products or to use product names. They may devote substantial resources towards obtaining claims that cover the design of our atherectomy products to prevent the marketing and selling of competitive products. We may become a party to patent or trademark infringement or trade secret claims and litigation as a result of these and other third-party intellectual property rights being asserted against us. The defense and prosecution of these matters are both costly and time consuming. Vendors from whom we purchase hardware or software may not indemnify us in the event that such hardware or software is accused of infringing a third-party's patent or trademark or of misappropriating a third-party's trade secret.

Further, if such patents, trademarks, or trade secrets are successfully asserted against us, this may harm our business and result in injunctions preventing us from selling our products, license fees, damages and the payment of attorney fees and court costs. In addition, if we are found to willfully infringe third-party patents or trademarks or to have misappropriated trade secrets, we could be required to pay treble damages in addition to other penalties. Although patent, trademark, trade secret, and other intellectual property disputes in the medical device area have often been settled through licensing or similar arrangements, costs associated with such arrangements may be substantial and could include ongoing royalties. We may be unable to obtain necessary licenses on satisfactory terms, if at all. If we do not obtain necessary licenses, we may not be able to redesign our Lumivascular platform products to avoid infringement.

Similarly, interference or derivation proceedings provoked by third parties or brought by the U.S. Patent and Trademark Office, or USPTO, may be necessary to determine the priority of inventions or other matters of inventorship with respect to our patents or patent applications. We may also become involved in other proceedings, such as re-examination, inter partes review, or opposition proceedings, before the USPTO or other jurisdictional body relating to our intellectual property rights or the intellectual property rights of others. Adverse determinations in a judicial or administrative proceeding or failure to obtain necessary licenses could prevent us from manufacturing and selling our Lumivascular platform products or using product names, which would have a significant adverse impact on our business.

Additionally, we may need to commence proceedings against others to enforce our patents or trademarks, to protect our trade secrets or know-how, or to determine the enforceability, scope and validity of the proprietary rights of others. These proceedings would result in substantial expense to us and significant diversion of effort by our technical and management personnel. We may not prevail in any lawsuits that we initiate and the damages or other remedies awarded, if any, may not be commercially meaningful. We may not be able to stop a competitor from marketing and selling products that are the same or similar to our products or from using product names that are the same or similar to our product names, and our business may be harmed as a result.

We are aware of patents held by third parties that may be asserted against us in litigation that could be costly and could limit our ability to sell our Lumivascular platform products.

We are aware of patent families related to catheter positioning, optical coherence tomography, occlusion cutting and atherectomy owned by third parties. With regard to atherectomy patents, one of our founders, Dr. John Simpson, founded FoxHollow Technologies prior to founding our company. FoxHollow Technologies developed an atherectomy device that is currently sold by Medtronic, and Dr. Simpson and our Chief Technology Officer, Himanshu Patel, are listed as inventors on patents covering that device that are now held by Medtronic. We are not currently aware of any claims Medtronic has made or intends to make against us with respect to Pantheris or any other product or product under development. Because of a doctrine known as “assignor estoppel,” if any of Dr. Simpson’s earlier patents are asserted against us by Medtronic, we may be prevented from asserting an invalidity defense regarding those patents, and our defense may be compromised. Medtronic has significantly greater financial resources than we do to pursue patent litigation and could assert these patent families against us at any time. Adverse

determinations in any such litigation could prevent us from manufacturing or selling Pantheris or other products or products under development, which would significantly harm our business.

Intellectual property rights may not provide adequate protection, which may permit third parties to compete against us more effectively.

In order to remain competitive, we must develop and maintain protection of the proprietary aspects of our technologies. We rely on a combination of patents, copyrights, trademarks, trade secret laws and confidentiality and invention assignment agreements to protect our intellectual property rights. As of December 31, 2018, we held 23 issued and allowed U.S. patents and had 29 U.S. utility patent applications and 4 PCT applications pending. As of December 31, 2018, we also had 45 issued and allowed patents outside of the United States. As of December 31, 2018, we had 43 pending patent applications outside of the United States, including in Australia, Canada, China, Europe, India and Japan. Our patents and patent applications include claims covering key aspects of the design, manufacture and therapeutic use of OCT imaging catheters, occlusion-crossing catheters, atherectomy devices and our imaging console. Our patent applications may not result in issued patents and our patents may not be sufficiently broad to protect our technology. Any patents issued to us may be challenged by third parties as being invalid, or third parties may independently develop similar or competing technology that avoids our patents. Should such challenges be successful, competitors might be able to market products and use manufacturing processes that are substantially similar to ours. We may not be able to prevent the unauthorized disclosure or use of our technical knowledge or other trade secrets by consultants, vendors or former or current employees, despite the existence generally of confidentiality agreements and other contractual restrictions. Monitoring unauthorized use and disclosure of our intellectual property is difficult, and we do not know whether the steps we have taken to protect our intellectual property will be adequate. In addition, the laws of many foreign countries will not protect our intellectual property rights to the same extent as the laws of the United States. Consequently, we may be unable to prevent our proprietary technology from being exploited abroad, which could affect our ability to expand to international markets or require costly efforts to protect our technology. To the extent our intellectual property protection is incomplete, we are exposed to a greater risk of direct competition. In addition, competitors could purchase our products and attempt to replicate some or all of the competitive advantages we derive from our development efforts or design around our protected technology. Our failure to secure, protect and enforce our intellectual property rights could substantially harm the value of our Lumivascular platform, brand and business.

We use certain open source software in Lightbox. We may face claims from companies that incorporate open source software into their products or from open source licensors, claiming ownership of, or demanding release of, the source code, the open source software or derivative works that were developed using such software, or otherwise seeking to enforce the terms of the applicable open source license. These claims could result in litigation and could require us to cease offering Lightbox unless and until we can re-engineer it to avoid infringement. This re-engineering process could require significant additional research and development resources, and we may not be able to complete it successfully. These risks could be difficult to eliminate or manage, and, if not addressed, could harm our business, financial condition and operating results.

Risks Related to Government Regulation

Failure to comply with laws and regulations could harm our business.

Our business is subject to regulation by various federal, state, local and foreign governmental agencies, including agencies responsible for monitoring and enforcing employment and labor laws, workplace safety, environmental laws, consumer protection laws, anti-bribery laws, import/export controls, federal securities laws and tax laws and regulations. In certain jurisdictions, these regulatory requirements may be more stringent than those in the United States and in other circumstances these requirements may be more stringent in the United States. Noncompliance with applicable regulations or requirements could subject us to investigations, sanctions, mandatory recalls, enforcement actions, adverse publicity, disgorgement of profits, fines, damages, civil and criminal penalties or injunctions and administrative actions. If any governmental sanctions, fines or penalties are imposed, or if we do not prevail in any possible civil or criminal litigation, our business, operating results and financial condition could be harmed. In addition, responding to any action will likely result in a significant diversion of management's attention and resources and substantial costs. Enforcement actions and sanctions could further harm our business, operating results and financial condition.

If we fail to obtain and maintain necessary regulatory clearances or approvals for our Lumivascular platform products, or if clearances or approvals for future products and indications are delayed or not issued, our commercial operations would be harmed.

Our Lumivascular platform products are medical devices that are subject to extensive regulation by FDA in the United States and by regulatory agencies in other countries where we do business. Government regulations specific to medical devices are wide-ranging and govern, among other things:

product design, development and manufacture;

laboratory, preclinical and clinical testing, labeling, packaging, storage and distribution;

pre-marketing clearance or approval;

record keeping;

product marketing, promotion and advertising, sales and distribution; and

post-marketing surveillance, including reporting of deaths or serious injuries and recalls and correction and removals.

Before a new medical device, or a new intended use for, an existing product can be marketed in the United States, a company must first submit and receive either 510(k) clearance or pre-marketing approval from FDA, unless an exemption applies. Either process can be expensive, lengthy and unpredictable. We may not be able to obtain the necessary clearances or approvals or may be unduly delayed in doing so, which could harm our business. Furthermore, even if we are granted regulatory clearances or approvals, they may include significant limitations on the indicated uses for the product, which may limit the market for the product. Although we have obtained 510(k) clearance to market Pantheris, our image-guided atherectomy device, and our Ocelot family of catheters for crossing sub and total occlusions in the peripheral vasculature, our clearance can be revoked if safety or efficacy problems develop. We obtained 510(k) clearance for our next-generation Pantheris in May 2018 and we filed a 510(k) submission for Pantheris SV in August 2018. Delays in obtaining clearance or approval could increase our costs and harm our revenues and growth.

In addition, we are required to timely file various reports with the FDA, including medical device reports, or MDRs, if our devices may have caused or contributed to a death or serious injury or malfunctioned in a way that would likely cause or contribute to a death or serious injury if the malfunction were to recur. If these MDRs are not filed timely, regulators may impose sanctions and sales of our products may suffer, and we may be subject to product liability or regulatory enforcement actions, all of which could harm our business.

If we initiate a correction or removal for one of our devices to reduce a risk to health posed by the device, we would be required to submit a publicly available Correction and Removal report to the FDA and in many cases, similar reports to other regulatory agencies. This report could be classified by the FDA as a device recall that could lead to increased scrutiny by the FDA, other international regulatory agencies and our customers regarding the quality and safety of our devices. Furthermore, the submission of these reports has been and could be used by competitors against us in competitive situations and cause customers to delay purchase decisions or cancel orders and would harm our reputation.

The FDA and the Federal Trade Commission, or FTC, also regulate the advertising and promotion of our products to ensure that the claims we make are consistent with our regulatory clearances, that there are adequate and reasonable scientific data to substantiate the claims and that our promotional labeling and advertising is neither false nor misleading in any respect. If the FDA or FTC determines that any of our advertising or promotional claims are misleading, not substantiated or not permissible, we may be subject to enforcement actions, including Warning Letters, adverse publicity, and we may be required to revise our promotional claims and make other corrections or restitutions.

The FDA and state authorities have broad enforcement powers. Our failure to comply with applicable regulatory requirements could result in enforcement action by the FDA or state agencies, which may include any of the following sanctions:

- adverse publicity, warning letters, fines, injunctions, consent decrees and civil penalties;
- repair, replacement, refunds, recall or seizure of our products;
- operating restrictions, partial suspension or total shutdown of production;
- refusing our requests for 510(k) clearance or pre-market approval of new products, new intended uses or modifications to existing products;
- withdrawing 510(k) clearance or pre-market approvals that have already been granted; and

criminal prosecution.

If any of these events were to occur, our business and financial condition would be harmed.

Material modifications to our Lumivascular platform products may require new 510(k) clearances or pre-market approvals or may require us to recall or cease marketing our Lumivascular platform products until clearances or approvals are obtained.

Material modifications to the intended use or technological characteristics of our Lumivascular platform products will require new 510(k) clearances or pre-market approvals or require us to recall or cease marketing the modified devices until these clearances or approvals are obtained. Based on published FDA guidelines, the FDA requires device manufacturers to initially make and document a determination of whether or not a modification requires a new approval, supplement or clearance; however, the FDA can review a manufacturer's decision. Any modification to an FDA-cleared device that would significantly affect its safety or efficacy or that would constitute a major change in its intended use would require a new 510(k) clearance or possibly a pre-market approval. We may not be able to obtain additional 510(k) clearances or pre-market approvals for new products or for modifications to, or additional indications for, our Lumivascular platform products in a timely fashion, or at all. Delays in obtaining required future clearances would harm our ability to introduce new or enhanced products in a timely manner, which in turn would harm our future growth. We have made modifications to our Lumivascular platform products in the past and will make additional modifications in the future that we believe do not or will not require additional clearances or approvals. If the FDA disagrees and requires new clearances or approvals for the modifications, we may be required to recall and to stop selling or marketing our Lumivascular platform products as modified, which could harm our operating results and require us to redesign our Lumivascular platform products. In these circumstances, we may be subject to significant enforcement actions. We plan to make further modifications to the design of Pantheris to enhance cutting efficiency and access smaller vessels. Future versions of Pantheris incorporating these enhancements may require additional regulatory clearances or approvals.

If we or our suppliers fail to comply with the FDA's QSR, our manufacturing operations could be delayed or shut down and Lumivascular platform sales could suffer.

Our manufacturing processes and those of our third-party suppliers are required to comply with the FDA's QSR, which covers the procedures and documentation of the design, testing, production, control, quality assurance, labeling, packaging, storage and shipping of our Lumivascular platform products. We are also subject to similar state requirements and licenses. In addition, we must engage in extensive recordkeeping and reporting and must make available our manufacturing facilities and records for periodic unannounced inspections by governmental agencies, including the FDA, state authorities and comparable agencies in other countries. If we fail a QSR inspection, our operations could be disrupted and our manufacturing interrupted. Failure to take adequate corrective action in response to an adverse QSR inspection could result in, among other things, a shut-down of our manufacturing operations, significant fines, suspension of marketing clearances and approvals, seizures or recalls of our device, operating restrictions and criminal prosecutions, any of which would cause our business to suffer. Furthermore, our key component suppliers may not currently be or may not continue to be in compliance with applicable regulatory requirements, which may result in manufacturing delays for our products and cause our revenues to decline.

We have registered with the FDA as a medical device manufacturer and have obtained a manufacturing license from the CDHS. The FDA has broad post-market and regulatory enforcement powers. We are subject to unannounced inspections by the FDA and the Food and Drug Branch of CDHS to determine our compliance with the QSR and other regulations, and these inspections may include the manufacturing facilities of our suppliers. Our current facility has been inspected by the FDA in 2009, 2011 and 2013, and two, three and zero observations, respectively, were noted during those inspections. BSI, our European Notified Body, inspected our facility in 2014 and 2015 and found zero non-conformances. BSI conducted four external audits in 2016 and zero non-conformances were found in all except for one audit, for which four minor non-conformances were found. BSI conducted a recertification audit (for EU) in 2016 followed by surveillance audits in 2017 & 2018, and found no major non-conformances. BSI also audited us for QSR compliance under MDSAP (Medical Device Single Audit Program) for FDA in July 2016, and found no major non-conformances. Additionally, BSI conducted a Technical File Audit in 2018 that resulted in one major non-conformance and three minor non-conformances. All non-conformances identified in aforementioned audits have been, or are being addressed via Avinger's CAPA system.

We can provide no assurance that we will continue to remain in substantial compliance with the QSR. If the FDA, CDHS or BSI inspect our facility and discover major compliance problems, we may have to shut down our facility and cease manufacturing until we can take the appropriate remedial steps to correct the audit findings. Taking corrective action may be expensive, time consuming and a distraction for management and if we experience a shutdown or delay at our manufacturing facility we may be unable to produce our Lumivascular platform products, which would harm our business.

Our Lumivascular platform products may in the future be subject to product recalls that could harm our reputation.

FDA and similar governmental authorities in other countries have the authority to require the recall of commercialized products in the event of material regulatory deficiencies or defects in design or manufacture. A government mandated or voluntary recall by us could occur as a result of component failures, manufacturing errors or design or labeling defects. Recalls of our Lumivascular platform products or products we commercialize in the future would divert managerial attention, be expensive, harm our reputation with customers and harm our financial condition and results of operations. A recall announcement would negatively affect our stock price.

Changes in coverage and reimbursement for procedures using our Lumivascular platform products could affect the adoption of our Lumivascular platform and our future revenues.

Currently, our Lumivascular platform procedure is typically reimbursed by third-party payors, including Medicare and private healthcare insurance companies, under existing reimbursement codes. These payors may change their coverage and reimbursement policies, as well as payment amounts, in a way that would prevent or limit reimbursement for our products, which would significantly harm our business. Also, healthcare reform legislation or regulation may be proposed or enacted in the future, which may adversely affect such policies and amounts. We cannot predict whether and to what extent existing coverage and reimbursement will continue to be available. If physicians, hospitals and other providers are unable to obtain adequate coverage and reimbursement for procedures performed using our Lumivascular platform products, they are significantly less likely to use our Lumivascular platform products and our business would be harmed.

Healthcare reform measures could hinder or prevent our planned products' commercial success.

In the United States, there have been, and we expect there will continue to be, a number of legislative and regulatory changes to the healthcare system in ways that could harm our future revenues and profitability and the future revenues and profitability of our potential customers. Federal and state lawmakers regularly propose and, at times, enact legislation that would result in significant changes to the healthcare system, some of which are intended to contain or reduce the costs of medical products and services. For example, one of the most significant healthcare reform measures in decades, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Affordability Reconciliation Act, or Affordable Care Act, was enacted in 2010. The Affordable Care Act contains a number of provisions, including those governing enrollment in federal healthcare programs, reimbursement changes and fraud and abuse measures, all of which will impact existing government healthcare programs and will result in the development of new programs. The Affordable Care Act, among other things, imposed an excise tax of 2.3% on the sale of most medical devices, including ours, and any failure to pay this amount could result in the imposition of an injunction on the sale of our products, fines and penalties. Although this tax has been suspended through 2019, it is expected to apply to sales of our products in 2020 and thereafter. The current presidential administration and Congress may continue to attempt broad sweeping changes to the current healthcare laws. We face uncertainties that might result from modifications or repeal of any of the provisions of the Affordable Care Act, including as a result of current and future executive orders and legislative actions. The impact of those changes on us and potential effect on the medical device industry as a whole is currently unknown. Any changes to the Affordable Care Act are likely to have an impact on our results of operations, and may have a material adverse effect on our results of operations. We cannot predict what other healthcare programs and regulations will ultimately be implemented at the federal or state level or the effect of any future legislation or regulation in the United States may have on our business.

The continuing efforts of the government, insurance companies, managed care organizations and other payors of healthcare services to contain or reduce costs of healthcare may harm:

our ability to set a price that we believe is fair for our products;

our ability to generate revenues and achieve or maintain profitability; and

the availability of capital.

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

Even though we do not and will not control referrals of healthcare services or bill directly to Medicare, Medicaid or other third-party payors, certain federal and state healthcare laws and regulations pertaining to fraud and abuse and

patients' rights are and will be applicable to our business. We are subject to many healthcare fraud and abuse and patient privacy regulations by both the federal government and the states in which we conduct our business. The regulations that affect how we operate include:

the federal healthcare program Anti-Kickback Statute, which prohibits, among other things, any person from knowingly and willfully offering, soliciting, receiving or providing remuneration, directly or indirectly, in exchange for or to induce either the referral of an individual for, or the purchase, order or recommendation of, any good or service for which payment may be made under federal healthcare programs, such as the Medicare and Medicaid programs;

the federal False Claims Act, which prohibits, among other things, individuals or entities from knowingly presenting, or causing to be presented, false claims, or knowingly using false statements, to obtain payment from the federal government;

federal criminal laws that prohibit executing a scheme to defraud any healthcare benefit program or making false statements relating to healthcare matters;

the Sunshine Act, created under the Affordable Care Act, and its implementing regulations, which require manufacturers of drugs, medical devices, biologicals and medical supplies for which payment is available under Medicare, Medicaid, or the Children's Health Insurance Program to report annually to the HHS information related to payments or other transfers of value made to physicians and teaching hospitals, as well as ownership and investment interests held by physicians and their immediate family members;

HIPAA, as amended by the HITECH Act, which protects the security and privacy of protected health information; and

state law equivalents of each of the above federal laws, such as anti-kickback and false claims laws which may apply to items or services reimbursed by any third-party payor, including commercial insurers.

The Affordable Care Act, among other things, amends the intent requirement of the Federal Anti-Kickback Statute and criminal healthcare fraud statutes. A person or entity no longer needs to have actual knowledge of this statute or specific intent to violate it. In addition, the Affordable Care Act provides that the government may assert that a claim including items or services resulting from a violation of the Federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the False Claims Act.

Efforts to ensure that our business arrangements will comply with applicable healthcare laws may involve substantial costs. It is possible that governmental and enforcement authorities will conclude that our business practices do not comply with current or future statutes, regulations or case law interpreting applicable fraud and abuse or other healthcare laws and regulations. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, those actions could have a significant impact on our business, including the imposition of civil, criminal and administrative penalties, damages, disgorgement, monetary fines, possible exclusion from participation in Medicare, Medicaid and other federal healthcare programs, contractual damages, reputational harm, diminished profits and future earnings, and curtailment of our operations, any of which could harm our ability to operate our business and our results of operations. In addition, the clearance or approval and commercialization of any of our products outside the United States will also likely subject us to foreign equivalents of the healthcare laws mentioned above, among other foreign laws.

Compliance with environmental laws and regulations could be expensive. Failure to comply with environmental laws and regulations could subject us to significant liability.

Our research and development and manufacturing operations involve the use of hazardous substances and are subject to a variety of federal, state, local and foreign environmental laws and regulations relating to the storage, use, discharge, disposal, remediation of, and human exposure to, hazardous substances and the sale, labeling, collection, recycling, treatment and disposal of products containing hazardous substances. In addition, our research and development and manufacturing operations produce biological waste materials, such as human and animal tissue, and waste solvents, such as isopropyl alcohol. These operations are permitted by regulatory authorities, and the resultant waste materials are disposed of in material compliance with environmental laws and regulations. Liability under environmental laws and regulations can be joint and several and without regard to fault or negligence. Compliance with environmental laws and regulations may be expensive and non-compliance could result in substantial liabilities, fines and penalties, personal injury and third party property damage claims and substantial investigation and remediation costs. Environmental laws and regulations could become more stringent over time, imposing greater compliance costs and increasing risks and penalties associated with violations. We cannot assure you that violations of these laws and regulations will not occur in the future or have not occurred in the past as a result of human error, accidents, equipment failure or other causes. The expense associated with environmental regulation and remediation could harm our financial condition and operating results.

Regulations related to "conflict minerals" may force us to incur additional expenses, may result in damage to our business reputation and may adversely impact our ability to conduct our business.

Pursuant to the Dodd-Frank Wall Street Reform and Consumer Protection Act, the SEC promulgated final rules regarding disclosure of the use of certain minerals, known as conflict minerals, that are mined from the Democratic Republic of the Congo and adjoining countries, as well as procedures regarding a manufacturer's efforts to prevent the sourcing of such minerals and metals produced from those minerals. These disclosure requirements require ongoing due diligence efforts and disclosure obligations. We have incurred and expect to incur additional costs to comply with these disclosure requirements, including costs related to determining the source of any of the relevant minerals and metals used in our products. Additional costs could include the cost of remediation and other changes to products, processes, or sources of supply as a consequence of such verification activities. In addition, our implementation of these rules could adversely affect the sourcing, supply, and pricing of materials used in our products. We may face reputational harm if we determine that certain of our components contain minerals not determined to be conflict free or if we are unable to alter our processes or sources of supply to avoid using such materials. Reputational harm could adversely affect our business, financial condition or results of operations.

Risks Related to Our Common Stock and Preferred Stock

Our stock price may be volatile, and purchasers of our common stock could incur substantial losses.

Our stock price has fluctuated significantly since our IPO and is likely to continue to fluctuate substantially. As a result of this price fluctuation, investors may experience losses on their investments in our stock. In addition, the development stage of our operations may make it difficult for investors to evaluate the success of our business to date and to assess our future viability. The market price for our common stock may be influenced by many factors, including:

sales of stock by our existing stockholders, including our affiliates;

market acceptance of our Lumivascular platform and products, including Pantheris;

the results of our clinical trials;

changes in analysts' estimates, investors' perceptions, recommendations by securities analysts or our failure to achieve analysts' and our own estimates;

the financial projections we may provide to the public, any changes in these projections or our failure to meet these projections;

actual or anticipated fluctuations in our financial condition and operating results;

quarterly variations in our or our competitors' results of operations;

general market conditions and other factors unrelated to our operating performance or the operating performance of our competitors;

changes in operating performance and stock market valuations of other technology companies generally, or those in the medical device industry in particular;

the loss of key personnel, including changes in our board of directors and management;

legislation or regulation of our business;

lawsuits threatened or filed against us;

the announcement of new products or product enhancements by us or our competitors;

announcements related to patents issued to us or our competitors and to litigation; and

developments in our industry.

From time to time, our affiliates may sell stock for reasons due to their personal financial circumstances. These sales may be interpreted by other stockholders as an indication of our performance and result in subsequent sales of our stock that have the effect of creating downward pressure on the market price of our common stock. In addition, the stock prices of many companies in the medical device industry have experienced wide fluctuations that have often been unrelated to the operating performance of those companies.

Our stock price has decreased significantly over the course of the past year. As a result of the decrease in our stock price, the options held by our employees are less valuable which make it more likely that certain of our employees may leave our company. The loss of key employees could have an adverse effect on our business.

We may fail to meet our publicly announced guidance or other expectations about our business and future operating results, which would cause our stock price to decline.

We have provided in the past and may provide guidance in the future about our business and future operating results. In developing this guidance, our management must make certain assumptions and judgments about our future performance, including projected revenues and the timing of regulatory approvals. Furthermore, analysts and investors may develop and publish their own projections of our business, which may form a consensus about our future performance. Our business results may vary significantly from such guidance or that consensus due to a number of factors, many of which are outside of our control, and which could adversely affect our operations and operating results. Furthermore, if we make downward revisions of our previously announced guidance, or if our publicly announced guidance of future operating results fails to meet expectations of securities analysts, investors or other interested parties, the price of our common stock would decline.

If securities or industry analysts do not publish research or reports about our business, or publish negative reports about our business, our share price and trading volume could decline.

The trading market for our common stock will depend in part on the research and reports that securities or industry analysts publish about us or our business, our market and our competitors. We do not have any control over these analysts. The analysts who previously published research reports on our stock following our IPO have discontinued coverage. Although one new analyst initiated coverage of our business in March 2018, if additional analysts do not begin regularly publishing reports on us, we could lose visibility in the financial markets, which could cause our share price or trading volume to decline.

Sales of a substantial number of shares of our common stock in the public market, including by our existing stockholders, could cause our stock price to fall.

Sales of a substantial number of shares of our common stock in the public market, or the perception that these sales might occur, could depress the market price of our common stock and could impair our ability to raise capital through the sale of additional equity securities. We are unable to predict the effect that these sales and others may have on the prevailing market price of our common stock.

We will need to raise additional funds through future equity or debt financings to meet our operational needs and capital requirements for product development, clinical trials and commercialization. We can provide no assurance that we will be successful in raising funds pursuant to additional equity or debt financings or that such funds will be raised at prices that do not create substantial dilution for our existing stockholders. Given the recent decline in our stock price, any financing that we undertake in the next nine months could cause substantial dilution to our existing stockholders.

On February 3, 2016, we filed a universal shelf registration statement (the “Shelf Registration Statement”) to offer up to $150.0 million of our securities and entered into an “at-the-market” program pursuant to a Sales Agreement with Cowen and Company (“Cowen”), through which we issued and sold approximately 200,000 shares of common stock having an aggregate offering value of approximately $8.7 million between the Shelf Registration Statement’s effectiveness on March 8, 2016 and September 2017. In July 2018, we sold a further 2,166,180 shares of our common stock (excluding warrants to purchase an additional 1,083,091 shares of our common stock issued in a concurrent private placement) pursuant to the Shelf Registration Statement, for gross proceeds of approximately $3.5 million. We have established, and may in the future establish, “at-the-market” programs pursuant to which we may offer and sell shares of our common stock pursuant to the Shelf Registration Statement. Due to the SEC’s “baby shelf rules,” which prohibit companies with a public float of less than $75 million from issuing securities under a shelf registration statement in excess of one-third of such company’s public float in a twelve-month period, we are only able to issue a limited number of shares using the Shelf Registration Statement at this time. Accordingly, it was necessary to register the shares sold pursuant to our various financing activities.. This has increased our transaction expenses and the number

of shares required to be sold to finance our operations.

In addition, pursuant to our Securities Purchase Agreement with CRG, the Shelf Registration Statement also registered for resale 8,705 shares of common stock held by CRG, which may be sold freely in the public market. On November 3, 2017, we also entered into the Lincoln Park Purchase Agreement, pursuant to which Lincoln Park is obligated to purchase, at our request, up to $15.0 million of our common stock over a 30-month period, subject to certain limitations set forth in the Purchase Agreement. The warrants issued in connection with the Series B preferred stock prohibit us from entering into certain transactions involving the issuance of securities for a variable price determined by reference to the trading price of our common stock or otherwise subject to modification following the date of issuance, in each case until February 17, 2021. This prohibition may be waived by holders of two-thirds of the outstanding Series 1 and Series 2 warrants at any time. If these additional shares are sold, or if it is perceived that they will be sold, in the public market, the trading price of our common stock could decline. Sales of newly issued securities under any registration statement will result in dilution of our stockholders and could cause our stock price to fall.

Our directors and employees may sell our stock through 10b5-1 trading plans or in the market during open windows under our insider trading policy without such plans in place. Sales of our common stock by our directors and employees could be perceived negatively by investors or cause downward pressure on our common stock and cause a reduction in the price of our common stock as a result. We have also registered shares of our common stock that we may issue under our employee equity incentive plans. These shares will be able to be sold freely in the public market upon issuance.

Our 2018 financial statements contain disclosure that there is substantial doubt about our ability to continue as a going concern, and we will need additional financing to execute our business plan, to fund our operations and to continue as a going concern.

Since inception, we have experienced recurring operating losses and negative cash flows and we expect to continue to generate operating losses and consume significant cash resources for the foreseeable future. There is substantial doubt regarding our ability to continue as a going concern. Our independent registered public accounting firm has expressed in its auditors' report on our 2018 financial statements, included in this Annual Report on Form 10-K, a "going concern" opinion, meaning that we have recurring losses from operations and negative cash flows from operations that raise substantial doubt regarding our ability to continue as a going concern. We have prepared our financial statements on a going concern basis, which contemplates the realization of assets and the satisfaction of liabilities and commitments in the normal course of business. Our 2018 financial statements do not include any adjustment to reflect the possible future effects on the recoverability and classification of assets or the amounts and classification of liabilities that may result from the outcome of this uncertainty, with the exception that all borrowings are classified as current on the condensed balance sheets.

The requirements of being a public company may strain our resources, divert management's attention and affect our ability to attract and retain executive management and qualified board members.

As a public company, we are subject to the reporting requirements of the Securities Exchange Act of 1934, as amended, or the Exchange Act, the Sarbanes-Oxley Act, the Dodd-Frank Act, the listing requirements of Nasdaq and other applicable securities laws, rules and regulations. Compliance with these laws, rules and regulations have increased our legal and financial compliance costs and will make some activities more difficult, time-consuming or costly and increase demand on our systems and resources, particularly after we are no longer an "emerging growth company." The Exchange Act requires, among other things, that we file annual, quarterly and current reports with respect to our business and operating results. The Sarbanes-Oxley Act requires, among other things, that we maintain effective disclosure controls and procedures and internal control over financial reporting. In order to maintain and, if required, improve our disclosure controls and procedures and internal control over financial reporting to meet this standard, significant resources and management oversight may be required. Our management and other personnel now need to devote a substantial amount of time to these compliance initiatives. 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 need to hire more employees in the future or engage outside consultants to comply with these requirements, which will increase our costs and expenses.

In addition, changing laws, regulations and standards relating to corporate governance and public disclosure are creating uncertainty for public companies, increasing legal and financial compliance costs and making some activities more time consuming. These laws, regulations and standards are subject to varying interpretations, in many cases due to their lack of specificity and, as a result, their application in practice may evolve over time as new guidance is provided by regulatory and governing bodies. This could result in continuing uncertainty regarding compliance matters and higher costs necessitated by ongoing revisions to disclosure and governance practices. We intend to invest

resources to comply with evolving laws, regulations and standards, and this investment may result in increased general and administrative expenses and a diversion of management's time and attention from revenue-generating activities to compliance activities. If our efforts to comply with new laws, regulations and standards differ from the activities intended by regulatory or governing bodies due to ambiguities related to their application and practice, regulatory authorities may initiate legal proceedings against us and our business may be harmed.

We will incur additional compensation costs in the event that we decide to pay our executive officers cash compensation closer to that of executive officers of other public medical device companies, which would increase our general and administrative expense and could harm our profitability. Any future equity awards will also increase our compensation expense. We also expect that being a public company and compliance with applicable rules and regulations will make it more expensive for us to obtain director and officer liability insurance, and we may be required to accept reduced coverage or incur substantially higher costs to obtain coverage. These factors could also make it more difficult for us to attract and retain qualified executive officers and members of our board of directors, particularly to serve on our audit committee and compensation committee.

As a result of disclosure of information in this Annual Report on Form 10-K and in other filings required of a public company, our business and financial condition will become more visible, which could be advantageous to our competitors and clients and could result in threatened or actual litigation, including by competitors and other third parties. If such claims are successful, our business and operating results could be harmed, and even if the claims are resolved in our favor, these claims, and the time and resources necessary to resolve them, could divert the resources of our management and harm our business and operating results.

We are an emerging growth company and we cannot be certain if the reduced disclosure requirements applicable to emerging growth companies will make our common stock less attractive to investors.

We are an emerging growth company. For as long as we continue to be an emerging growth company, we may take advantage of certain exemptions from reporting requirements that are applicable to other public companies including, but not limited to, not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act, reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements, and exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved. We cannot predict if investors will find our common stock less attractive because we will rely on these exemptions. If some investors find our common stock less attractive as a result, there may be a less active trading market for our common stock and our stock price may be more volatile or decline.

We will remain an emerging growth company until the earlier of (1) the last day of the fiscal year (a) following the fifth anniversary of our IPO, (b) in which we have total annual gross revenue of at least $1.07 billion, or (c) in which we are deemed to be a large accelerated filer, which means the market value of our common stock that is held by non-affiliates exceeds $700 million as of the prior June 30th, and (2) the date on which we have issued more than $1.0 billion in non-convertible debt securities during the prior three-year period. We cannot predict if investors will find our common stock less attractive because we may rely on these exemptions. If some investors find our common stock less attractive as a result, there may be a less active trading market for our common stock and our stock price may suffer or be more volatile.

Nasdaq may delist our securities from its exchange, which could harm our business and limit our stockholders' liquidity.

Our common stock is currently listed on the Nasdaq Capital Market, which has qualitative and quantitative listing criteria.

On December 4, 2018, we received a letter from Nasdaq's Listing Qualifications Department notifying us that the Company was not in compliance with Nasdaq Listing Rule 5550(a)(2), as the minimum bid price for the Company's listed securities was less than $1 for the previous 30 consecutive business days. The Company has a period of 180 calendar days, or until June 3, 2019, to regain compliance with the rule referred to in this paragraph. To regain compliance, during the 180 day period, the bid price of the Company's common stock must close at $1 or more for a minimum of ten consecutive business days. The notice has no present impact on the listing of the Company's securities on Nasdaq.

In the event that the Company does not regain compliance with the Nasdaq Listing Rules prior to the expiration of the compliance period, it will receive written notification that its securities are subject to delisting. At that time, the Company may appeal the delisting determination to a hearings panel pursuant to the procedures set forth in the applicable Nasdaq Listing Rules. The Company intends to actively monitor its bid price and will consider available options to resolve the deficiency and regain compliance with the Nasdaq Listing Rules, including conducting a reverse stock split.

In the event of a delisting, we can provide no assurance that any action taken by us to restore compliance with listing requirements would allow our common stock to become listed again, stabilize the market price or improve the liquidity of our common stock, prevent our common stock from dropping below the Nasdaq minimum market value of listed securities and minimum closing bid price requirements or prevent future non-compliance with Nasdaq's listing requirements.

Anti-takeover provisions in our amended and restated certificate of incorporation and bylaws and Delaware law could discourage a takeover.

Our amended and restated certificate of incorporation and bylaws contain provisions that might enable our management to resist a takeover. These provisions include:

a classified board of directors;

advance notice requirements applicable to stockholders for matters to be brought before a meeting of stockholders and requirements as to the form and content of a stockholder's notice;

a supermajority stockholder vote requirement for amending certain provisions of our amended and restated certificate of incorporation and bylaws;

the right to issue preferred stock without stockholder approval, which could be used to dilute the stock ownership of a potential hostile acquirer;

allowing stockholders to remove directors only for cause;

a requirement that the authorized number of directors may be changed only by resolution of the board of directors;

allowing all vacancies, including newly created directorships, to be filled by the affirmative vote of a majority of directors then in office, even if less than a quorum, except as otherwise required by law;

a requirement that our stockholders may only take action at annual or special meetings of our stockholders and not by written consent;

limiting the forum for certain litigation against us to Delaware; and

limiting the persons that can call special meetings of our stockholders to our board of directors, the chairperson of our board of directors, the chief executive officer or the president (in the absence of a chief executive officer).

These provisions might discourage, delay or prevent a change in control of our company or a change in our management. The existence of these provisions could adversely affect the voting power of holders of common stock and limit the price that investors might be willing to pay in the future for shares of our common stock. In addition, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporation Law, which generally prohibits a Delaware corporation from engaging in any of a broad range of business combinations with any "interested" stockholder for a period of three years following the date on which the stockholder became an "interested" stockholder.

Our amended and restated certificate of incorporation provides that the Court of Chancery of the State of Delaware will be the sole and exclusive forum for substantially all disputes between us and our stockholders, which could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us or our directors, officers or employees.

Our amended and restated certificate of incorporation provides that, unless we consent to the selection of an alternative forum, the Court of Chancery of the State of Delaware is the sole and exclusive forum for (i) any derivative action or proceeding brought on our behalf, (ii) any action asserting a claim of breach of fiduciary duty owed by any of our directors, officers or other employees to us or to our stockholders, (iii) any action asserting a claim arising pursuant to the Delaware General Corporation Law or our certificate of incorporation or bylaws (iv) any action to interpret apply, enforce or determine the validity of our certificate of incorporation or bylaws or (v) any action asserting a claim governed by the internal affairs doctrine. The choice of forum provision may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers or other employees, which may discourage such lawsuits against us and our directors, officers and other employees. Alternatively, if a court were to find the choice of forum provision contained in our amended and restated certificate of incorporation to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving such action in other jurisdictions, which could harm our business, operating results and financial condition.

We have not paid dividends in the past and do not expect to pay dividends in the future, and any return on investment may be limited to the value of our stock.

We have never paid cash dividends and do not anticipate paying cash dividends in the foreseeable future, except the cumulative dividend payable on our Series A preferred stock. The payment of all other dividends will depend on our earnings, capital requirements, financial condition, prospects and other factors our board of directors may deem relevant. In addition, our Loan Agreement with CRG prohibits us from, among other things, paying any dividends or making any other distribution or payment on account of our common stock. The terms of our Series A preferred stock and our Series B preferred stock provide that we may not pay dividends on our common stock without concurrently declaring dividends on each. If we do not pay dividends, our stock may be less valuable because a return on your investment will only occur if you sell our common stock after our stock price appreciates. For more information on restrictions governing our ability to pay dividends, see the section titled "*Dividend Policy*" below.

CRG has the ability to exert significant control over matters pursuant to the protective provisions therein as well as the covenants and other restrictions in the Loan Agreement.

Even though Series A preferred stock is non-voting stock, our governing documents, as amended, have protective provisions that will require CRG to consent to certain significant Company events. For example, CRG's consent would be necessary to create additional shares of Series A preferred stock, amend our organizational documents, or approve any merger, sale of assets, or other major corporate transaction. This consent requirement could delay or prevent any acquisition of our company on terms that other stockholders may desire, and may adversely affect the market price of our common stock.

The Series A preferred stock has a liquidation preference senior to our common stock, the Series B preferred stock and the Series C Preferred Stock.

Series A preferred stock has a liquidation preference that gets paid prior to any payment on our common stock (including shares issuable upon the exercise of our outstanding warrants) and Series B preferred stock. As a result, if we were to dissolve, liquidate, merge with another company or sell our assets, the holders of our Series A preferred stock would have the right to receive up to approximately $41,800,000, plus any unpaid dividends from any such transaction before any amount is paid to the holders of our Series B preferred stock, Series C preferred stock or common stock or pursuant to the redemption rights in the warrants for fundamental transactions. The payment of the liquidation preferences could result in common stockholders, Series B preferred stockholders, Series C preferred stockholders and warrantholders not receiving any consideration if we were to liquidate, dissolve or wind up, either voluntarily or involuntarily.

The existence of the liquidation preferences may reduce the value of our common stock, make it harder for us to sell shares of common stock in offerings in the future, or prevent or delay a change of control.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

We maintain our principal executive offices, comprising 44,200 square feet in two buildings in Redwood City, California, under a lease agreement that expires in November 2019. We are currently in the process of negotiating a renewal of one of the buildings under the original lease.. Our facility houses our research and development, sales, marketing, manufacturing, finance and administrative activities. In February 2016, we entered into an additional non-cancelable operating lease for 6,600 square feet of warehouse and storage space in Redwood City, California, the lease agreement originally was to expire in November 2019. We exited this warehouse lease in December 2018 and incurred exit costs of approximately $50,000 which is included in rent expense for 2018.

On October 19, 2017, we entered into an agreement to sublease one of our facilities. The sublease commenced on December 1, 2017, and is scheduled to expire on November 15, 2019 (which is 15 days prior to the expiration of the facility lease). Prior to December 1, 2018, the sublessee paid a base rent of $3.25 per rentable square foot, or a total of $79,950 per month. On December 1, 2018 the base rent increased to $3.35 per rentable square foot, or a total of $82,410 per month. In addition to the base rent, the sublessee pays for the Landlord’s operating expenses and property taxes due and payable with respect to the subleased facility.

We believe that our current facilities are adequate for our current and anticipated future needs through at least 2019.

ITEM 3. LEGAL PROCEEDINGS

Except as set forth below, we are not involved in any pending legal proceedings that we believe could have a material adverse effect on our financial condition, results of operations or cash flows. From time to time we may be involved in legal proceedings or investigations, which could harm our reputation, business and financial condition and divert the attention of our management from the operation of our business.

Between May 22, 2017 and May 25, 2017, three class actions were filed in the Superior Court of the State of California, County of San Mateo, or the State Court, against us and certain of our officers and directors. The

underwriters of our IPO in January 2015 are also named as defendants. The actions were captioned Grotewiel v. Avinger, Inc., et al., No. 17-CIV-02240, Gonzalez v. Avinger, Inc., et al., No. 17-CIV-02284, and Olberding v. Avinger, Inc., et al., No. 17-CIV-02307. These lawsuits allege that the registration statement for our IPO made false and misleading statements and omissions in violation of the Securities Act of 1933. Plaintiffs seek to represent a class of purchasers of our common stock in and/or traceable to our IPO. Plaintiffs seek, among other things, unspecified compensatory damages, interest, costs, recission, and attorneys' fees. On June 12, 2017, defendants removed these actions to the United States District Court for the Northern District of California, or Federal Court.

On June 22, 2017, and June 23, 2017, plaintiffs Olberding and Gonzalez moved to remand their cases to the State Court. Defendants opposed these motions. On July 21, 2017, the Federal Court granted the motions to remand the Olberding and Gonzalez actions to the State Court. On August 9, 2017, the State Court consolidated the Olberding and Gonzalez actions under the caption Gonzalez v. Avinger, Inc., et al., No. 17-CIV-02284, or State Action. On September 22, 2017, an amended complaint was filed in the State Action. On October 31, 2017, the parties in the State Action stipulated to a stay of proceedings until judgment is entered in the federal Grotewiel action, or Federal Action. On June 20, 2018, the State Court dismissed the State Action pursuant to the proposed settlement described below.

On October 11, 2017, the Federal Court appointed a lead plaintiff and approved the selection of a lead counsel in the Federal Action. On November 21, 2017, an amended complaint was filed in the Federal Action. Defendants filed a motion to dismiss that complaint on January 26, 2018. On March 19, 2018, plaintiff in the Federal Action filed a further amended complaint, on behalf of a class of purchasers of our common stock in and/or traceable to our IPO, as well as purchasers of our common stock during the period January 30, 2015, to April 10, 2017.

The Company and its directors believe that the foregoing lawsuits were without merit; however, in the interest of avoiding the cost and disruption of continuing to defend against these lawsuits, the Company entered into a settlement of the actions. The settlement was for a total of $5 million. The Company's total contribution to the settlement fund was $1.76 million, which the Company paid in March 2018. On October 24, 2018, the court approved the settlement.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

PART II

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

Our common stock began trading on the Nasdaq Global Market on January 30, 2015 and was transferred to the Nasdaq Capital Market on January 19, 2018, where it trades under the symbol "AVGR".

HOLDERS OF RECORD

As of March 1, 2019, there were 42,297,117 shares of our common stock held by 170 holders of record of our common stock. The actual number of stockholders is greater than this number of record holders, and includes stockholders who are beneficial owners, but whose shares are held in street name by brokers and other nominees. This number of holders of record also does not include stockholders whose shares may be held in trust by other entities.

DIVIDEND POLICY

Our Series A preferred stock carries an 8% cumulative dividend, which accumulates and is compounded annually. This cumulative dividend is payable in arrears on December 31 of each year, commencing with December 31, 2018, and at our option is payable in additional shares of Series A preferred stock. Additionally, the terms of our Series A preferred stock and Series B preferred stock provide that we may not declare dividends on the common stock without concurrently declaring dividends on such series of preferred stock in an amount equal to that payable had they been converted to common stock prior to the dividend. On February 11, 2019, our board of directors declared a dividend on our Series A Preferred Stock, and we issued 2,945 shares of Series A Preferred Stock to pay the preferred dividend to the holder of Series A Preferred Stock. Other than the preferred dividend on Series A Preferred Stock, we have never declared or paid any cash dividends on any of our capital stock. Except with respect to the Series A preferred stock's cumulative dividend, we do not anticipate paying any dividends in the foreseeable future and currently intend to retain all available funds and any future earnings for use in the operation of our business and to finance the growth and development of our business.

Future determination as to the declaration and payment of dividends, if any, will be at the discretion of our board of directors and will depend on then existing conditions, including our operating results, financial condition, contractual restrictions, capital requirements, business prospects and other factors our board of directors may deem relevant. In addition, our Loan Agreement with CRG prohibits us from paying any dividends or making any other distribution or

payment on account of our common stock.

RECENT SALES OF UNREGISTERED SECURITIES

There were no sales of unregistered securities during fiscal 2018 other than those transactions previously reported to the SEC on a Quarterly Report on Form 10-Q or Current Report on Form 8-K.

PURCHASES OF EQUITY SECURITIES BY THE ISSUER AND AFFILIATED PURCHASERS

None.

ITEM 6. SELECTED FINANCIAL DATA

This item does not apply to smaller reporting companies.

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 financial statements and related notes included elsewhere in this Annual Report on Form 10-K. This discussion and other parts of this Annual Report on Form 10-K contain forward-looking statements that involve risks and uncertainties, such as statements of our plans, objectives, expectations and intentions, that are based on the beliefs of our management, as well as assumptions made by, and information currently available to, our management. Our actual results could differ materially from those discussed in these forward-looking statements. Factors that could cause or contribute to such differences include, but are not limited to, those discussed in the section of this Annual Report on Form 10-K entitled "Risk factors."

Overview

We are a commercial-stage medical device company that designs, manufactures and sells image-guided, catheter-based systems that are used by physicians to treat patients with peripheral artery disease, or PAD. Patients with PAD have a build-up of plaque in the arteries that supply blood to areas away from the heart, particularly the pelvis and legs. Our mission is to significantly improve the treatment of vascular disease through the introduction of products based on our Lumivascular platform, the only intravascular image-guided system available in this market. We manufacture and sell a suite of products in the United States and select international markets. Our current products include our Lightbox imaging console, the Ocelot family of catheters, which are designed to allow physicians to penetrate a total blockage in an artery, known as a chronic total occlusion, or CTO, and Pantheris, our image-guided atherectomy device which is designed to allow physicians to precisely remove arterial plaque in PAD patients. We received 510(k) clearance from the U.S. Food and Drug Administration, or FDA, for commercialization of Pantheris in October 2015. We received an additional 510(k) clearance for an enhanced version of Pantheris in March 2016 and commenced sales of Pantheris in the United States and select European countries promptly thereafter. In May 2018, the Company also received 510(K) clearance from the FDA for its current next-generation version of Pantheris. The Company has sales in the U.S. and select international markets. The Company is located in Redwood City, California. The Company submitted a 510(k) filing in respect of Pantheris SV (Small Vessel), a lower profile Pantheris, in August 2018 and received CE Marking for Pantheris SV in October 2018.We also offer the Wildcat and Kittycat 2 catheters, which are used for crossing CTOs but do not contain on-board imaging technology.

We are developing a next-generation version of our Pantheris atherectomy device, Pantheris SV, a lower profile Pantheris. The lower profile Pantheris has a smaller diameter and longer length that we believe will optimize it for use in smaller vessels. We submitted a 510(k) application for Pantheris SV in smaller vessels in August 2018 and received CE Marking approval in October 2018. In addition, we completed development of our next-generation Pantheris which we believe represents a significant improvement over our prior product. Our next-generation Pantheris includes new features and design improvements to the handle, shaft, balloon and nose cone that we believe improves usability and reliability. Our next-generation Pantheris received CE Marking approval in December 2017 and was cleared by the FDA in May 2018. The next-generation Pantheris is available for commercial sale in the EU and United States.

During the first quarter of 2015, we completed enrollment of patients in VISION, a clinical trial designed to support our August 2015 510(k) filing with the FDA for our Pantheris atherectomy device. VISION was designed to evaluate the safety and efficacy of Pantheris to perform atherectomy using intravascular imaging and successfully achieved all primary and secondary safety and efficacy endpoints. We believe the data from VISION allows us to demonstrate that avoiding damage to healthy arterial structures, and in particular disruption of the external elastic lamina, which is the membrane between the outermost layers of the artery, reduces the likelihood of restenosis, or re-narrowing, of the diseased artery. Although the original VISION study protocol was not designed to follow patients beyond six months, we have worked with 18 of the VISION sites to re-solicit consent from previous clinical trial patients in order for them to evaluate patient outcomes through 12 and 24 months following initial treatment. Data collection for the remaining patients from participating sites was completed in May 2017, and we released the final 12- and 24-month results for a total of 89 patients in July 2017. We commenced commercialization of Pantheris as part of our Lumivascular platform in the United States and in select international markets in March 2016, after obtaining the required marketing authorizations. During the fourth quarter of 2017, we began enrolling patients in INSIGHT, a clinical trial designed to support a filing with the FDA to expand the indication for our Pantheris atherectomy device to include in-stent restenosis. Patient enrollment began in October 2017 and is expected to continue through early 2019. Patient outcomes will be evaluated at thirty days, six months and one year following treatment. We plan to submit a 510(k) application with the FDA seeking a specific indication for treating in-stent restenosis with Pantheris once the trial is fully enrolled and follow-up data through six months are available and analyzed.

We focus our direct sales force, marketing efforts and promotional activities on interventional cardiologists, vascular surgeons and interventional radiologists. We also work on developing strong relationships with physicians and hospitals that we have identified as key opinion leaders. Although our sales and marketing efforts are directed at these physicians because they are the primary users of our technology, we consider the hospitals and medical centers where the procedure is performed to be our customers, as they typically are responsible for purchasing our products. We are designing future products to be compatible with our Lumivascular platform, which we expect to enhance the value proposition for hospitals to invest in our technology. Pantheris qualifies for existing reimbursement codes currently utilized by other atherectomy products, further facilitating adoption of our products.

Prior to the introduction of our Lumivascular platform our non-imaging catheter products were manufactured by third parties. All of our products are now manufactured in-house at our facilities in Redwood City, California using components and sub-assemblies manufactured both in-house and by outside vendors. We assemble all of our products at our manufacturing facility, but certain critical processes such as coating and sterilization are done by outside vendors. We expect our current manufacturing facility will be sufficient through at least 2019.

In addition to commercialization of Pantheris in the United States and select international markets in March 2016, we began commercializing our initial non-Lumivascular platform products in 2009 and introduced our Lumivascular platform products in the United States in late 2012. We generated revenues of $7.9 million in the year ended December 31, 2018 and $9.9 million in the year ended December 31, 2017. During the years ended December 31, 2018 and 2017, our net loss and comprehensive loss was $27.6 million and $48.7 million, respectively. We have not been profitable since inception, and as of December 31, 2018, our accumulated deficit was $328.9 million. Since inception, we have financed our operations primarily through private and public placements of our preferred and common securities and, to a lesser extent, debt financing arrangements. In January 2015, we completed an initial public offering, or IPO, of 125,000 shares. As a result of our IPO, which closed in February 2015, we received net proceeds of approximately $56.9 million, after underwriting discounts and commissions of approximately $4.5 million and other expenses associated with our IPO of approximately $3.6 million.

In September 2015, we entered into a Term Loan Agreement, or Loan Agreement, with CRG Partners III L.P. and certain of its affiliated funds, collectively CRG, under which we were able to borrow up to $50.0 million on or before March 29, 2017, subject to certain terms and conditions. We borrowed $30.0 million on September 22, 2015 and an additional $10.0 million on June 15, 2016 under the Loan Agreement. Contingent on achievement of certain revenue milestones, among other conditions, we would have been eligible to borrow an additional $10.0 million, on or prior to March 29, 2017; however, we did not achieve the level of revenues required to borrow the final $10.0 million. Contemporaneously with the execution of the Loan Agreement, we entered into a Securities Purchase Agreement with CRG, pursuant to which CRG purchased 8,705 shares of our common stock on September 22, 2015 at a price of $559.64 per share, which represents the 10-day average of closing prices of our common stock ending on September 21, 2015. Pursuant to the Securities Purchase Agreement, we filed a registration statement covering the resale of the shares sold to CRG and must comply with certain affirmative covenants during the time that such registration statement remains in effect. We used the proceeds from the CRG borrowing and securities purchase to retire our outstanding principal and accrued interest with PDL Biopharma, or PDL, and to retire the principal and accrued interest underlying our outstanding promissory notes, or the notes.

On February 3, 2016, we filed a universal shelf registration statement to offer up to $150.0 million of our securities and entered into an “at-the-market” program pursuant to a Sales Agreement with Cowen and Company, or Cowen, through which we may, from time to time, issue and sell shares of common stock having an aggregate offering value of up to $50.0 million. The shelf registration statement also covers the resale of the shares sold to CRG. The registration statement was declared effective by the SEC on March 8, 2016. During the year ended December 31, 2016, we sold 27,374 shares of common stock through the “at-the-market” program at an average price of $194.74 and raised net proceeds of $5.2 million, after payment of $0.2 million in commissions and fees to Cowen. During the year ended December 31, 2017, we sold 189,684 shares of common stock through the “at-the-market” program at an average price of $17.68 and raised net proceeds of $3.2 million, after payment of $0.1 million in commissions and fees to Cowen. Due to the SEC’s “baby shelf rules,” which prohibit companies with a public float of less than $75 million from issuing securities under a shelf registration statement in excess of one-third of such company’s public float in a twelve-month period, at this time we are unable to issue more shares through our “at-the-market” program. In addition, in August 2016 we completed a follow-on public offering of 246,445 shares of our common stock for net proceeds of approximately $31.5 million after deducting underwriting discounts and commissions of approximately $2.4 million and other expenses of approximately $0.6 million. The 246,445 shares include the exercise in full by the underwriters of their option to purchase an additional 32,145 shares of our common stock.

In April 2017, we undertook an organizational realignment which included a reduction in force, that lowered our total headcount by approximately 33% compared to December 31, 2016. The organizational realignment was designed to focus our commercial efforts on driving catheter utilization in our strongest markets, around our most productive sales professionals. Our field sales personnel headcount was reduced to 32, down from 60 as of December 31, 2016. This workforce reduction was designed to reduce operating expenses while continuing to support major product development and clinical initiatives. The strategic reduction in the field sales force was designed to maintain robust engagement with higher volume users of our Lumivascular technology and position us to increase utilization of our catheters within our installed base of accounts in 2018 following the launch of our next generation products. In September 2017, we effected a cost reduction plan, which also included a company-wide reduction in force, lowering our total headcount by an additional 24 employees. Our field sales personnel headcount was further reduced to a total of 20 people. In addition, as part of the cost reduction plan, in October 2017, we subleased a portion of the Company's facilities and consolidated our operations primarily into one building.

On November 3, 2017, we entered into a purchase agreement with Lincoln Park Capital Fund, LLC, or Lincoln Park, pursuant to which Lincoln Park is obligated to purchase, at our request, up to $15.0 million of our common stock over a 30-month period, subject to certain limitations set forth in the purchase agreement (the "Lincoln Park Purchase Agreement"). As a fee for Lincoln Park's commitment to purchase such shares, we issued 23,584 shares of common stock to Lincoln Park on November 3, 2017. As obligated under a registration rights agreement entered into with Lincoln Park in connection with the Lincoln Park Purchase Agreement, we filed a registration statement on Form S-1 on November 6, 2017 for up to 248,750 of such shares, which registration statement was declared effective by the SEC on November 17, 2017.

On February 14, 2018, we entered into Amendment No. 2 to the Term Loan Agreement (the "Amendment No. 2 Loan Agreement") with CRG. Under its terms, the Amendment No. 2 Loan Agreement, among other things: (1) extended the interest-only period through June 30, 2021; (2) extended the period during which the Company may elect to pay a portion of interest in payment-in-kind, or PIK, interest payments through June 30, 2021 so long as no default has occurred and is continuing; (3) permitted the Company to make its entire interest payments in PIK interest payments for through December 31, 2019 so long as no default has occurred and is continuing; (4) extended the maturity date to June 30, 2023; (5) reduced the minimum liquidity requirement to $3.5 million at all times; (6) eliminated the minimum revenue covenant for 2018 and 2019; (7) reduced the minimum revenue covenant to $15 million for 2020, $20 million for 2021 and $25 million for 2022; and (8) provided CRG with board observer rights.

In addition, on February 14, 2018, we entered into a Series A preferred stock Purchase Agreement (the "Series A Purchase Agreement") with CRG, pursuant to which it agreed to convert $38.0 million of the outstanding principal amount of its senior secured term loan (plus the back-end fee and prepayment premium applicable thereto) under the Loan Agreement into a newly authorized Series A preferred stock. As discussed in the section of this report titled "Dividend Policy," the holders of Series A preferred stock are entitled to receive annual accruing dividends at a rate of 8%, payable in additional shares of Series A preferred stock or cash, at our option. The shares of Series A preferred stock have no voting rights and rank senior to all other classes and series of the Company's equity in terms of repayment and certain other rights. The Series A preferred stock and any of the Company's common stock issued upon conversion of the Series A preferred stock is subject to a lockup agreement through February 14, 2019.

On February 16, 2018, we completed a public offering of 17,979 shares of Series B preferred stock and warrants to purchase 17,979,000 shares of common stock. As a result, we received net proceeds of approximately $15.5 million after underwriting discounts, commissions, legal and accounting fees. Each share of Series B preferred stock is accompanied by one warrant that expires on the seventh anniversary of the date of issuance to purchase up to 500 shares of common stock (the “Series 1 warrants”) and one warrant that expires on the earlier of (i) the seventh anniversary of the date of issuance or (ii) the 60th calendar day following the receipt and announcement of FDA clearance of our Pantheris below-the-knee device (or the same or similar product with a different name) to purchase up to 500 shares of common stock; provided, however, if at any time during such 60-day period the volume weighted average price for any trading day is less than the then effective exercise price, the termination date shall be extended to the seven year anniversary of the initial exercise date (the “Series 2 warrants”). In addition, pursuant to the Series A Purchase Agreement, we issued to CRG 41,800 shares of Series A preferred stock at the closing of the Series B Offering. The Series A preferred stock was issued in exchange for the conversion of $38.0 million of the outstanding principal amount of their senior secured term loan (plus the back-end fee and prepayment premium applicable thereto), totaling approximately $41.8 million. The Series A preferred stock is initially convertible into 20,900,000 shares of common stock subject to certain limitations contained in the Series A Purchase Agreement.

On July 12, 2018, we entered into a securities purchase agreement with certain investors pursuant to which we agreed to sell and issue, in a registered direct offering, an aggregate of 2,166,180 shares of our common stock at an offering price of $1.6425 per share. In a concurrent private placement, or the Private Placement, we agreed to issue to these investors warrants exercisable for one share of our common stock for each two shares purchased in the registered direct offering, which equals an aggregate of 1,083,091 shares of common stock. The closing of such registered direct offering and the concurrent Private Placement occurred on July 16, 2018, in connection with which we received net proceeds of approximately $3.0 million after deducting placement agent fees and other expenses payable by us and the conversion price of the outstanding shares of Series B preferred stock, issued in our February 2018 offering, was reduced to $1.58 per share as a result. The warrants have an exercise price of $1.58 per share of our common stock and may be exercised from time to time beginning on January 17, 2019 and expire on July 16, 2021.

On November 1, 2018, we completed a public offering of 7,285,000 shares of common stock and 8,586 shares of Series C convertible preferred stock (the "Series C preferred stock"). As a result, we received net proceeds of approximately $10.2 million after underwriting discounts, commissions, legal and accounting fees. Upon any dissolution, liquidation or winding up, whether voluntary or involuntary, holders of Series C preferred stock will be entitled to receive distributions out of our assets, whether capital or surplus, of an amount equal to $0.001 per share of Series C preferred stock before any distributions shall be made on the common stock but after distributions shall be made on any outstanding Series A preferred stock and any of our existing or future indebtedness. The Series C preferred stock has no voting rights.

Components of our Results of Operations

Revenues

All of our revenues are currently derived from sales of our Lightbox console, as well as related services, and sales of our various PAD catheters in the United States and select international markets. We expect our revenues to increase in 2019 as we introduce our Pantheris small vessel device and expand our sales force. No single customer accounted for more than 10% of our revenues during the years ended December 31, 2018 and 2017.

Revenues may fluctuate from quarter to quarter due to a variety of factors including capital equipment purchasing patterns that are typically increased towards the end of the calendar year and decreased in the first quarter. In addition, during the first quarter, our results can be harmed by adverse weather and by resetting of annual patient healthcare insurance plan deductibles, both of which may cause patients to delay elective procedures. In the third quarter, the number of elective procedures nationwide is historically lower than other quarters throughout the year, which we believe is primarily attributable to the summer vacations of physicians and their patients.

Cost of Revenues and Gross Margin

Cost of revenues consists primarily of costs related to manufacturing overhead, materials and direct labor. We expense all warranty costs and inventory provisions as cost of revenues. We periodically write-down inventory for estimated excess, obsolete and non-sellable inventories based on assumptions about future demand, past usage, changes to manufacturing processes and overall market conditions. A significant portion of our cost of revenues currently consists of manufacturing overhead costs. These overhead costs include the cost of quality assurance, material procurement, inventory control, facilities, equipment and operations supervision and management. We expect overhead costs as a percentage of revenues to become less significant as our production volume increases. Cost of revenues also includes depreciation expense for production equipment, depreciation and related maintenance expense for placed Lightboxes held by customers and certain direct costs such as those incurred for shipping our products.

We calculate gross margin as gross profit divided by revenues. Our gross margin has been and will continue to be affected by a variety of factors, primarily production volumes, manufacturing costs, product yields, headcount, charges for excess and obsolete inventories and cost-reduction strategies. We expect our gross margin to increase over the long term as our production volume increases and as we spread the fixed portion of our manufacturing overhead costs over a larger number of units produced, thereby reducing our per unit manufacturing costs. We intend to use our design, engineering and manufacturing capabilities to further advance and improve the efficiency of our manufacturing processes, which we believe will reduce costs and increase our gross margin. In the future, we may seek to manufacture certain of our products outside the United States to further reduce costs. Our gross margin will likely fluctuate from quarter to quarter as we continue to introduce new products and sales channels, and as we adopt new manufacturing processes and technologies.

Research and Development Expenses

Research and development, or R&D, expenses consist primarily of engineering, product development, clinical and regulatory affairs, consulting services, materials, depreciation and other costs associated with products and technologies in development. These expenses include employee compensation, including stock-based compensation, supplies, materials, quality assurance expenses allocated to R&D programs, consulting, related travel expenses and facilities expenses. Clinical expenses include clinical trial design, clinical site reimbursement, data management, travel expenses and the cost of manufacturing products for clinical trials. We expect R&D expenses as a percentage of revenues to vary over time depending on the level and timing of our new product development efforts, as well as our clinical development, clinical trial and other related activities.

Selling, General and Administrative Expenses

Selling, general and administrative, or SG&A, expenses consist primarily of compensation for personnel, including stock-based compensation, related to selling and marketing functions, physician education programs, business development, finance, information technology and human resource functions. Other SG&A expenses include commissions, training, travel expenses, educational and promotional activities, marketing initiatives, market research and analysis, conferences and trade shows, professional services fees, including legal, audit and tax fees, insurance costs, general corporate expenses and allocated facilities-related expenses. We expect SG&A expenses to remain relatively flat compared to the prior year.

Interest Income (Expense), net

Interest income (expense), net consists primarily of interest incurred on our outstanding indebtedness and non-cash interest related to the amortization of debt discount and issuance costs associated with our various debt agreements.

Other Income (Expense), net

Other income (expense), net primarily consists of gains and losses resulting from the remeasurement of foreign exchange transactions.

Results of Operations:

	Year Ended December 31,	
	2018	**2017**
Revenues	$7,915	$9,934
Cost of revenues	6,531	13,002
Gross profit (loss)	1,384	(3,068)
Gross margin	17%	-31%
Operating expenses:		
Research and development	6,009	11,319
Selling, general and administrative	17,442	25,120
Restructuring charges	-	1,285
Litigation settlement	-	1,760
Total operating expenses	23,451	39,484
Loss from operations	(22,067)	(42,552)
Interest income (expense), net	(5,478)	(6,191)
Other income (expense), net	(13)	11
Net loss and comprehensive loss	$(27,558)	$(48,732)

Comparison of Years Ended December 31, 2018 and 2017

Revenues. Revenues decreased $2.0 million, or 20.4%, to $7.9 million during the year ended December 31, 2018, compared to $9.9 million during the year ended December 31, 2017. The decreased revenues in 2018 reflect the impact of the reduced size of our field sales force.

Cost of Revenues and Gross Margin. Cost of revenues decreased $6.5 million, or 50%, to $6.5 million during the year ended December 31, 2018, compared to $13.0 million during the year ended December 31, 2017. This decrease was primarily attributable to lower excess and obsolescence charges predominantly related to our Lightbox and Pantheris inventories and our decreased sales in the year ended December 31, 2018 reflecting the impact of the reduced size of our sales force. Gross margin for the year ended December 31, 2018 increased to 17% compared to -31% in the year ended December 31, 2017. Stock-based compensation expense within cost of revenues totaled $0.1 million and $0.3 million for the years ended December 31, 2018 and 2017, respectively.

Research and Development Expenses. R&D expenses decreased $5.3 million, or 47%, to $6.0 million during the year ended December 31, 2018, compared to $11.3 million during the year ended December 31, 2017. This decrease was primarily due to a decrease in personnel-related expenses as a result of fewer employees and lower project spending

due to completion of projects previously in process. Stock-based compensation expense within R&D totaled $0.5 million and $1.7 million for the years ended December 31, 2018 and 2017, respectively.

Selling, General and Administrative Expenses. SG&A expenses decreased $7.7 million, or 31%, to $17.4 million during the year ended December 31, 2018, compared to $25.1 million during the year ended December 31, 2017. This decrease was primarily due to a decrease in personnel-related expenses as a result of fewer employees and lower professional services expenses. Stock-based compensation expense within SG&A totaled $2.4 million and $2.9 million for the years ended December 31, 2018 and 2017, respectively.

Restructuring. In April, September and October 2017, we undertook organizational realignment and cost reduction activities to conserve resources which included reductions in force that lowered our total headcount and the sublease of one of our facilities. We recorded $1.3 million in restructuring charges during the year ended December 31, 2017, which consisted of severance related costs specific to the termination of 44 and 24 employees in April and September 2017, respectively, and an operating lease related liability for one of our facilities.

Litigation Settlement. Between May 22, 2017 and May 25, 2017, three class actions were filed in the Superior Court of the State of California, County of San Mateo, or the State Court, against us and certain of our officers and directors. The underwriters of our IPO in January 2015 were also named as defendants. These lawsuits allege that the registration statement for our IPO made false and misleading statements and omissions in violation of the Securities Act of 1933. Plaintiffs sought, among other things, unspecified compensatory damages, interest, costs, recission, and attorneys' fees.

The Company and its directors believe that the foregoing lawsuits were without merit; however, in the interest of avoiding the cost and disruption of continuing to defend against these lawsuits, the Company entered into a settlement of the actions. The settlement is for a total of $5 million. The Company's total contribution to the settlement fund was $1.76 million, which was expensed in 2017 and paid in March 2018. On October 24, 2018, the court approved the settlement.

Interest Income (Expense), Net. Interest income (expense), net decreased $0.6 million, or 19%, to an expense of $5.5 million during the year ended December 31, 2018, compared to an expense of $6.2 million during the year ended December 31, 2017. The reason for the decrease is primarily due to CRG's conversion of $38.0 million in outstanding principal and interest into Series A preferred stock in connection with our February 2018 public offering. Additionally, amortization of the debt discount recorded in connection with the issuance of the debt was converted as a result of our offering.

Other income (expense), net was not significant for the years ended December 31, 2018 and 2017. Other income was primarily attributable to the remeasurement of foreign exchange transactions.

Liquidity and Capital Resources

As of December 31, 2018, we had cash and cash equivalents of $16.4 million and an accumulated deficit of $328.9 million, compared to cash and cash equivalents of $5.4 million and an accumulated deficit of $301.3 million as of December 31, 2017. We do not know when or if our operations will generate sufficient cash to fund our ongoing operations. Additional debt financing, if available, may involve covenants restricting our operations or our ability to incur additional debt. Any additional debt financing or additional equity that we raise may contain terms that are not favorable to us or our stockholders and require significant debt service payments, which divert resources from other activities. Additional financing may not be available at all, or if available, may not be in amounts or on terms acceptable to us. If we are unable to obtain additional financing, we may be required to delay the development, commercialization and marketing of our products and we may be required to significantly scale back our business and operations.

To date, we have financed our operations primarily through sales of our products and net proceeds from the issuance of our preferred stock and debt financings, our "at-the-market" program, our initial public offering, or IPO, our follow-on public offerings and other post-IPO private offerings, primarily of warrants. The warrants issued pursuant to the Series B Purchase Agreement entered into in connection with the Series B preferred stock follow-on in February 2018, or the Series B Offering, prohibit us from entering into certain transactions involving the issuance of securities for a price determined by reference to the trading price of our common stock or otherwise subject to modification following the date of issuance, in each case for a period of three years from the closing date of the Series B Offering (and excluding purchases pursuant to the Series B Purchase Agreement, which may be made on the 120 day anniversary of the closing date of the offering). This prohibition may be waived by holders of two-thirds of the

outstanding Series 1 and Series 2 warrants at any time.

On September 22, 2015, the Company entered into a Term Loan Agreement (the "Loan Agreement"), with CRG under which, subject to certain conditions, the Company had the right to borrow up to $50,000,000 in principal amount from CRG on or before March 29, 2017. The Company borrowed $30,000,000 on September 22, 2015. The Company borrowed an additional $10,000,000 on June 15, 2016 under the Loan Agreement.

On February 14, 2018, the Company and CRG amended the Loan Agreement concurrent with the conversion of $38,000,000 of the principal amount of the senior secured term loan (plus $3,800,000 in back-end fees and prepayment premium applicable thereto) into shares of a newly authorized Series A convertible preferred stock. To date, the Company has elected to make payment-in-kind for the majority of the 12.5% interest rate and plans to continue doing so until such time as cash payments are required. As of December 31, 2018, the balance due under the loan, including payment-in-kind, is $7.5 million. No cash payments will be made until the final two years of the loan, which matures in June 2023. On February 11, 2019, our board of directors declared a dividend on our Series A Preferred Stock, and we issued 2,945 shares of Series A Preferred Stock to pay the preferred dividend to the holder of Series A Preferred Stock.

On February 3, 2016, we filed a universal shelf registration statement to offer up to $150.0 million of our securities and entered into an "at-the-market" program pursuant to a Sales Agreement with Cowen, as sales agent, through which we issued and sold common stock with an aggregate value of approximately $8.7 million between the registration statement's effectiveness on March 8, 2016 and September 2017. During the year ended December 31, 2016, we sold 27,374 shares of common stock through the "at-the-market" program at an average price of $194.74 and raised net proceeds of $5.2 million, after payment of $0.2 million in commissions and fees to Cowen. During the year ended December 31, 2017, we sold 189,684 shares of common stock through the "at-the-market" program at an average price of $17.68 and raised net proceeds of $3.2 million, after payment of $0.1 million in commissions and fees to Cowen. Due to the SEC's "baby shelf rules," which prohibit companies with a public float of less than $75 million from issuing securities under a shelf registration statement in excess of one-third of such company's public float in a twelve-month period, we are unable to issue more shares through our "at-the-market" program at this time. In addition, in August 2016, we issued and sold 246,445 shares of our common stock in a follow-on public offering at a public offering price of $140.00 per share, for net proceeds of approximately $31.5 million after deducting underwriting discounts and commissions of approximately $2.4 million and other expenses of approximately $0.6 million. The 246,445 shares include the exercise in full by the underwriters of their option to purchase an additional 32,145 shares of our common stock.

On February 16, 2018, we completed a public offering of 17,979 shares of Series B preferred stock and warrants to purchase 17,979,000 shares of common stock. As a result, we received net proceeds of approximately $15.5 million after underwriting discounts, commissions, legal and accounting fees. The Series B preferred stock has a liquidation preference of $0.001 per share, full ratchet price based anti-dilution protection, has no voting rights and is subject to certain ownership limitations. The Series B preferred stock is immediately convertible at the option of the holder, has no stated maturity, and does not pay regularly stated dividends or interest. Each share of Series B preferred stock is accompanied by one Series 1 warrant that expires on the seventh anniversary of the date of issuance to purchase up to 500 shares of common stock and one Series 2 warrant that expires on the earlier of (i) the seventh anniversary of the date of issuance or (ii) the 60th calendar day following the receipt and announcement of FDA clearance of our Pantheris below-the-knee device (or the same or similar product with a different name) to purchase up to 500 shares of common stock; provided, however, if at any time during such 60-day period the volume weighted average price for any trading day is less than the then effective exercise price, the termination date shall be extended to the seven year anniversary of the initial exercise date. In addition, pursuant to the Series A Purchase Agreement, we issued to CRG 41,800 shares of Series A preferred stock at the closing of the Series B Offering. The Series A preferred stock was issued in exchange for the conversion of $38.0 million of the outstanding principal amount of their senior secured term loan (plus the back-end fee and prepayment premium applicable thereto), totaling approximately $41.8 million. The Series A Preferred Stock is initially convertible into 20,900,000 shares of common stock subject to certain limitations contained in the Series A Purchase Agreement.

On July 12, 2018, we entered into a securities purchase agreement with certain investors pursuant to which we agreed to sell and issue, in a registered direct offering, an aggregate of 2,166,180 shares of our common stock at an offering price of $1.6425 per share. In a concurrent private placement, or the Private Placement, we agreed to issue to these investors warrants exercisable for one share of our common stock for each two shares purchased in the registered direct offering, which equals an aggregate of 1,083,091 shares of common stock. The closing of such registered direct offering and the concurrent Private Placement occurred on July 16, 2018, in connection with which we received net proceeds of approximately $3. million after deducting placement agent fees and other expenses payable by us and the conversion price of the outstanding shares of Series B preferred stock, issued in our February 2018 offering, was reduced to $1.58 per share as a result. The warrants have an exercise price of $1.58 per share of our common stock and may be exercised from time to time beginning on January 17, 2019 and expire on July 16, 2021.

On November 1, 2018, we completed a public offering of 7,285,000 shares of common stock and 8,586 shares of Series C convertible preferred stock (the “Series C preferred stock”). As a result, we received net proceeds of approximately $10.2 million after underwriting discounts, commissions, legal and accounting fees. Upon any dissolution, liquidation or winding up, whether voluntary or involuntary, holders of Series C preferred stock will be entitled to receive distributions out of our assets, whether capital or surplus, of an amount equal to $0.001 per share of Series C preferred stock before any distributions shall be made on the common stock but after distributions shall be made on any outstanding Series A preferred stock and any of our existing or future indebtedness. The Series C preferred stock has no voting rights.

Cash Flows

	Year Ended December 31,	
	2018	2017
Net cash (used in) provided by:		
Operating activities	$(18,466)	$(34,476)
Investing activities	(4)	(41)
Financing activities	29,491	3,810
Net change in cash and cash equivalents	$11,021	$(30,707)

Net Cash Used in Operating Activities

Net cash used in operating activities for the year ended December 31, 2018 was $18.5 million, consisting primarily of a net loss of $27.6 million and an increase in net operating assets of $2.2 million, offset by non-cash charges of $11.3 million. Non-cash charges were largely related to non-cash interest charges of $5.6 million, stock-based compensation of $3.1 million, depreciation and amortization of $1.3 million and provision for excess and obsolete inventories of $0.9 million. The increase in net operating assets was due to decreases in accrued expenses and other liabilities, and other long-term liabilities, offset by decreases in other assets and accrued compensation in inventories and accounts receivable, offset by an increase in other assets. The increase in operating liabilities was largely due to decreases in accrued compensation due to our workforce reductions, offset by an increase in accrued expenses and other current liabilities related to the litigation settlement.

Net cash used in operating activities for the year ended December 31, 2017 was $34.5 million, consisting primarily of a net loss of $48.7 million and an increase in net operating assets of $2.8 million, offset by non-cash charges of $17.3 million. The increase in non-cash charges was due to an increase in interest expense and other charges, litigation settlement and provision for excess and obsolete inventories, offset by a decrease in stock-based compensation. The increase in net operating assets was due to an increase in inventories. The decreases in accounts payable, accrued compensation and accrued expenses and other current liabilities, were due to our workforce reductions in April and September, the sublease of one of our facilities and efforts to reduce operating expenses, and decreases in other liabilities related to the repayment of assigned interest to PDL, partially offset by a decrease in accounts receivable. The non-cash charges primarily consisted of depreciation, stock-based compensation, non-cash interest expense and other charges related to our credit agreement with CRG, and an increased reserve for excess and obsolescence in inventories.

Net Cash Used in Investing Activities

Net cash used in investing activities in the year ended December 31, 2018 was $4,000 consisting of purchases of property and equipment of $32,000, partially offset by proceeds of $28,000 from the sale of property and equipment.

Net cash used in investing activities in the year ended December 31, 2017 was $41,000 consisting of purchases of property and equipment of $45,000, partially offset by proceeds of $4,000 from the sales of property and equipment.

Net Cash Provided by Financing Activities

Net cash provided by financing activities in the year ended December 31, 2018 of $29.4 million primarily related to net proceeds of $29.2 million from the issuances of convertible preferred stock and common stock, net of various issuance costs, in addition to $0.6 million related to proceeds from warrant exercises.

Net cash provided by financing activities in the year ended December 31, 2017 of $3.8 million primarily relates to net proceeds of $3.6 million from the issuance of common stock under the Sales Agreement with Cowen and Lincoln Park Purchase Agreement and $0.2 million proceeds from sales of our common stock.

Off-Balance Sheet Arrangements

We currently have no off-balance sheet arrangements, such as structured finance, special purpose entities, or variable interest entities.

Contractual Obligations

Our principal obligations consist of the operating lease for our facilities (net of sublease income), our Loan Agreement with CRG and non-cancellable purchase commitments. The following table sets out, as of December 31, 2018, our contractual obligations due by period (in thousands):

	Payments Due by Period				
	Less Than 1 Year	1 - 3 Years	3-5 Years	More Than 5 Years	Total
Operating lease obligations, net of sublease income	$899	$—	$—	$—	$899
CRG Loan	—	4,202	9,502	—	13,704
Noncancellable purchase commitments	1,490	387	—	—	1,877
	$2,389	$4,589	$9,502	$—	$16,480

The total CRG Loan amount, shown as borrowings on the balance sheet as of December 31, 2018, is $7.5 million. The contractual obligation in the table above of $13.7 million under the CRG Loan includes future interest to be accrued but not paid in cash as well as a $1.5 million back-end fee to be paid in June 2023 on maturity of the CRG Loan.

CRG

For more information, see Part II, Item 7 “Liquidity and Capital Resources.”

Lease Agreements

We lease our headquarters in Redwood City, California pursuant to a lease agreement with HCP LS Redwood City dated July 30, 2010, as amended by the First Amendment to Lease dated September 30, 2011 and the Second Amendment to Lease dated March 4, 2016, collectively, the Amended Lease. The Amended Lease has a rental commencement date of December 1, 2011, a term of eight years and expires in November 2019 The Amended Lease is for an aggregate of approximately 44,200 rentable square feet. We are currently in the process of negotiating a renewal of one of the buildings under the original lease.

On October 19, 2017, the Company entered into an agreement to sublease one of its facilities. The sublease agreement is estimated to commence on approximately December 1, 2017 and is scheduled to expire on November 15, 2019 (which is 15 days prior to the expiration of the facility lease). Prior to December 1, 2018, he sublessee paid a base rent of $3.25 per rentable square foot, for a total of $79,950 per month. On December 1, 2018, the base rent increased to $3.35 per rentable square foot, for a total of $82,410 per month. In addition to the base rent, the sublessee pays the Landlord’s operating expenses and property taxes due and payable with respect to the subleased facility.

In February 2016, we entered into an additional non-cancelable operating lease for 6,600 square feet of warehouse and storage space in Redwood City, California, The lease agreement originally was to expire in November 2019. We exited this warehouse lease in December 2018 and incurred exit costs of approximately $50,000 which is included in rent expense for 2018.

Critical Accounting Policies and Estimates

Management's discussion and analysis of our financial condition and results of operations is based on our financial statements, which have been prepared in accordance with U.S. generally accepted accounting principles. The preparation of these financial statements requires us to make estimates and assumptions for the reported amounts of assets, liabilities, revenues, expenses and related disclosures. Our estimates are based on our 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 and any such differences may be material.

While our significant accounting policies are more fully described in Note 2 of our financial statements included in this Annual Report on Form 10-K, we believe the following discussion addresses our most critical accounting policies, which are those that are most important to our financial condition and results of operations and require our most difficult, subjective and complex judgments.

Revenue Recognition

All of our revenues are currently derived from sales of our Lumivascular platform products, sales of various non-imaging PAD catheters and related services in the United States and select international markets. We do not have bundled sales arrangements. We recognize revenues when the following revenue recognition criteria are met:

Persuasive evidence of an arrangement exists. We consider this criterion satisfied when we have an agreement or contract in place with the customer.

Delivery has occurred or services have been rendered. We principally determine this criterion to be satisfied as follows:

Lightbox console: upon our receipt of a form executed by the customer acknowledging that the training and installation process is complete.

PAD catheters: when the product has been shipped and risk of loss and title has passed to the customer.

Service: recognized ratably over the term of the service period. To date service revenues have been insignificant.

The fee is fixed or determinable and collectability is reasonably assured.

We determine the satisfaction of these criteria based on our judgment regarding the nature of the fee charged for products, contractual agreements entered into, and the collectability of those fees under any contract or agreement.

We offer our customers the ability to purchase or lease our Lightbox. In addition, we provide our Lightbox under a limited commercial evaluation program to allow certain strategic accounts to install and utilize the Lightbox for a limited trial period of three to six months. When a Lightbox is placed, we retain title to the equipment and it remains capitalized on our balance sheet under property and equipment. The costs to maintain these placed Lightboxes held by customers are charged to cost of revenues as incurred.

For sales through distributors, we recognize revenue when title to the product and the risk of loss transfers from us to the distributor. The distributors are responsible for all marketing, sales, training and warranty in their respective territories. The standard terms and conditions contained in our distribution agreements do not provide price protection or stock rotation rights to any of its distributors. In addition, its distributor agreements do not allow the distributor to

return or exchange products, and the distributor is obligated to pay us upon invoice regardless of its ability to resell the product.

We must make significant assumptions regarding the future collectability of accounts receivable from customers to determine whether revenue recognition criteria have been met. If collectability is not assured at the time of shipment, we defer revenues until such criterion has been met. We estimate reductions in revenue for potential returns of products by customers. In making such estimates, we analyze historical returns, current economic trends and changes in customer demand and acceptance of our products.

Inventories

Inventories, which includes material, labor and overhead costs, are stated at standard cost, which approximates actual cost, determined on a first-in, first-out basis, and not in excess of net realizable value. The cost basis of our inventory is reduced for any products that are considered excessive or obsolete based upon assumptions about future demand and market conditions. If actual future demand or market conditions are less favorable than those projected by management, additional inventory write-downs may be required, which could have a material impact on our gross profit and inventory balances.

Stock-Based Compensation

We maintain an equity incentive plan to provide long-term incentive for employees, consultants and members of our board of directors. The plan provides for the grant of incentive stock options (“ISOs”) to employees and for the grant of non-statutory stock options (“NSOs”), restricted stock, RSUs, stock appreciation rights, performance units and performance shares to employees, directors and consultants.

As noncash stock-based compensation expense recognized in the financial statements is based on awards ultimately expected to vest, it has been reduced for estimated forfeitures. During the year ended December 31, 2017, the Company estimated a forfeiture rate for its stock options and RSUs based on an analysis of its actual forfeitures and other factors. Forfeitures are estimated at the time of grant and revised, if necessary, over the service period to the extent that actual forfeitures differ, or are expected to differ, from prior estimates. Forfeitures are estimated based on estimated future employee turnover and historical experience. Effective January 1, 2017, the Company adopted ASU No. 2016-09 and elected to recognize forfeitures when they occur using a modified retrospective approach. We use the straight-line method for expense attribution.

The valuation model we used for calculating the fair value of stock options for stock-based compensation expense is the Black-Scholes option-pricing model, or the Black-Scholes model. The Black-Scholes model requires us to make assumptions and judgments about the variables used in the calculation, including the weighted average period of time that the options granted are expected to be outstanding, the volatility of common stock, an assumed risk-free interest rate and an estimated forfeiture rate.

Fair Value of Common Stock. Prior to completion of our IPO in January 2015, the fair value of the shares of our common stock underlying the stock options has historically been determined by our board of directors after considering independent third-party valuation reports. Because there had previously been no public market for our common stock, our board of directors determined the fair value of our common stock at the time of grant of the option by considering a number of objective and subjective factors, including valuations of comparable companies, sales of our preferred stock, our operating and financial performance and the general and industry-specific economic outlook. Following our IPO in January 2015, the fair value of our common stock is determined based on the closing price of our common stock on The Nasdaq Capital Market.

Expected Term. We do not believe we are able to rely on our historical exercise and post-vesting termination activity to provide accurate data for estimating the expected term for use in determining the fair value-based measurement of our options. Therefore, we have opted to use the “simplified method” for estimating the expected term of options, which is the arithmetic average of the vesting term and the original contractual term of the option.

Expected Volatility. Due to the Company’s limited operating history and a lack of company specific historical and implied volatility data, the Company bases its estimate of expected volatility on the historical volatility of a group of similar companies that are publicly traded. When selecting these public companies on which it has based its expected stock price volatility, the Company selected companies with comparable characteristics to it, including enterprise value, stage of development, risk profile, and position within the industry as well as selecting companies with historical share price information sufficient to meet the expected life of the stock-based awards. The historical volatility data was computed using the daily closing prices for the selected companies’ shares during the equivalent period of the calculated expected term of the share-based payments. The Company will continue to analyze the historical stock price volatility and expected term assumptions as more historical data for the Company’s common stock becomes available.

Risk-free Interest Rate. The risk-free interest rate is based on the U.S. Treasury yield in effect at the time of the grant for zero-coupon U.S. Treasury notes with remaining terms similar to the expected term of the options.

Dividend Rate. We assumed the expected dividend to be zero as we have never paid dividends and have no current plans to do so.

Expected Forfeiture Rate. As allowed under ASU No. 2016 09, Compensation-Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting, we account for forfeitures as they occur.

Service Period. We amortize all stock-based compensation over the requisite service period of the awards, which is generally the same as the vesting period of the awards. We amortize the stock-based compensation cost on a straight-line basis over the expected service periods.

If factors change and we employ different assumptions, stock-based compensation expense may differ significantly from what we have recorded in the past. If there are any modifications or cancellations of the underlying unvested securities, we may be required to accelerate, increase or cancel any remaining unearned stock-based compensation expense. To the extent that our assumptions are incorrect, the amount of stock-based compensation recorded will change.

JOBS Act Accounting Election

As an emerging growth company under the Jumpstart Our Business Startups Act of 2012, we are eligible to take advantage of certain exemptions from various reporting requirements that are applicable to other public companies that are not emerging growth companies. We have irrevocably elected not to avail ourselves of the exemption from new or revised accounting standards and, therefore, are subject to the same new or revised accounting standards as other public companies that are not emerging growth companies.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Interest Rate Risk

The risk associated with fluctuating interest rates is primarily limited to our cash equivalents, which are carried at quoted market prices. Due to the short-term maturities and low risk profile of our cash equivalents, an immediate 100 basis point change in interest rates would not have a material effect on the fair value of our cash equivalents. We do not currently use or plan to use financial derivatives in our investment portfolio.

Credit Risk

As of December 31, 2018, our cash and cash equivalents were maintained with one financial institution in the United States, and our current deposits are likely in excess of insured limits. We have reviewed the financial statements of this institution and believe it has sufficient assets and liquidity to conduct its operations in the ordinary course of business with little or no credit risk to us.

Our accounts receivable primarily relate to revenues from the sale of our Lumivascular platform products to hospitals and medical centers in the United States. None and one of our customers represented more than 10% of our accounts receivable as of December 31, 2018 and 2017, respectively.

Foreign Currency Risk

Our business is primarily conducted in U.S. dollars. Any transactions that may be conducted in foreign currencies are not expected to have a material effect on our results of operations, financial position or cash flows.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The information required by this item appears in a separate section of this Annual Report on Form 10-K beginning on page F-1 and is incorporated herein by reference.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

We changed our independent registered public accounting firm effective October 11, 2017 from Ernst & Young LLP to Moss Adams LLP. Information regarding the change in the independent registered public accounting firm was disclosed in our Current Report on Form 8-K filed with the SEC on October 11, 2017. There were no disagreements with Ernst & Young LLP or Moss Adams LLP or any reportable events requiring disclosure under Item 304(b) of Regulation S-K.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

We maintain disclosure controls and procedures that are designed to ensure that information required to be disclosed in our reports under the Securities Exchange Act of 1934, as amended, or the Exchange Act, and the rules and regulations thereunder, is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms and that such information is accumulated and communicated to our management, including our principal executive officer and principal financial officer, as appropriate, to allow for timely decisions regarding required disclosure. In designing and evaluating the disclosure controls and procedures, management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives, and management is required to apply its judgment in evaluating the cost-benefit relationship of possible controls and procedures.

As required by Rule 13a-15(b) under the Exchange Act, our management, under the supervision and with the participation of our principal executive officer and principal financial officer, has evaluated the effectiveness of the design and operation of our disclosure controls and procedures (as such term is defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act) as of December 31, 2018. Based on such evaluation, our principal executive officer and principal financial officer have concluded that, as of December 31, 2018, our disclosure controls and procedures were effective.

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 defined in Rule 13a-15(f) of the Exchange Act. Our management conducted an evaluation of the effectiveness of our internal control over financial reporting based on the framework in *Internal Control—Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on this evaluation, management concluded that our internal control over financial reporting was effective as of December 31, 2018.

This Annual Report on Form 10-K does not include an attestation report of our registered public accounting firm on our internal control over financial reporting due to an exemption established by the JOBS Act for "emerging growth companies." In addition, we are currently a non-accelerated filer and are therefore not required to provide an attestation report on our internal control over financial reporting until such time as we are an accelerated filer or large accelerated filer.

Changes in Internal Control Over Financial Reporting

There were no changes in our internal controls over financial reporting identified in management's evaluation pursuant to Rules 13a-15(d) and 15d-15(d) of the Exchange Act that occurred during the year ended December 31, 2018 that materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Inherent Limitations on Effectiveness of Controls

Our management, including our chief executive officer and chief financial officer, believes that our disclosure controls and procedures and internal control over financial reporting are designed to provide reasonable assurance of achieving their objectives and are effective at the reasonable assurance level. However, our management does not expect that our disclosure controls and procedures or our internal control over financial reporting will prevent all errors and all fraud. A control system, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met. Further, the design of a control system must reflect the fact that there are resource constraints, and the benefits of controls must be considered relative to their costs. Because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that all control issues and instances of fraud, if any, have been detected. These inherent limitations include the realities that judgments in decision-making can be faulty, and that breakdowns can occur because of a simple error or mistake. Additionally, controls can be circumvented by the individual acts of some persons, by collusion of two or more people or by management override of the controls. The design of any system of controls also is based in part upon certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions; over time, controls may become inadequate because of changes in conditions, or the degree of compliance with policies or procedures may deteriorate. Because of the inherent limitations in a cost-effective control system, misstatements due to error or fraud may occur and not be detected.

ITEM 9B. OTHER INFORMATION

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

Directors

Our business affairs are managed under the direction of our board of directors, which is currently composed of four members. Three of our directors are independent within the meaning of the listing standards of The Nasdaq Stock Market, or Nasdaq. Our board of directors is divided into three staggered classes of directors. At each annual meeting of stockholders, a class of directors will be elected for a three-year term to succeed the same class whose term is then expiring.

The following table sets forth the names, ages as of March 1, 2019 and certain other information for each of the directors with terms expiring at the 2019 annual meeting of stockholders (the "Annual Meeting") (who are also nominees for election as a director at the Annual Meeting) and for each of the continuing members of our board of directors:

	Class	Age	Position	Director Since	Current Term Expires
Directors					
James G. Cullen(1)(2)(3)	III	75	Director and Chairman of the Board of Directors	2014	2021
Jeffrey M. Soinski	I	57	President, Chief Executive Officer and Director	2014	2019
Donald A. Lucas(1)(2)(3)	II	57	Director	2013	2020
James B. McElwee(1)(2)(3)	II	66	Director	2011	2020

(1) Member of our audit committee
(2) Member of our compensation committee
(3) Member of our nominating and corporate governance committee

Jeffrey M. Soinski has served as our President, Chief Executive Officer and a member of our Board of Directors since December 2014. From its formation in September 2009 until the acquisition of its Unisyn business by GE Healthcare in May 2013, Mr. Soinski served as Chief Executive Officer of Medical Imaging Holdings and its primary operating company Unisyn Medical Technologies, a national provider of technology-enabled products and services to the

medical imaging industry. Mr. Soinski was a Director of Medical Imaging Holdings and its remaining operating company Consensys Imaging Service from September 2009 until its sale in October 2017. Mr. Soinski served periodically as a Special Venture Partner from July 2008 to June 2013 and as a Special Investment Partner since October 2016 for Galen Partners, a leading healthcare-focused private equity firm, which included Medical Imaging Holdings as one of its portfolio companies. From 2001 until its acquisition by C.R. Bard in 2008, Mr. Soinski was President and CEO of Specialized Health Products International, a publicly-traded manufacturer and marketer of proprietary safety medical products. Mr. Soinski served as a consultant to BLOXR Corporation, a venture-backed medical device company, from October 2013 until September 2014. He served on the board of directors of Merriman Holdings, parent of Merriman Capital, a San Francisco-based investment banking and brokerage firm, from 2008 until March 2016. Mr. Soinski holds a B.A. degree from Dartmouth College.

We believe Mr. Soinski is qualified to serve as a member of our board of directors because of his extensive corporate finance and business strategy experience as well as his experience with public companies.

James G. Cullen has served as a member of our board of directors since December 2014, as our Lead Independent Director since January 2015 and as our Non-Executive Chairman since December 2017. During the last five years, Mr. Cullen has held board and committee positions with various companies. Mr. Cullen is currently a director of Keysight Technologies, which was spun out of Agilent Technologies, where he was previously a director. Mr. Cullen previously served as a director and chairman of the audit committee of Johnson & Johnson and as a director and member of the investment and finance committees of Prudential Financial. From 1993 to 2000, Mr. Cullen was President, Vice Chairman and Chief Operating Officer of Bell Atlantic Corporation (now Verizon). From 1989 to 1993, he was President and Chief Executive Officer of Bell Atlantic-New Jersey. Mr. Cullen holds a B.A. in Economics from Rutgers University and an M.S. in Management Science from the Massachusetts Institute of Technology.

We believe Mr. Cullen is qualified to serve as a member of our board of directors because of his extensive experience serving on the boards of public companies as well as his financial and business expertise.

Donald A. Lucas has served as a member of our board of directors since 2013 and has been an investor in our company since 2011. Mr. Lucas has been a venture capitalist since 1985, having invested in companies such as Oracle, Macromedia and Cadence Design alongside his father Donald L. Lucas. Mr. Lucas has sourced or led investments in companies such as Intuitive Surgical, Coulter Pharmaceutical, Dexcom, Infinera, Signifyd, Obalon Therapeutics, Katerra, Bossa Nova Robotics, Filld, Berkeley Lights Inc, and Palantir. Mr. Lucas has served on the boards of Dexcom and the Silicon Valley Chapter of the JDRF and is a member of the UCSF Diabetes Center Leadership Council. Mr. Lucas serves on the advisory board for U.S. Bank. Mr. Lucas holds a B.A. from Santa Clara University.

We believe Mr. Lucas is qualified to serve as a member of our board of directors because of his substantial corporate finance, business strategy and corporate development expertise gained from his significant experience in the venture capital industry, analyzing, investing in, serving on the boards of, and providing guidance to various technology companies.

James B. McElwee has served as a member of our board of directors since March 2011. Mr. McElwee has served as an independent venture capital investor since 2010. Mr. McElwee served as general partner of Weston Presidio, a private equity and venture capital firm, from 1992 to 2010. During his tenure as a general partner and member of the investment committee, Weston Presidio led the start up financing of JetBlue Airways and made investments in Fender Musical Instruments, The Coffee Connection, Guitar Center, Mapquest, Party City, Petzazz, RE/MAX, and others.

We believe Mr. McElwee is qualified to serve as a member of our board of directors because of his substantial corporate development and business strategy expertise gained in the venture capital industry.

Executive Officers

The following table identifies certain information about our executive officers as of March 1, 2019. Our executive officers are appointed by, and serve at the discretion of, our board of directors. Each of our executive officers serves at the discretion of our board of directors and holds office until his successor is duly elected and qualified or until his earlier resignation or removal. There are no family relationships among any of our directors or executive officers.

Name	Age	Title
Jeffrey M. Soinski	57	President, Chief Executive Officer and Director
Mark Weinswig	46	Chief Financial Officer
Himanshu N. Patel	59	Chief Technology Officer

For a brief biography of Mr. Soinski, please see the section of this Annual Report on Form 10-K titled "*Directors*."

Mark Weinswig has served as our Chief Financial Officer since June 2018. Prior to joining the Company, Mr. Weinswig served as Chief Financial Officer at Aqua Metals, Inc., a heavy metal recycling company, from August 2017 to March 2018. Mr. Weinswig has previously served as Chief Financial Officer of One Workplace, a designer and manufacturer of customized workspaces, from July 2016 to July 2017. From October 2010 to June 2016, Mr. Weinswig served as Chief Financial Officer of Emcore Corporation, a Nasdaq-listed designer and manufacturer of indium phosphide optical chips, components, subsystems and systems for the broadband and specialty fiber optics market. From September 2009 to October 2010, Mr. Weinswig served as International Finance Director at Coherent, Inc., a Nasdaq-listed designer and manufacturer of photonics solutions. Earlier in his career Mr. Weinswig worked at Morgan Stanley and PricewaterhouseCoopers. He received an M.B.A. from the University of Santa Clara and a B.S. in business administration with an accounting major from Indiana University. He has earned the CFA and CPA designations.

Himanshu N. Patel co-founded Avinger in 2007 and has served as our Chief Technology Officer from January 2011 to November 2011 and since October 2013. From September 1999 to February 2007, Mr. Patel held various research and development positions, including Director of Advanced Technologies, at FoxHollow Technologies. Mr. Patel previously held research and development positions at EndoTex Interventional Systems and General Surgical Innovations. Mr. Patel holds a B.S. in Mechanical Engineering from M.S. University of Baroda, India, and an M.S. in Mechanical Engineering from the University of Florida.

Section 16(a) Beneficial Ownership Reporting Compliance

Section 16(a) of the Exchange Act requires our directors and executive officers, and persons who own more than 10% of a registered class of our equity securities, to file with the SEC initial reports of ownership and reports of changes in ownership of our common stock and other equity securities. Executive officers, directors and greater than 10% stockholders are required by SEC regulations to furnish us with copies of all Section 16(a) forms they file.

SEC regulations require us to identify in this Annual Report on Form 10-K anyone who filed a required report late during the most recent fiscal year. To our knowledge, based solely on a review of the copies of such reports furnished to us and written representations that no other reports were required, during the year ended December 31, 2018, all of our officers, directors and greater than 10% beneficial owners have complied with Section 16(a) filing requirements on a timely basis, other than one late report from Himanshu Patel in March 2018 and Mark Weinswig in July 2018.

Code of Business Conduct and Ethics

We have adopted a code of business conduct and ethics that applies to all of our employees, officers and directors, including those officers responsible for financial reporting. The code of business conduct and ethics is available on

our website at *www.avinger.com*. Changes to or waivers of the code will be disclosed on the same website. We intend to satisfy the disclosure requirement under Item 5.05 of Form 8-K regarding any amendment to, or waiver of, any provision of the code in the future by disclosing such information on our website.

Board Leadership Structure

We believe that the structure of our board of directors and its committees provides strong overall management of our company. Our board of directors does not have a formal policy on whether the roles of Chief Executive Officer and Chairman of our board of directors should be separate. However, Messrs. Soinski and Cullen, respectively, hold these positions at present.

Our Chief Executive Officer, Mr. Soinski, is responsible for setting the strategic direction of our company, the general management and operation of the business and the guidance and oversight of senior management. In his capacity as Chairman of our board of directors, Mr. Cullen is also responsible for the guidance and oversight of senior management, monitoring the content, quality and timeliness of information sent to our board of directors, consultation with our board of directors regarding the oversight of our business affairs, presiding over meetings of our board of directors and performing such additional duties as our Board may otherwise determine and delegate. At the end of each board meeting, the independent directors are expected to meet in executive session, without Mr. Soinski present. Following each meeting, Mr. Cullen is expected to provide feedback to Mr. Soinski on his performance and the performance of our employees during the meeting and to recommend new agenda items for the next meeting.

Director Independence

Our common stock is listed on The Nasdaq Capital Market. Under the Nasdaq listing standards, independent directors must comprise a majority of a listed company's board of directors. In addition, the Nasdaq listing standards require that, subject to specified exceptions, each member of a listed company's audit, compensation, and nominating and corporate governance committees be independent. Under the Nasdaq listing standards, a director will only qualify as an "independent director" if, in the opinion of that listed company's board of directors, that director does not have a relationship that would interfere with the exercise of independent judgment in carrying out the responsibilities of a director.

Audit committee members must also satisfy the additional independence criteria set forth in Rule 10A-3 under the Securities Exchange Act of 1934, as amended, or the "Exchange Act, and the Nasdaq listing standards. Compensation committee members must also satisfy the additional independence criteria set forth in Rule 10C-1 under the Exchange Act and the Nasdaq listing standards.

Our board of directors has undertaken a review of the independence of each of our directors. Based on information provided by each director concerning his background, employment and affiliations, our board of directors has determined that Messrs. Cullen, Lucas and McElwee do not have a relationship that would interfere with the exercise of independent judgment in carrying out the responsibilities of a director and that each of these directors is "independent" as that term is defined under the Nasdaq listing standards. In making these determinations, our board of directors considered the current and prior relationships that each non-employee director has with our company and all other facts and circumstances our board of directors deemed relevant in determining their independence, including the beneficial ownership of our capital stock by each non-employee director, and the transactions involving them described below in Item 13 under the heading "Related Person Transactions."

Board Meetings and Committees

During our fiscal year ended December 31, 2018, our board of directors held 11 meetings (including regularly scheduled and special meetings), and each director attended at least 75% of the aggregate of (i) the total number of meetings of our board of directors held during the period for which he has been a director and (ii) the total number of meetings held by all committees of our board of directors on which he served during the periods that he served. All of our directors attended our 2018 annual meeting of stockholders, either in person or telephonically.

Although we do not have a formal policy regarding attendance by members of our board of directors at annual meetings of stockholders, we strongly encourage our directors to attend.

Our board of directors has established an audit committee, a compensation committee and a nominating and corporate governance committee. The composition and responsibilities of each of the committees of our board of directors are described below. Members will serve on these committees until their resignation or until as otherwise determined by our board of directors.

Audit Committee

Messrs. Lucas, McElwee and Cullen serve on our audit committee. Mr. Lucas serves as the chair of the audit committee. Our board of directors has assessed whether all members of the audit committee meet the composition requirements of Nasdaq, including the requirements regarding financial literacy and financial sophistication. Our board of directors found that Messrs. Lucas, McElwee and Cullen have met the financial literacy and financial sophistication requirements and that Messrs. Lucas, McElwee and Cullen are independent under SEC and Nasdaq rules. In addition, our board of directors has determined that Mr. Cullen is an audit committee financial expert within the meaning of Item 407(d) of Regulation S-K under the Securities Act of 1933, as amended, or the Securities Act. The audit committee's primary responsibilities include:

- appointing, approving the compensation of, and assessing the qualifications and independence of our independent registered public accounting firm, which currently is Moss Adams LLP;
- reviewing and discussing with management and our independent registered public accounting firm our annual and quarterly financial statements and related disclosures;
- preparing the audit committee report required by SEC rules to be included in our annual proxy statements;
- monitoring our internal control over financial reporting, disclosure controls and procedures;
- reviewing our risk management status;
- establishing policies regarding hiring employees from our independent registered public accounting firm and procedures for the receipt and retention of accounting related complaints and concerns;
- meeting independently with our independent registered public accounting firm and management; and
- monitoring compliance with the code of business conduct and ethics for financial management.

All audit and non-audit services must be approved in advance by the audit committee. Our audit committee operates under a written charter that satisfies the applicable rules and regulations of the SEC and Nasdaq listing standards. A copy of the charter of our audit committee is available on our website at *www.avinger.com* under "*Investors–Governance*." During our fiscal year ended December 31, 2018, our audit committee held four meetings.

Compensation Committee

Messrs. Lucas, Cullen and McElwee serve on our compensation committee. Mr. McElwee serves as the chair of the compensation committee. Each member of our compensation committee meets the requirements for independence for compensation committee members under the Nasdaq listing standards and SEC rules and regulations, including Rule 10C-1 under the Exchange Act. Each member of our compensation committee is also a non-employee director, as defined pursuant to Rule 16b-3 promulgated under the Exchange Act, and an outside director, as defined pursuant to Section 162(m) of the Internal Revenue Code. Our compensation committee is responsible for, among other things:

- annually reviewing and approving corporate goals and objectives relevant to compensation of our chief executive officer and our other executive officers;
- determining the compensation of our chief executive officer and our other executive officers;
- reviewing and making recommendations to our board of directors with respect to director compensation; and
- overseeing and administering our equity incentive plans.

Our Chief Executive Officer and Chief Financial Officer make compensation recommendations for our other executive officers and initially propose the corporate and departmental performance objectives under our Executive Incentive Compensation Plan to the compensation committee. From time to time, the compensation committee may use outside compensation consultants to assist it in analyzing our compensation programs and in determining appropriate levels of compensation and benefits. For example, we have periodically engaged Radford, a business unit of Aon Hewitt, to help develop our compensation philosophy, select a group of peer companies to use for compensation benchmarking purposes and advise on cash and equity compensation levels for our directors, executives and other employees based on current market practices. Our compensation committee operates under a written charter that satisfies the applicable rules and regulations of the SEC and Nasdaq listing standards. A copy of the charter of our compensation committee is available on our website at *www.avinger.com* under "*Investors–Governance*." During our fiscal year ended December 31, 2018, our compensation committee held one meeting.

Nominating and Corporate Governance Committee

Messrs. Lucas, Cullen and McElwee serve on our nominating and governance committee. Mr. Cullen serves as the chair of the nominating and governance committee. Each member of our nominating and corporate governance committee meets the requirements for independence under the Nasdaq listing standards and SEC rules and regulations. Our nominating and corporate governance committee is responsible for, among other things:

- identifying individuals qualified to become members of our board of directors;
- recommending to our board of directors the persons to be nominated for election as directors and to each of our board's committees;
- reviewing and making recommendations to our board of directors with respect to management succession planning;
- developing, updating and recommending to our board of directors corporate governance principles and policies; and
- overseeing the evaluation of our board of directors and committees.

Our nominating and corporate governance committee operates under a written charter that satisfies the applicable Nasdaq listing standards. A copy of the charter of our nominating and corporate governance committee is available on our website at *www.avinger.com* under "*Investors–Governance*." During our fiscal year ended December 31, 2018, our nominating and corporate governance committee held no meetings.

ITEM 11. EXECUTIVE COMPENSATION

Processes and Procedures for Compensation Decisions

Our compensation committee is responsible for the executive compensation programs for our executive officers and reports to our board of directors on its discussions, decisions and other actions. Our compensation committee reviews and approves corporate goals and objectives relating to the compensation of our Chief Executive Officer, evaluates the performance of our Chief Executive Officer in light of those goals and objectives and determines and approves the compensation of our Chief Executive Officer based on such evaluation. Our compensation committee has the sole authority to determine our Chief Executive Officer's compensation. In addition, our compensation committee, in

consultation with our Chief Executive Officer, reviews and approves all compensation for other officers, including the directors. Our Chief Executive Officer and Chief Financial Officer also make compensation recommendations for our other executive officers and initially propose the corporate and departmental performance objectives under our Executive Incentive Compensation Plan to the compensation committee.

The compensation committee is authorized to retain the services of one or more executive compensation and benefits consultants or other outside experts or advisors as it sees fit, in connection with the establishment of our compensation programs and related policies.

Summary Compensation Table

The following table presents summary information regarding the total compensation for services rendered in all capacities that was earned by our Chief Executive Officer and our two other most highly compensated executive officers in our fiscal years ended December 31, 2018 and 2017. The individuals listed in the table below are our named executive officers for our fiscal year ended December 31, 2018.

Name and Principal Position	Year	Salary ($)	Bonus ($)	Stock Awards ($)(1)	Option Awards ($)(1)	Non-Equity Incentive Plan Compensation ($)	All Other Compensation ($)(2)	Total ($)
Jeffrey M. Soinski(3)	2018	390,000	84,539	815,000	-	-	3,000	1,292,539
President and Chief Executive Officer	2017	390,000	-	61,500	67,161	-	3,000	521,661
Himanshu Patel (3)	2018	280,000	48,556	489,000	-	-	3,000	820,556
Chief Technology Officer	2017	280,000	-	61,500	67,161	-	3,000	411,661
Mark B. Weinswig (4)	2018	156,250	-	407,500	-	-	-	563,750
Chief Financial Officer								

(1) The amounts reported represent the aggregate grant-date fair value of the stock awards and stock options awarded to the named executive officer in 2018 and 2017, calculated in accordance with ASC Topic 718. Such grant-date fair value does not take into account any estimated forfeitures related to service-vesting conditions. The assumptions used in calculating the grant-date fair value of the options reported in this column are set forth in the section of this Annual Report on Form 10-K titled “Management’s Discussion and Analysis of Financial Condition and Results of Operations—Critical Accounting Policies and Estimates—Stock-Based Compensation.”

(2) The amounts reported for Mr. Soinski and Mr. Patel represent funds contributed to his health savings account of $3,000 for each of 2018 and 2017.

(3) Mr. Soinski's and Mr. Patel's salary was increased in February 2019 to $400,000 and $300,000, respectively.

(4) Mr. Weinswig was hired effective June 25, 2018, replacing Matt Ferguson, who resigned August 1, 2018.

Executive Employment Letters

Jeffrey M. Soinski

We entered into an employment offer letter in December 2014 with Jeffrey M. Soinski, our President and Chief Executive Officer. The letter has no specific term and provides for at-will employment. The letter also provides that, in 2015, Mr. Soinski was eligible to receive an annual performance bonus of up to 40% of his annual salary based on

the achievement of certain goals mutually agreed upon by him and our board of directors. Effective January 1, 2016, Mr. Soinski's annual base salary was $390,000 and his target bonus percentage was increased from 40% to 50%. Effective February 1, 2019, Mr. Soinski's annual base salary was increased to $400,000.

Pursuant to Mr. Soinski's employment offer letter, if, within the 12-month period following a "change in control," we terminate Mr. Soinski's employment without "cause," or Mr. Soinski resigns for "good reason" (as such terms are defined in Mr. Soinski's employment offer letter), Mr. Soinski will receive accelerated vesting as to 100% of his outstanding unvested stock options. If we experience a change in control, and Mr. Soinski remains our employee through such date, Mr. Soinski will receive accelerated vesting as to 50% of his outstanding unvested stock options and/or restricted stock.

If we terminate Mr. Soinski without cause at any time, he will be entitled to receive 12 months of base salary and COBRA medical and dental insurance coverage, in each case payable in substantially equal installments in accordance with our payroll practices, as severance, in exchange for signing and not revoking a severance agreement and general release against us and our affiliates within 60 days following his termination of employment.

The letter provided that Mr. Soinski receive payments or reimbursements from us for up to $30,000 of reasonable and documented expenses related to temporary lodging, travel, and commuting costs incurred by Mr. Soinski prior to August 2015 in connection with his transition from Utah to Redwood City, California, and reimbursements of up to $100,000 related to the sale of Mr. Soinski's home in Utah and relocation to California. All relocation benefits owed to Mr. Soinski have been paid, and no further obligations exist under these provisions.

Mark Weinswig

Pursuant to an Employment Offer Letter between the Company and Mr. Weinswig, dated as of June 11, 2018, Mr. Weinswig is entitled to receive as compensation (i) a base salary of $300,000; (ii) a discretionary bonus targeted at 40% of his base salary, subject to achievement of mutually agreed performance goals and payable semi-annually; and (iii) other standard benefits provided to each of the Company's executive officers.

401(k) Plan

We maintain a tax-qualified retirement plan that provides eligible employees with an opportunity to save for retirement on a tax advantaged basis. We may make a discretionary matching contribution to the 401(k) plan, and may make a discretionary employer contribution to each eligible employee each year. To date, we have not made any matching or profits sharing contributions into the 401(k) plan. All participants' interests in our matching and profit sharing contributions, if any, vest pursuant to a four-year graded vesting schedule from the time of contribution. Pre-tax contributions are allocated to each participant's individual account and are then invested in selected investment alternatives according to the participants' directions. The 401(k) plan is intended to qualify under Sections 401(a) and 501(a) of the Code. As a tax-qualified retirement plan, contributions to the 401(k) plan and earnings on those contributions are not taxable to the employees until distributed from the 401(k) plan, and all contributions are deductible by us when made.

Pension Benefits and Nonqualified Deferred Compensation

We do not provide a pension plan for our employees, and none of our named executive officers participated in a nonqualified deferred compensation plan in 2018.

Outstanding Equity Awards at Fiscal Year-End

The following table provides information regarding equity awards held by our named executive officers at December 31, 2018.

	Option Awards				Stock Awards	
	Number of Securities Underlying Unexercised Options (#)	Number of Securities Underlying Unexercised Options (#)	Option Exercise Price ($)(4)	Option Expiration Date	Number of Shares or Units of Stock That	Market Value of Shares or Units of Stock That

Name	Grant Date	Exercisable (3)	Unexercisable			Have Not Vested (#)	Have Not Vested ($)(5)
Jeffrey M. Soinski	12/31/2014(1)(7)	15,484	—	180	12/31/2024	—	—
	3/7/2016 (2)(7)	1030	468	518.4	3/7/2026	—	—
	3/7/2016(2)(8)					563	169
	3/13/2017 (2) (7)	656	844	82	3/13/2027	—	—
	3/13/2017 (2)(8)					375	113
	9/5/2018(2) (9)					500,000	150,000
Himanshu Patel	11/5/2013 (1) (6)	555	—	810	11/5/2023	—	—
	12/31/2014(1) (7)	4339	—	180	12/31/2024		
	3/3/2016(2) (7)	428	196	519.6	3/3/2026		
	3/3/2016(2) (8)					156	47
	3/13/2017 (2) (7)	327	422	82	3/13/2027		
	3/13/2017 (2) (8) (5)					282	85
	9/5/2018(2) (5)					300,000	90,000
Mark Weinswig	9/5/2018(2) (5) (9)					250,000	75,000

(1) Each of the outstanding equity awards was granted pursuant to our 2009 Stock Plan. No additional awards may be granted under the 2009 Stock Plan, and all awards granted under the 2009 Stock Plan that are repurchased, forfeited, expire, are cancelled or otherwise not issued become available for grant under the 2015 Plan in accordance with its terms.

(2) Each of the outstanding equity awards was granted pursuant to our 2015 Equity Incentive Plan.

(3) All of our options granted pursuant to our 2009 Stock Plan are early exercisable subject to the Company's right to repurchase any unvested shares.

(4) This column represents the fair value of a share of our common stock on the date of grant, as determined by our board of directors.

(5) This column represents the market value of the unvested shares of our common stock underlying the RSUs as of December 30, 2018, based on the closing price of our common stock, as reported on the Nasdaq Global Select Market, of $0.30 per share.

(6) 25% of the shares of our common stock subject to this option vested on October 11, 2014, and the balance vested in 36 successive equal monthly installments, subject to continued service through each such vesting date.

(7) 25% of the shares of our common stock subject to this option vested on the one year anniversary of the grant date, and the balance vests in 36 successive equal monthly installments, subject to continued service through each such vesting date.

(8) 25% of the shares of our common stock subject to this option vested on the one year anniversary of the grant date, and the balance vests in 3 successive equal annual installments, subject to continued service through each such vesting date.

(9) 33.3% of the shares of our common stock subject to this option vested on the one year anniversary of the grant date, and the balance vests in 2 successive equal annual installments, subject to continued service through each such vesting date.

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Potential Payments upon Termination or Change of Control

Jeffrey M. Soinski

In March 2018, we entered into a change of control and severance agreement with Jeffrey M. Soinski. Under this agreement, if, within the 18 month period following a "change of control," we terminate Mr. Soinski's employment other than for "cause," death or disability, or the employee resigns for "good reason" (as such terms are defined in the employee's employment agreement) and, within 60 days following the employee's termination, the employee executes an irrevocable separation agreement and release of claims, the employee is entitled to receive (i) continuing payments of severance pay at a rate equal to the employee's base salary and target bonus, as then in effect, for 12 months, (ii) reimbursement of premiums to maintain group health insurance continuation benefits pursuant to "COBRA" for employee and employee's dependents for up to 12 months, (iii) accelerated vesting as to 100% of the employee's outstanding unvested stock options and/or restricted stock, and (iv) the extension of the post-termination exercise period of any options held by the employee for a period of 1 year. Additionally, if we experience a change in control, 50% of Mr. Soinski's outstanding unvested stock options and/or restricted stock will vest. In the event of any conflict between Mr. Soinski's change of control and severance agreement and his offer letter, described above under "*Executive Employment Letters*," he will be entitled to the greater of the benefits provided by either.

Himanshu Patel

We previously entered into a change of control and severance agreement with Himanshu Patel. Under this agreement, if, within the 18 month period following a "change of control," we terminate Mr. Patel's employment other than for "cause," death or disability, or the employee resigns for "good reason" (as such terms are defined in the employee's employment agreement) and, within 60 days following the employee's termination, the employee executes an irrevocable separation agreement and release of claims, the employee is entitled to receive (i) continuing payments of severance pay at a rate equal to the employee's base salary and target bonus, as then in effect, for 12 months, (ii) reimbursement of premiums to maintain group health insurance continuation benefits pursuant to "COBRA" for employee and employee's dependents for up to 12 months, (iii) accelerated vesting as to 100% of the employee's outstanding unvested stock options and/or restricted stock, and (iv) the extension of the post-termination exercise period of any options held by the employee for a period of 1 year.

Mark Weinswig

In June 2018, we entered into a change of control and severance agreement with Mark Weinswig. Under this agreement, if, within the 18 month period following a "change of control," we terminate Mr. Weinswig's employment other than for "cause," death or disability, or the employee resigns for "good reason" (as such terms are defined in the

employee's employment agreement) and, within 60 days following the employee's termination, the employee executes an irrevocable separation agreement and release of claims, the employee is entitled to receive (i) continuing payments of severance pay at a rate equal to the employee's base salary and target bonus, as then in effect, for 12 months, (ii) reimbursement of premiums to maintain group health insurance continuation benefits pursuant to "COBRA" for employee and employee's dependents for up to 12 months, (iii) accelerated vesting as to 100% of the employee's outstanding unvested stock options and/or restricted stock, and (iv) the extension of the post-termination exercise period of any options held by the employee for a period of 1 year. Additionally, if we experience a change in control, 50% of Mr. Weinswig's outstanding unvested stock options and/or restricted stock will vest. In the event of any conflict between Mr. Weinswig's change of control and severance agreement and his offer letter, described above under "*Executive Employment Letters*," he will be entitled to the greater of the benefits provided by either.

Executive Incentive Compensation Plan

Our board of directors has adopted an Executive Incentive Compensation Plan, or the Bonus Plan, that is administered by our compensation committee. The Bonus Plan allows our compensation committee to provide cash incentive awards to selected employees, including our named executive officers, based upon performance goals established by our compensation committee.

Under the Bonus Plan, our compensation committee determines the performance goals applicable to any award, which goals may include, without limitation: attainment of research and development milestones, sales bookings, business divestitures and acquisitions, cash flow, cash position, earnings (which may include any calculation of earnings, including but not limited to earnings before interest and taxes, earnings before taxes, earnings before interest, taxes, depreciation and amortization and net earnings), earnings per share, net income, net profit, net sales, operating cash flow, operating expenses, operating income, operating margin, overhead or other expense reduction, product defect measures, product release timelines, productivity, profit, return on assets, return on capital, return on equity, return on investment, return on sales, revenue, revenue growth, sales results, sales growth, stock price, time to market, total stockholder return, working capital, and individual objectives such as peer reviews or other subjective or objective criteria. Performance goals that include our financial results may be determined in accordance with GAAP or such financial results may consist of non-GAAP financial measures and any actual results may be adjusted by the compensation committee for one-time items or unbudgeted or unexpected items when performance goals that include our financial results may be determined in accordance with GAAP, or such financial results may consist of non-GAAP financial measures, and any actual results may be adjusted by the compensation committee for one-time items or unbudgeted or unexpected items when determining whether the performance goals have been met. The goals may be on the basis of any factors the compensation committee determines relevant, and may be adjusted on an individual, divisional, business unit or company-wide basis. The performance goals may differ from participant to participant and from award to award.

Our compensation committee may, in its sole discretion and at any time, increase, reduce or eliminate a participant's actual award, and/or increase, reduce or eliminate the amount allocated to the bonus pool for a particular performance period. The actual award may be below, at or above a participant's target award, in the compensation committee's discretion. Our compensation committee may determine the amount of any reduction on the basis of such factors as it deems relevant, and it is not required to establish any allocation or weighting with respect to the factors it considers.

Actual awards are paid in cash only after they are earned, which usually requires continued employment through the date a bonus is paid. Our compensation committee has the authority to amend, alter, suspend or terminate the Bonus Plan provided such action does not impair the existing rights of any participant with respect to any earned bonus.

Director Compensation

Our board of directors approved our Outside Director Compensation Policy in January 2015 to compensate each non-employee director for his or her service, and amended certain aspects of this policy in August 2018. Our board of directors will have the discretion to revise non-employee director compensation as it deems necessary or appropriate. Under our Outside Director Compensation Policy, non-employee directors will receive compensation in the form of equity and cash, as described below:

Cash Compensation. All non-employee directors will be entitled to receive the following cash compensation for their services:

- $35,000 per year for service as a board member;
- $25,000 per year additionally for service as chairman of the board;
- $20,000 per year additionally for service as chairman of the audit committee;
- $10,000 per year additionally for service as an audit committee member;
- $15,000 per year additionally for service as chairman of the compensation committee;
- $7,500 per year additionally for service as a compensation committee member;
- $10,000 per year additionally for service as chairman of the nominating and corporate governance committee; and
- $5,000 per year additionally for service as a nominating and corporate governance committee member.

All cash payments to non-employee directors, or the Retainer Cash Payments, will be paid semiannually with the first semiannual installment payable on the date of our annual meeting of stockholders or, if no annual meeting occurs in a given year, May 1, and the second semiannual installment payable on November 1 of each year.

Election to Receive Stock Options in Lieu of Cash Payments. All non-employee directors may elect to convert a Retainer Cash Payment into a nonstatutory stock option, or a Retainer Option, with a grant date fair value equal to the applicable Retainer Cash Payment. Each Retainer Option will be granted on the date that the applicable Retainer Cash Payment was scheduled to be paid, and all of the shares underlying the Retainer Option will vest and become exercisable one year from the date of grant, subject to continued service as a director through the applicable vesting date. The Retainer Option will be subject to certain terms and conditions as described below under the section titled "*Director Compensation—Equity Compensation*."

Elections to convert a Retainer Cash Payment into a Retainer Option must generally be made on or prior to December 31 of the year prior to the year in which the Retainer Cash Payment is scheduled to be paid, or such earlier deadline as is established by our board of directors or compensation committee. A newly appointed non-employee director will be permitted to elect to convert Retainer Cash Payments payable in the same calendar year into Retainer Options, provided that such election is made prior to the date the individual becomes a non-employee director.

Equity Compensation. Nondiscretionary, automatic grants of nonstatutory stock options will be made to our non-employee directors.

Initial option. Each person who first becomes a non-employee director will be granted an option to purchase shares having a grant date fair value equal to $115,000, or the Initial Option. The Initial Option will be granted on the date of the first meeting of our board of directors or compensation committee occurring on or after the date on which the individual first became a non-employee director. The shares underlying the Initial Option will vest and become exercisable as to one thirty-sixth (1/36th) of the shares subject to such Initial Option on each monthly anniversary of the commencement of the non-employee director's service as a director, subject to the continued service as a director through the applicable vesting date.

Annual Option. Once each calendar year, on the same date that our board of directors grants annual equity awards to our senior executives, each non-employee director will be granted an option to purchase shares having a grant date fair value equal to $75,000, or the Annual Option. All of the shares underlying the Annual Option will vest and become exercisable one year from the date of grant, subject to continued service as a director through the applicable vesting date.

The exercise price per share of each stock option granted under our outside director compensation policy, including Retainer Options, Initial Options and Annual Options, will be the fair market value of a share of our common stock, as determined in accordance with our 2015 Equity Incentive Plan, which we refer to as the 2015 Plan, on the date of the option grant. The grant date fair value is computed in accordance with the Black-Scholes option valuation methodology or such other methodology as our board of directors or compensation committee may determine.

Any stock option granted under our outside director compensation policy will fully vest and become exercisable in the event of a change in control, as defined in our 2015 Plan, provided that the optionee remains a director through such change in control. Further, our 2015 Plan provides that in the event of a merger or change in control, as defined in our 2015 Plan, each outstanding equity award granted under our 2015 Plan that is held by a non-employee director will

fully vest, all restrictions on the shares subject to such award will lapse and, with respect to awards with performance-based vesting, all performance goals or other vesting criteria will be deemed achieved at 100% of target levels, and all of the shares subject to such award will become fully exercisable, if applicable, provided such optionee remains a director through such merger or change in control.

Compensation for Fiscal Year 2018

The following table sets forth a summary of the compensation received by our non-employee directors who received compensation during our fiscal year ended December 31, 2018:

Name	Fees earned or paid in cash(1)	Option awards(2)	Stock awards(3)	Total
James G. Cullen	$82,500	$ 0	$ 75,000	$157,500
Donald A. Lucas	$67,500	$ 0	$ 75,000	$142,500
James B. McElwee	$65,000	$ 0	$ 75,000	$140,000

(1) Mr. Cullen elected to convert $38,750 of his Retainer Cash Payments for 2018 into Retainer Options. The grant date fair value of Mr. Cullen's Retainer Options was $38,750, as calculated in accordance with ASC Topic 718. The assumptions used in calculating the grant-date fair value of the options reported in this column are set forth in the section of this Annual Report on Form 10-K titled "Management's Discussion and Analysis of Financial Condition and Results of Operations – Critical Accounting Policies and Estimates – Stock-Based Compensation."

(2) As of December 31, 2018, Messrs. Cullen, Lucas, and McElwee had outstanding options to purchase a total of 3,265, 3,100 and 2,831 shares of our common stock.

(3) During 2018, all non-employee directors received an Annual RSU grant.

Directors who are also our employees receive no additional compensation for their service as directors. During 2018, Jeffrey M. Soinski, our President, Chief Executive Officer and a director, was also our employee. See the section titled "*Summary Compensation Table*" above in this Item 11 for additional information about the compensation for Mr. Soinski.

Officer and Director Share Purchase Plan

On August 22, 2018, our board of directors adopted an Officer and Director Share Purchase Plan (the "Purchase Plan"). In connection with the adoption of the Purchase Plan, the Board reserved a total of 200,000 shares of our common stock for issuance under the Purchase Plan. The Purchase Plan provides for the optional purchase of shares of our common stock by the Company's directors and executive officers, in accordance with their regular pay schedule. Purchases under the Purchase Plan is funded using payroll deductions, which deductions are used to purchase shares of fully vested common stock on the payment date when the cash compensation deducted would otherwise have been paid.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

Equity Compensation Plan Information

All of our equity compensation plans have been approved by our stockholders. The following table provides information as of December 31, 2018, with respect to the shares of our common stock that may be issued under our existing equity compensation plans.

Plan Category	(a) Number of Securities to be Issued Upon Exercise of Outstanding Options, Warrants and Rights	(b) Weighted Average Exercise Price of Outstanding Options, Warrants and Rights (2)	(c) Number of Securities Remaining Available for Future Issuance Under Equity Compensation Plans (Excluding Securities Reflected in Column (a))
Equity compensation plans approved by stockholders (1)	3,065,878	$ 108.83	126,686

(1) Includes the following plans: our 2009 Stock Plan, our 2015 Plan and our 2015 Employee Stock Purchase Plan. Our 2015 Plan provides that on the first day of each fiscal year commencing in fiscal year 2016, the number of shares authorized for issuance under the 2015 Plan is automatically increased by a number equal to the lesser of (i) 42,250 shares of common stock, (ii) 5.0% of the aggregate number of shares of common stock outstanding on the last day of the preceding fiscal year, or (iii) such number of shares that may be determined by our board of directors. Our 2015 Employee Stock Purchase Plan provides that on the first day of each fiscal year commencing in fiscal year 2016 the number of shares authorized for issuance under our 2015 Employee Stock Purchase Plan is automatically increased by a number equal to the lesser of (i) 12,325 shares of common stock, (ii) 1.5% of the

aggregate number of shares of common stock outstanding on such date, or (iii) an amount determined by our board of directors or a duly authorized committee of our board of directors.

(2) The weighted average exercise price does not take into account outstanding restricted stock, or RSUs, which have no exercise price.

Security Ownership of Certain Beneficial Owners and Management

The following table sets forth certain information with respect to the beneficial ownership of our capital stock as of March 1, 2019 for:

- each person or group of affiliated persons known by us to be the beneficial owner of more than 5% of our common stock;
- each of our named executive officers;
- each of our directors and nominees for director; and
- all of our current executive officers and directors as a group.

We have determined beneficial ownership in accordance with the rules and regulations of the SEC, and the information is not necessarily indicative of beneficial ownership for any other purpose. Except as indicated by the footnotes below, we believe, based on information furnished to us, that the persons and entities named in the table below have sole voting and sole investment power with respect to all shares of our capital stock that they beneficially own, subject to applicable community property laws.

Applicable percentage ownership is based on 34,921,999 shares of our common stock outstanding as of December 31, 2018. In computing the number of shares of capital stock beneficially owned by a person and the percentage ownership of such person, we deemed to be outstanding all shares of our capital stock subject to options held by the person that are currently exercisable or exercisable within 60 days of December 31, 2018. However, we did not deem such shares of our capital stock outstanding for the purpose of computing the percentage ownership of any other person.

Unless otherwise indicated, the address of each beneficial owner listed in the table below is c/o Avinger, Inc., 400 Chesapeake Drive, Redwood City, California 94063. The information provided in the table is based on our records, information filed with the SEC and information provided to us, except where otherwise noted.

Name of Beneficial Owner	Shares Beneficially Owned	Percentage

Named Executive Officers and Directors:	Number of Shares		
Jeffrey M. Soinski(1)	38,972	*	
Mark Weinswig(2)	18,664	*	
James G. Cullen(3)	6,057	*	
Donald A. Lucas(4)	3,680	*	
James B. McElwee(5)	3,346	*	
Himanshu Patel(6)	76,879	*	
Perkins Capital Management, Inc.(7)	3,593,093	9.8	%
Hudson Bay Capital Management LP and Sander Gerber(8)	2,603,565	6.9	%
All executive officers, directors and director nominees as a group (6 individuals)(9)	147,598	*	%

*Represents ownership of less than 1%

(1) Consists of (i) 21,677 shares of common stock held of record by Mr. Soinski and (ii) 17,295 shares of common stock issuable upon exercise of options exercisable within 60 days of December 31, 2018.

(2) Consists of 18,664 shares of common stock held of record by Mr. Weinswig.

(3) Consists of (i) 1,843 shares of common stock held by Gilbert Investments, LLC, (ii) warrants to purchase 621 shares of common stock held by Gilbert Investments, LLC, (iii) 328 shares held by 2000 James Cullen Generation Skipping Family Trust and (iv) 3,265 shares of common stock issuable upon exercise of options exercisable within 60 days of December 31, 2018. Mr. Cullen has sole voting and dispositive power with respect to shares held by Gilbert Investments, LLC and James Cullen Generation Skipping Family Trust. Mr. Cullen does not have a pecuniary interest in the James Cullen Generation Skipping Family Trust and disclaims beneficial ownership in Gilbert Investments, LLC except to the extent of his pecuniary interest therein.

(4) Consists of (i) 580 shares of common stock held of record by Lucas Venture Group III, LP and (ii) 3,100 shares of common stock issuable upon exercise of options exercisable within 60 days of December 31, 2018.

(5) Consists of (i) 377 shares of common stock held of record by Mr. McElwee, (ii) warrants to purchase 138 shares of common stock and (iii) 2,831 shares issuable upon exercise of options exercisable within 60 days of December 31, 2018.

(6) Consists of (i) 21,149 shares of common stock held of record by Mr. Patel, (ii) warrants to purchase 50,000 shares of common stock, (iii) 5,680 shares of common stock issuable upon exercise of options exercisable within 60 days of December 31, 2018 and (iv) 50 shares of Series B preferred stock that are immediately convertible to common stock.

(7) Consists of (i) 1,750,093 shares of common stock, and (ii) warrants to purchase 1,843,000 shares of common stock. The address of Perkins Capital Management, Inc. is 730 Lake St. E., Wayzata, MN 55391.

(8) Consists of warrants to purchase 2,603,565 shares of common stock. The address of Hudson Bay Capital Management LP and Mr. Gerber is 777 Third Avenue, 30th Floor, New York, NY 10017. Mr. Gerber serves as the managing member of Hudson Bay Capital GP LLC, which is the general partner of the Investment Manager. Mr. Gerber disclaims beneficial ownership of these securities

(9) Consists of (i) 64,618 shares of common stock, (ii) warrants to purchase 50,759 shares of common stock (iii) 32,171 shares issuable upon exercise of options exercisable within 60 days of December 31, 2018 and (iv) 50 shares of Series B preferred stock that are immediately convertible to common stock.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

Related Person Transactions

We describe below transactions and series of similar transactions, since the beginning of our last fiscal year, to which we were a party or will be a party, in which:

- the amounts involved exceeded or will exceed $120,000; and
- any of our directors, nominees for director, executive officers or beneficial holders of more than 5% of our outstanding common stock, or any immediate family member of, or person sharing the household with, any of these individuals or entities (each, a related person), had or will have a direct or indirect material interest.

Master Consulting Agreement

We entered into a Master Consulting Agreement in November 2013 with Recreation, Inc., a brand strategy and design agency, for marketing services. John D. Simpson is the founder and was the Chief Executive Officer of Recreation at the time we entered into the Master Consulting Agreement, and until March 2017, he was also our Senior Vice President, Sales and Marketing. Pursuant to this Consulting Agreement, as amended, Recreation provided marketing services to us until June 2017. The total amounts we paid to Recreation in 2017 and 2018 were $136,000 and $0, respectively.

Master Services Agreement

We entered into a Master Services Agreement effective September 1, 2015, which we refer to as the MSA, with Consensys Imaging Service, Inc., or Consensys. Jeffrey M. Soinski, our President, Chief Executive Officer and member of our Board of Directors was also a member of the Board of Directors of Consensys at the time we entered into the MSA. Under the MSA, we may enter into any number of Statements of Work, each of which is governed by the general terms of the MSA. We entered into a Statement of Work effective as of January 15, 2016, pursuant to which Consensys provides field engineers to assist with the installation, service and maintenance of our Lightbox consoles for a fixed fee depending on the type of service. The Statement of Work has no expiration date and remains in effect. The total amounts we paid to Consensys in 2017 and 2018 were $202,000 and $202,000, respectively.

Employment of Related Persons

Through March 2017, we employed John D. Simpson most recently as our Senior Vice President, Sales and Marketing, who is the son of John B. Simpson, our former Executive Chairman. Mr. Simpson became an employee in August 2009, and in this capacity Mr. Simpson's compensation totaled $93,143 in 2017 and $0 in 2018. We believe that Mr. Simpson's compensation was comparable with compensation paid to other employees with similar levels of responsibility and years of experience.

Other Transactions

We have entered into employment and separation arrangements with certain current and former executive officers. For more information on these employment and separation agreements, see the section titled "Executive Employment Letters" in Item 11 above.

We have entered into indemnification agreements with our directors and executive officers. The indemnification agreements, as well as our certificate of incorporation and bylaws, require us to indemnify our directors and executive officers to the fullest extent permitted by Delaware law.

Policies and Procedures for Related Party Transactions

Our board of directors has adopted a written policy that our executive officers, directors, nominees for election as a director, beneficial owners of more than 5% of any class of our common stock and any members of the immediate family of any of the foregoing persons are not permitted to enter into a related person transaction with us without the prior consent of our audit committee. Any request for us to enter into a transaction with an executive officer, director, nominee for election as a director, beneficial owner of more than 5% of any class of our common stock or any member of the immediate family of any of the foregoing persons in which the amount involved exceeds $120,000 and such person would have a direct or indirect interest must first be presented to our audit committee for review, consideration and approval. In approving or rejecting any such proposal, our audit committee is to consider the material facts of the transaction, including, but not limited to, whether the transaction is on terms no less favorable than terms generally available to an unaffiliated third-party under the same or similar circumstances and the extent of the related person's interest in the transaction.

Director Independence

Information regarding the independence of directors is disclosed above under Item 10 under the heading “Director Independence” and incorporated herein by reference.

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

Fees Paid to the Independent Registered Public Accounting Firm

The following table represents aggregate fees billed to us for the years ended December 31, 2018 and 2017 by E&Y or Moss Adams, as applicable. All fees below were approved by our Audit Committee.

Year ending December 31,	2018	2017
Audit fees(1)(2)(3)	$808,511	$1,002,454
Audit related fees	13,650	13,650
Tax fees	37,785	61,381
Total	$859,946	$1,077,485

(1) Audit fees consist of fees incurred for professional services rendered for the audit of our annual financial statements and review of the quarterly financial statements, assistance with registration statements filed with the SEC, and services that are normally provided by our independent registered public accounting firm in connection with regulatory filings or engagements. For the years ended December 31, 2018 and 2017, audit fees also include fees related to our public offerings and review of documents filed with the SEC of $99,400 and $205,000, respectively.

(2) For the fiscal year ended December 31, 2018, Audit fees of $255,000 and $553,511 were paid to E&Y and Moss Adams, respectively.

(3) For the fiscal year ended December 31, 2017, Audit fees of $702,022 and $300,432 were paid to E&Y and Moss Adams, respectively.

Auditor Independence

In our fiscal year ended December 31, 2018, there were no other professional services provided by Moss Adams that would have required our audit committee to consider their compatibility with maintaining the independence of Moss Adams.

Audit Committee Policy on Pre-Approval of Audit and Permissible Non-Audit Services of Independent Registered Public Accounting Firm

Our audit committee has established a policy governing our use of the services of our independent registered public accounting firm. Under this policy, our audit committee is required to pre-approve all audit and non-audit services performed by our independent registered public accounting firm in order to ensure that the provision of such services does not impair the public accountants' independence. All fees paid to E&Y and Moss Adams for our fiscal years ended December 31, 2018 and 2017 were pre-approved by our audit committee.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

(a)(1) Financial Statements

The following Financial Statements are filed as part of this Annual Report on Form 10-K:

(a)(2) Financial Statement Schedules

All other schedules have been omitted because the information required to be set forth therein is not applicable or is shown in the financial statements or notes thereto. Financial statement schedules relating to the allowance for doubtful accounts receivable and for sales returns follows (in thousands):

Description	Balance at Beginning of Year	Charged to costs and expenses	Write offs	Balance at End of Year
Allowance for doubtful accounts receivable:				
Fiscal year ended 2017	$ 21	$ 125	$ —	$ 146
Fiscal year ended 2018	$ 146	$ 120	$ 6	$ 260

	Balance at Beginning of Year	Charged to costs and expenses	Write offs	Balance at End of Year
Allowance for sales returns:				
Fiscal year ended 2017	$ 43	$ 87	$ 75	$ 55

Fiscal year ended 2018	$ 55	$ 45	$ 90	$ 10

(a)(3) Exhibits

The following exhibits are filed as part of, or incorporated by reference into, this Annual Report on Form 10-K.

Exhibit Number	Exhibit Title
3.1 (1)	Amended and Restated Certificate of Incorporation of the registrant.
3.2 (1)	Bylaws of the registrant.
3.3 (2)	Certificate of Amendment to the Amended and Restated Certificate of Incorporation.
3.4 (3)	Avinger, Inc. Certificate of Designation of Preferences, Rights and Limitations of Series A Convertible Preferred Stock
3.5 (4)	Avinger, Inc. Certificate of Designation of Preferences, Rights and Limitations of Series B Convertible Preferred Stock
3.6 (5)	Avinger, Inc. Certificate of Designation of Preferences, Rights and Limitations of Series C Convertible Preferred Stock
3.7 (5)	Certificate of Amendment to the Certificate of Designation of Preferences, Rights and Limitations of Series A Convertible Preferred Stock
4.1 (6)	Specimen Common Stock certificate of the registrant.
4.2 (4)	Specimen Series 1/2 warrant of the registrant.
4.3 (7)	Specimen Common Stock certificate of the registrant.
4.4 (8)	Specimen Series 1/2 warrant of the registrant.
10.1 (9)	Form of Indemnification Agreement for directors and executive officers.
10.2 (10)	2009 Stock Plan and Form of Option Agreement thereunder.
10.3 (10)	2014 Preferred Stock Plan.
10.4 (11)	2015 Equity Incentive Plan, as amended
10.5 (9)	Form of Restricted Stock Unit Award Agreement.
10.6 (9)	Form of Stock Option Agreement.
10.7 (9)	2015 Employee Stock Purchase Plan.
10.8 (9)	Executive Incentive Compensation Plan.
10.9 (10)	Amended and Restated Investors' Rights Agreement dated September 2, 2014 by and among the registrant and certain stockholders.

Exhibit Number	Exhibit Title
10.10 (10)	Lease Agreement, dated July 30, 2010, by and between the registrant and HCP LS Redwood City, LLC for office space located at 400 and 600 Chesapeake Drive, Redwood City, California.
10.11 (10)	First Amendment to Lease Agreement dated September 30, 2011 by and between registrant and HCP LS Redwood City, LLC.
10.12 (13)	Second Amendment to Lease Agreement dated March 4, 2016 by and between the registrant and HCP LS Redwood City, LLC.
10.13 (10)	Employment Letter dated December 29, 2010 by and between the registrant and Matthew B. Ferguson.
10.14 (10)	Employment Letter dated December 17, 2014 by and between the registrant and Jeffrey M. Soinski.
10.15 (10)	Change of Control and Severance Agreement dated March 1, 2012 by and between the registrant and Matthew B. Ferguson.
10.16 (14)	Change of Control and Severance Agreement dated March 29, 2018 by and between the registrant and Jeffrey M. Soinski.
10.17 (3)	Registration Rights Agreement, dated as of February , 2018, by and among the registrant, CRG Partners III L.P. and certain of its affiliated funds, as purchasers.
10.18 (10)	Note and Warrant Purchase Agreement dated October 29, 2013 by and between the registrant and holders of convertible promissory notes.
10.19 (10)	Amendment No. 1 to the Note and Warrant Purchase Agreement dated May 6, 2014 by and between the registrant and holders of convertible promissory notes.
10.20 (12)	Term Loan Agreement, dated as of September 22, 2015, by and among the registrant, certain of its subsidiaries from time to time party thereto as guarantors and CRG Partners III L.P. and certain of its affiliated funds, as lenders.
10.21 (12)	Securities Purchase Agreement, dated as of September 22, 2015, by and among the registrant, CRG Partners III L.P. and certain of its affiliated funds, as purchasers.
10.23 (15)	Purchase Agreement, dated as of November 3, 2017, by and between the registrant and Lincoln Park Capital Fund, LLC.
10.24 (15)	Registration Rights Agreement, dated as of November 3, 2017, by and between the registrant and Lincoln Park Capital Fund, LLC.
10.26 (16)	Waiver and Consent, dated as of December 14, 2017, by and among the registrant and the lenders party thereto.
10.27 (17)	Waiver and Consent, dated as of January 24, 2018, by and among the registrant and the lenders party thereto.
10.28 (3)	Amendment No. 2 to Term Loan Agreement, dated as of February 14, 2018, by and among the registrant and the lenders party thereto.
10.29 (3)	Series A Preferred Stock Purchase Agreement, dated as of February 14, 2018, by and among the registrant, CRG Partners III L.P. and certain of its affiliated funds, as purchasers.
10.30 (18)	Securities Purchase Agreement, dated as of July 12, 2018, by and among the registrant and the purchasers identified on the signature pages thereto.
10.31 (19)	Separation Agreement and Release, dated as of August 1, 2018, between the registrant and Matt Ferguson.
10.32 (19)	Master Consulting Agreement, dated as of August 1, 2018, between the registrant and Matt Ferguson.
10.33 (19)	Employment Offer Letter, dated as of June 11, 2018, between the registrant and Mark Weinswig.
10.34 (19)	Change of Control and Severance Agreement, dated as of June 25, 2018, between the registrant and Mark Weinswig.
10.35 (20)	Officer and Director Share Purchase Plan.
10.36	Change of Control and Severance Agreement, dated as of October 10, 2013, between the registrant and Himanshu Patel.
23.1	Consent of Independent Registered Public Accounting Firm.

24.1	Power of Attorney (included on signature page).
31.1	Certification of the Chief Executive Officer pursuant to Securities Exchange Act Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2	Certification of the Chief Financial Officer pursuant to Securities Exchange Act Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1	Certifications of the Chief Executive Officer and Chief Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
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

(1) Previously filed as an Exhibit to the Current Report on Form 8-K filed with the Securities and Exchange Commission on February 6, 2015, and incorporated by reference herein.
(2) Previously filed as an Exhibit to the registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on February 2, 2018.
(3) Previously filed as an Exhibit to Amendment No. 2 to the registrant's Registration Statement on Form S-1 (File No. 333-222517) filed with the Securities and Exchange Commission on February 12, 2018, and incorporated by reference herein.
(4) Previously filed as an Exhibit to Amendment No. 3 to the registrant's Registration Statement on Form S-1 (File No. 333-222517) filed with the Securities and Exchange Commission on February 13, 2018, and incorporated by reference herein.
(5) Previously filed as an Exhibit to the registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on November 6, 2018, and incorporated by reference herein.
(6) Previously filed as an Exhibit to Amendment No. 2 to the registrant's Registration Statement on Form S-1 (File No. 333-201322) filed with the Securities and Exchange Commission on January 28, 2015, and incorporated by reference herein.
(7) Previously filed as an Exhibit to the registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on July 13, 2018, and incorporated by reference herein.
(8) Previously filed as an Exhibit to Amendment No. 1 to the registrant's Registration Statement on Form S-1 (File No. 333-227689) filed with the Securities and Exchange Commission on October 19, 2018, and incorporated by reference herein.
(9) Previously filed as an Exhibit to Amendment No. 1 to the registrant's Registration Statement on Form S-1 (File No. 333-201322) filed with the Securities and Exchange Commission on January 20, 2015, and incorporated by reference herein.
(10) Previously filed as an Exhibit to the registrant's Registration Statement on Form S-1 (File No. 333-201322), filed with the Securities and Exchange Commission on December 30, 2014, and incorporated by reference herein.
(11) Previously filed as an Exhibit to the registrant's Quarterly Report on Form 10-Q filed with the Securities and Exchange Commission on August 13, 2018, and incorporated by reference herein.
(12) Previously filed as an Exhibit to the registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on November 12, 2015, and incorporated by reference herein.
(13) Previously filed as an Exhibit to the registrant's Annual Report on Form 10-K filed with the Securities and Exchange Commission on March 8, 2016, and incorporated by reference herein.
(14) Previously filed as an Exhibit to the registrant's Annual Report on Form 10-K filed with the Securities and Exchange Commission on March 30, 2018, and incorporated by reference herein.
(15) Previously filed as an Exhibit to the registrant's Registration Statement on Form S-1 (File No. 333-221368), filed with the Securities and Exchange Commission on November 6, 2017, and incorporated by reference herein.
(16) Previously filed as an Exhibit to the registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on December 14, 2017, and incorporated by reference herein.
(17) Previously filed as an Exhibit to the registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on January 30, 2018, and incorporated by reference herein.
(18) Previously filed as an Exhibit to the registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on July 13, 2018, and incorporated by reference herein.
(19) Previously filed as an Exhibit to the registrant's Quarterly Report on Form 10-Q filed with the Securities and Exchange Commission on August 13, 2018, and incorporated by reference herein.
(20) Previously filed as an Exhibit to the registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on August 24, 2018, and incorporated by reference herein.

ITEM 16. FORM 10-K SUMMARY

None.

AVINGER, INC.

INDEX TO FINANCIAL STATEMENTS

As of December 31, 2018 and 2017, and the

Years Ended December 31, 2018 and 2017

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Stockholders and the Board of Directors of

Avinger, Inc.

Opinion on the Financial Statements

We have audited the accompanying balance sheets of Avinger, Inc. (the "Company") as of December 31, 2018 and 2017, the related statements of operations and comprehensive loss, stockholders' equity (deficit), and cash flows for the years then ended, the related notes and the financial statement schedule (collectively referred to as the "financial statements"). In our opinion, the financial statements 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 the years then ended, in conformity with accounting principles generally accepted in the United States of America.

Going Concern Uncertainty

The accompanying financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in Note 1 to the financial statements, the Company's recurring losses from operations and its need for additional capital raise substantial doubt about its ability to continue as a going concern. Management's plans in regard to these matters are also described in Note 1. The financial statements do not include any adjustments to reflect the possible future effects on the recoverability and classification of assets or the amounts and classification of liabilities that may result from the outcome of this uncertainty.

Change in Accounting Principle

As discussed in Note 2 to the financial statements, the Company changed its method of accounting for revenue recognition in the year ended December 31, 2018 due to the adoption of Accounting Standards Codification Topic No. 606, Revenue Recognition.

Basis for Opinion

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

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

Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ Moss Adams LLP

San Francisco, California

March 6, 2019

We have served as the Company's auditor since 2017.

AVINGER, INC.

BALANCE SHEETS

(In thousands, except share and per share data)

	December 31, 2018	December 31, 2017
Assets		
Current assets:		
Cash and cash equivalents	$*16,410*	$*5,389*
Accounts receivable, net of allowance for doubtful accounts of $260 and $146 at December 31, 2018 and 2017, respectively	*1,154*	*1,127*
Inventories	*3,422*	*4,295*
Prepaid expenses and other current assets	*635*	*640*
Total current assets	*21,621*	*11,451*
Property and equipment, net	*2,078*	*2,950*
Other assets	-	*687*
Total assets	$*23,699*	$*15,088*
Liabilities and stockholders' equity (deficit)		
Current liabilities:		
Accounts payable	$*1,148*	$*1,273*
Accrued compensation	*1,197*	*863*
Series A Preferred Stock dividends payable	*2,918*	-
Accrued expenses and other current liabilities	*1,449*	*3,597*
Borrowings	*7,486*	*44,744*
Total current liabilities	*14,198*	*50,477*
Other long-term liabilities	*41*	*301*
Total liabilities	*14,239*	*50,778*
Commitments and contingencies (Note 8)		
Stockholders' equity (deficit):		
Convertible preferred stock issuable in series, par value of $0.001 Shares authorized: 5,000,000 at December 31, 2018 and 2017 Shares issued and outstanding: 45,671 and none at December 31, 2018 and 2017, respectively; aggregate liquidation preference related to Series A convertible preferred stock of $44,718 and none at December 31, 2018 and 2017, respectively	—	—
Common stock, par value of $0.001 Shares authorized: 100,000,000 at December 31, 2018 and 2017		

Shares issued and outstanding: 34,921,999 and 833,597 at December 31, 2018 and 2017, respectively	*34*	*1*
Additional paid-in capital	*338,311*	*265,636*
Accumulated deficit	*(328,885)*	*(301,327)*
Total stockholders' equity (deficit)	*9,460*	*(35,690)*
Total liabilities and stockholders' equity (deficit)	$*23,699*	$*15,088*

See accompanying notes.

AVINGER, INC.

STATEMENTS OF OPERATIONS AND COMPREHENSIVE LOSS

(In thousands, except per share data)

	Year Ended December 31,	
	2018	**2017**
Revenues	$*7,915*	$*9,934*
Cost of revenues	*6,531*	*13,002*
Gross profit (loss)	*1,384*	*(3,068)*
Operating expenses:		
Research and development	*6,009*	*11,319*
Selling, general and administrative	*17,442*	*25,120*
Restructuring charges	*-*	*1,285*
Litigation settlement	*-*	*1,760*
Total operating expenses	*23,451*	*39,484*
Loss from operations	*(22,067)*	*(42,552)*
Interest income	*214*	*108*
Interest expense	*(5,692)*	*(6,299)*
Other income (expense), net	*(13)*	*11*
Net loss and comprehensive loss	*(27,558)*	*(48,732)*
Accretion of preferred stock dividends	*(2,918)*	*-*
Deemed dividend arising from beneficial conversion feature of convertible preferred stock	*(5,216)*	*-*
Net loss applicable to common stockholders	$*(35,692)*	$*(48,732)*
Net loss per share attributable to common stockholders, basic and diluted	$*(3.34)*	$*(74.74)*
Weighted average common shares used to compute net loss per share, basic and diluted	*10,687*	*652*

See accompanying notes.

AVINGER, INC.

STATEMENTS OF STOCKHOLDERS' EQUITY (DEFICIT)

(In thousands, except share data)

	Convertible Preferred Stock		Common Stock				Total
	Shares	Amount	Shares	Amount	Additional Paid-In Capital	Accumulated Deficit	Stockholders' Equity (Deficit)
Balance at December 31, 2016	—	$ —	***594,321***	***$ 1***	***$256,629***	***$ (252,389)***	***$ 4,241***
Issuance of common stock	—	—	*4,758*	—	*246*	—	*246*
Employee stock-based compensation	—	—	—	—	*4,966*	—	*4,966*
Adjustment for change in accounting treatment of stock-based compensation regarding forfeitures on a modified retrospective basis	—	—	—	—	*206*	*(206)*	—
Issuance of common stock in public offerings, net of underwriting discount, commissions and issuance costs	—	—	*234,518*	—	*3,589*	—	*3,589*
Net and comprehensive loss		—	—	—	—	*(48,732)*	*(48,732)*
Balance at December 31, 2017	—	—	***833,597***	***1***	***$265,636***	***(301,327)***	***(35,690)***
Issuance of common stock under officers' and directors' purchase plan	—	—	*44,012*	—	*21*	—	*21*
Employee stock-based compensation	—	—	—	—	*3,080*	—	*3,080*
Exercises of warrants for common stock	—	—	*290,500*	—	*581*	—	*581*
Common stock issued to a vendor	—	—	*80,000*	—	*106*	—	*106*
Issuance of common stock in July public offering, net of commissions and issuance costs	—	—	*2,166,180*	*2*	*3,024*		*3,026*
Issuance of Series B Preferred Stock, net of commissions and issuance costs	*17,979*	—	—	—	*15,525*	—	*15,525*
Conversion of Series B Preferred stock into common stock	*(16,278)*	—	*8,139,148*	*8*	*(8)*	—	—
Issuance of common stock and Series C Preferred Stock in	*8,586*	—	*7,285,000*	*7*	*10,172*	—	*10,179*

November public offering, net of commissions and issuance costs												
Conversion of Series C Preferred Stock into common stock	*(6,416*	)	—	*16,040,000*	*16*	*(16*	)	-				
Conversion of CRG into Series A Preferred Stock	*41,800*		—	—	—	*42,794*		—		*42,794*		
Issuance of common stock to Lincoln Park	—		—	*43,562*	—	*314*		—		*314*		
Accretion of Series A Preferred Stock dividends	—		—	—	—	*(2,918*	)	—		*(2,918*	)	
Net and comprehensive loss	—		—	—	—	—		*(27,558*	)	*(27,558*	)	
Balance at December 31, 2018	***45,671***	**$**	**—**	***34,921,999***	**$** ***34***	**$** ***338,311***		**$** ***(328,885***	**)**	**$** ***9,460***		

See accompanying notes.

AVINGER, INC.

STATEMENTS OF CASH FLOWS

(In thousands)

	Year Ended December 31,	
	2018	**2017**
Cash flows from operating activities		
Net loss	$*(27,558)*	$*(48,732)*
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization	*1,281*	*1,476*
Amortization of debt issuance costs and debt discount	*117*	*218*
Stock-based compensation	*3,080*	*4,966*
Noncash interest expense and other charges	*5,634*	*3,252*
Common stock issued for services	*106*	*—*
(Gain)/loss on disposal of property and equipment, net	*(7)*	*18*
Provision for litigation settlement	*—*	*1,760*
Provision for doubtful accounts receivable	*133*	*125*
Provision for excess and obsolete inventories	*914*	*5,500*
Changes in operating assets and liabilities:		
Accounts receivable	*(160)*	*2,318*
Inventories	*(92)*	*(1,181)*
Prepaid expenses and other current assets	*5*	*22*
Other assets	*340*	*(475)*
Accounts payable	*(125)*	*(334)*
Accrued compensation	*334*	*(1,945)*
Accrued expenses and other current liabilities and accrued interest	*(2,208)*	*(1,205)*
Other long-term liabilities	*(260)*	*(259)*
Net cash used in operating activities	*(18,466)*	*(34,476)*
Cash flows from investing activities		
Purchase of property and equipment	*(32)*	*(45)*
Proceeds from sale of property and equipment	*28*	*4*
Net cash used in investing activities	*(4)*	*(41)*
Cash flows from financing activities		
Proceeds from the issuance of convertible preferred stock, net of issuance costs	*15,525*	*—*
Proceeds from issuance of common stock and convertible preferred stock, net of issuance costs	*10,179*	*—*
Proceeds from issuance of common stock under officers' and directors' purchase plan	*21*	*—*
Principal paydown of capital lease obligations	*—*	*(25)*
Proceeds from public offerings, net of issuance costs	*3,026*	*3,589*
Proceeds from exercise of common stock warrants	*581*	*—*
Debt discount in connection with loan amendment	*(155)*	*—*

Proceeds from the issuance of common stock	*314*	*246*
Net cash provided by financing activities	*29,491*	*3,810*
Net change in cash and cash equivalents	*11,021*	*(30,707)*
Cash and cash equivalents, beginning of period	*5,389*	*36,096*
Cash and cash equivalents, end of period	$*16,410*	$*5,389*
Supplemental disclosure of cash flow information		
Cash paid for interest	$*60*	$*3,942*
Noncash investing and financing activities:		
Conversion of CRG loan principal and accrued interest into Series A Convertible Preferred Stock	*42,794*	*—*
Disposal of fully depreciated property and equipment	*2,849*	*1,738*
Accretion of Series A Convertible Preferred Stock dividends	*2,918*	*—*
Transfer between inventory and property and equipment	*51*	*153*

See accompanying notes.

AVINGER, INC.

Notes to Financial Statements

1. **Organization**

Organization, Nature of Business

Avinger, Inc. (the "Company"), a Delaware corporation, was incorporated in *March 2007.* The Company designs, manufactures and sells image-guided, catheter-based systems that are used by physicians to treat patients with peripheral artery disease ("PAD"). Patients with PAD have a build-up of plaque in the arteries that supply blood to areas away from the heart, particularly the pelvis and legs. The Company manufactures and sells a suite of products in the United States ("U.S.") and in select international markets. The Company has developed its Lumivascular platform, which integrates optical coherence tomography (*"OCT")* visualization with interventional catheters and is the industry's only system that provides real-time intravascular imaging during the treatment portion of PAD procedures. The Company's Lumivascular platform consists of a capital component, Lightbox, as well as a variety of disposable catheter products. The Company's current products include its non-imaging catheters, Wildcat and Kittycat, as well as its Lumivascular platform products, Ocelot, Ocelot PIXL and Ocelot MVRX, all of which are designed to allow physicians to penetrate a total blockage in an artery, known as a chronic total occlusion ("CTO"). In *March 2016,* the Company received *510*(k) clearance from the U.S. Food and Drug Administration ("FDA") for commercialization of Pantheris, the Company's image-guided atherectomy system, designed to allow physicians to precisely remove arterial plaque in PAD patients. In *May 2018,* the Company also received *510*(K) clearance from the FDA for its next-generation of Pantheris. The Company submitted a *510*(k) filing in respect of Pantheris SV, a lower profile Pantheris, in *August 2018* and received CE Marking approval for Pantheris SV in *October 2018.* The Company has sales in the U.S. and select international markets. The Company is located in Redwood City, California.

Liquidity Matters

The accompanying financial statements have been prepared assuming that the Company will continue as a going concern, which contemplates the realization of assets and the satisfaction of liabilities in the normal course of business. The Financial Accounting Standards Board ("FASB") Accounting Standards Update ("ASU") *No. 2014-15,* Presentation of Financial Statements - Going Concern (Subtopic *205-40*) requires the Company to make certain disclosures if it concludes that there is substantial doubt about the entity's ability to continue as a going concern within *one* year from the date of the issuance of these financial statements. The accompanying financial statements have been prepared assuming that the Company will continue as a going concern, which contemplates the realization

of assets and the satisfaction of liabilities in the normal course of business. In the course of its activities, the Company has incurred losses and negative cash flows from operations since its inception. As of *December 31, 2018,* the Company had an accumulated deficit of *$328.9* million. The Company expects to incur losses for the foreseeable future. The Company believes that its cash and cash equivalents of *$16.4* million at *December 31, 2018* and expected revenues and funds from operations will be sufficient to allow the Company to fund its current operations through at least the *fourth* quarter of *2019.* Even though we received net proceeds of *$10.2* million from the sale of our Series C Preferred Stock and common stock in our *November 2018* offering, net proceeds of *$15.5* million from the sale of our Series B preferred stock and warrants in our *February 2018* offering, and net proceeds of *$3.0* million from the sale of common stock and warrants in our *July 2018* offering, the Company will need to raise additional funds through future equity or debt financings within the next *twelve* months to meet its operational needs and capital requirements for product development, clinical trials and commercialization and *may* subsequently require additional fundraising. The Company can provide *no* assurance that it will be successful in raising funds pursuant to additional equity or debt financings or that such funds will be raised at prices that do *not* create substantial dilution for our existing stockholders. Given the recent decline in the Company's stock price, any financing that we undertake in the next *twelve* months could cause substantial dilution to our existing stockholders, there can be *no* assurance that the Company will be successful in acquiring additional funding at levels sufficient to fund its operations. These conditions raise substantial doubt about the Company's ability to continue as a going concern. If the Company is unable to raise additional capital in sufficient amounts or on terms acceptable to it, the Company *may* have to significantly reduce its operations or delay, scale back or discontinue the development of *one* or more of its products. The financial statements do *not* include any adjustments that might result from the outcome of this uncertainty. The Company's ultimate success will largely depend on its continued development of innovative medical technologies, its ability to successfully commercialize its products and its ability to raise significant additional funding. Additionally, due to the substantial doubt about the Company's ability to continue operating as a going concern and the material adverse change clause in the Loan Agreement with CRG, the entire amount of borrowings at *December 31, 2018* and *2017* has been classified as current in these financial statements. CRG has *not* invoked the material adverse change clause.

Public Offerings

On *February 3, 2016,* the Company filed a universal shelf registration statement to offer up to *$150,000,000* of its securities and entered into an "at-the-market" program pursuant to a Sales Agreement with Cowen and Company ("Cowen"), through which it *may,* from time to time, issue and sell shares of common stock having an aggregate offering value of up to *$50,000,000.* The shelf registration statement also covers the resale of the shares sold to CRG in *September 2015.* The registration statement was declared effective by the SEC on *March 8, 2016.* During the year ended *December 31, 2017,* the Company sold *189,684* shares of common stock through the "at-the-market" program at an average price of *$17.68* per common share and raised net proceeds of *$3,187,000,* after payment of *$101,000* in commissions and fees to Cowen. During the year ended *December 31, 2016,* the Company sold *27,374* shares, respectively, of common stock through the "at-the-market" program at an average price of *$194.74* per common share and raised net proceeds of *$5,171,000,* after payment of *$160,000* in commissions and fees to Cowen. Due to the SEC's "baby shelf rules," which prohibit companies with a public float of less than *$75* million from issuing securities under a shelf registration statement in excess of *one-third* of such company's public float in a *twelve*-month period, the Company is unable to issue more shares in its "at-the-market" program at this time.

On *February 16, 2018,* we completed a public offering of *17,979* shares of Series B preferred stock and warrants to purchase *17,979,000* shares of common stock. As a result, we received net proceeds of approximately *$15.5* million after underwriting discounts, commissions, legal and accounting fees. Each share of Series B preferred stock is accompanied by *one* warrant that expires on the *seventh* anniversary of the date of issuance to purchase up to *500* shares of common stock (the "Series *1* warrants") and *one* warrant that expires on the earlier of (i) the *seventh* anniversary of the date of issuance or (ii) the *60th* calendar day following the receipt and announcement of FDA clearance of our Pantheris below-the-knee device (or the same or similar product with a different name) to purchase up to *500* shares of common stock; provided, however, if at any time during such *60*-day period the volume weighted average price for any trading day is less than the then effective exercise price, the termination date shall be extended to the *seven* year anniversary of the initial exercise date (the "Series *2* warrants"). In addition, pursuant to the Series A Purchase Agreement, we issued to CRG *41,800* shares of Series A preferred stock at the closing of the Series B Offering. The Series A preferred stock was issued in exchange for the conversion of *$38.0* million of the outstanding principal amount of their senior secured term loan (plus the back-end fee and prepayment premium applicable thereto), totaling approximately *$41.8* million. The Series A preferred stock is initially convertible into *20,900,000* shares of common stock subject to certain limitations contained in the Series A Purchase Agreement.

On *July 12, 2018,* we entered into a securities purchase agreement with certain investors pursuant to which we agreed to sell and issue, in a registered direct offering, an aggregate of *2,166,180* shares of our common stock at an offering price of *$1.6425* per share. In a concurrent private placement, or the Private Placement, we agreed to issue to these investors warrants exercisable for *one* share of our common stock for each *two* shares purchased in the registered direct offering, which equals an aggregate of *1,083,091* shares of common stock. The closing of such registered direct offering and the concurrent Private Placement occurred on *July 16, 2018,* in connection with which we received net proceeds of approximately *$3.0* million after deducting placement agent fees and other expenses payable by us and the conversion price of the outstanding shares of Series B preferred stock, issued in our *February 2018* offering, was reduced to *$1.58* per share as a result. The warrants have an exercise price of *$1.58* per share of our common stock and *may* be exercised from time to time beginning on *January 17, 2019* and expire on *July 16, 2021.*

On *November 1, 2018,* we completed a public offering of *7,285,000* shares of common stock and *8,586* shares of Series C convertible preferred stock (the "Series C preferred stock"). As a result, we received net proceeds of approximately *$10.2* million after underwriting discounts, commissions, legal and accounting fees. Upon any dissolution, liquidation or winding up, whether voluntary or involuntary, holders of Series C preferred stock will be entitled to receive distributions out of our assets, whether capital or surplus, of an amount equal to *$0.001* per share of Series C preferred stock before any distributions shall be made on the common stock but after distributions shall be made on any outstanding Series A preferred stock and any of our existing or future indebtedness. The Series C preferred stock has *no* voting rights.

2. **Summary of Significant Accounting Policies**

Basis of Presentation

The accompanying financial statements have been prepared in accordance with United States generally accepted accounting principles ("U.S. GAAP") and pursuant to the rules and regulations of the SEC ("SEC").

On *January 30, 2018,* the Company's Board of Directors approved an amendment to the Company's amended and restated certificate of incorporation to effect a *1*-for-*40* reverse stock split of the Company's common stock. The par value of the common stock and convertible preferred stock was *not* adjusted as a result of the reverse stock split. All common stock, stock options, restricted stock units and warrants, and per share amounts in the financial statements have been retroactively adjusted for all periods presented to give effect to the reverse stock split. The reverse stock split was effected on *January 30, 2018.*

Use of Estimates

The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the amounts and disclosures reported in the financial statements. Management uses significant judgment when making estimates related to its common stock valuation and related stock-based compensation, the valuation of the common stock warrants, the valuation of compound embedded derivatives, provisions for doubtful accounts receivable and excess and obsolete inventories, clinical trial accruals, and its reserves for sales returns and warranty costs. Management bases its estimates on historical experience and on various other assumptions that are believed to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are *not* readily apparent from other sources. Although these estimates are based on the Company's knowledge of current events and actions it *may* undertake in the future, actual results *may* ultimately materially differ from these estimates and assumptions.

Fair Value of Financial Instruments

The Company has evaluated the estimated fair value of its financial instruments as of *December 31, 2018* and *2017.* Financial instruments consist of cash and cash equivalents, accounts receivable and payable, and other current liabilities and borrowings. The carrying amounts of cash and cash equivalents, accounts receivable and payable, and other current liabilities approximate their respective fair values because of the short-term nature of those instruments. Based upon the borrowing terms and conditions currently available to the Company, the carrying values of the borrowings approximate their fair value.

Cash and Cash Equivalents

The Company considers all highly liquid investments with an original maturity of *three* months or less at the time of purchase to be cash equivalents. Cash equivalents are considered available-for-sale marketable securities and are recorded at fair value, based on quoted market prices. As of *December 31, 2018* and *2017,* the Company's cash equivalents are entirely comprised of investments in money market funds. Any related unrealized gains and losses are recorded in other comprehensive income (loss) and included as a separate component of stockholders' equity (deficit). There were *no* unrealized gains and losses as of *December 31, 2018* and *2017.* Any realized gains and losses and interest and dividends on available-for-sale securities are included in interest income or expense and computed using the specific identification cost method.

Concentration of Credit Risk, and Other Risks and Uncertainties

Financial instruments that potentially subject the Company to credit risk consist of cash and cash equivalents and accounts receivable to the extent of the amounts recorded on the balance sheets.

The Company's policy is to invest in cash and cash equivalents, consisting of money market funds. These financial instruments are held in Company accounts at *one* financial institution. The counterparties to the agreements relating to the Company's investments consist of financial institutions of high credit standing.

The Company provides for uncollectible amounts when specific credit problems arise. Management's estimates for uncollectible amounts have been adequate, and management believes that all significant credit risks have been identified at *December 31, 2018* and *2017.*

The Company's accounts receivable are due from a variety of healthcare organizations in the United States and select international markets. At *December 31, 2018* and *2017, no* customer represented *10%* or more of the Company's accounts receivable. For the years ended *December 31, 2018* and *2017,* there were *no* customers that represented *10%* or more of revenues. Disruption of sales orders or a deterioration of financial condition of its customers would have a negative impact on the Company's financial position and results of operations.

The Company manufactures its commercial products in-house, including Pantheris and the Ocelot family of catheters. Certain of the Company's product components and sub-assemblies continue to be manufactured by sole suppliers. Disruption in component or sub-assembly supply from these manufacturers or from in-house production would have a negative impact on the Company's financial position and results of operations.

The Company is subject to certain risks, including that its devices *may not* be approved or cleared for marketing by governmental authorities or be successfully marketed. There can be *no* assurance that the Company's products will achieve widespread adoption in the marketplace, nor can there be any assurance that existing devices or any future devices can be developed or manufactured at an acceptable cost and with appropriate performance characteristics. The Company is also subject to risks common to companies in the medical device industry, including, but *not* limited to, new technological innovations, dependence upon *third*-party payors to provide adequate coverage and reimbursement, dependence on key personnel and suppliers, protection of proprietary technology, product liability claims, and compliance with government regulations.

Existing or future devices developed by the Company *may* require approvals or clearances from the FDA or international regulatory agencies. In addition, in order to continue the Company's operations, compliance with various federal and state laws is required. If the Company were denied or delayed in receiving such approvals or clearances, it *may* be necessary to adjust operations to align with the Company's currently approved portfolio. If clearance for the products in the current portfolio were withdrawn by the FDA, this *may* have a material adverse impact on the Company.

Accounts Receivable

Trade accounts receivable are recorded at the invoiced amount and do *not* bear interest. The allowance for doubtful accounts is the Company's best estimate of the amount of probable credit losses in the Company's existing accounts receivable. The Company determines the allowance for doubtful accounts based upon an aging of accounts receivable, historical experience, and management judgment. Accounts receivable balances are reviewed individually for collectability. To date, the Company has *not* experienced significant credit-related losses.

Inventories

Inventories are valued at the lower of cost or net realizable value. Cost is determined using the *first*-in, *first*-out method for all inventories. The Company's policy is to write down inventory that has expired or become obsolete, inventory that has a cost basis in excess of its expected net realizable value, and inventory in excess of expected requirements. The estimate of excess quantities is subjective and primarily dependent on the estimates of future demand for a particular product. If the estimate of future demand is too high, the Company *may* have to increase the reserve for excess inventory for that product and record a charge to the cost of revenues. Inventory used in clinical trials is expensed at the time of production and recorded as research and development expense.

Property and Equipment

Property and equipment are recorded at cost. Repairs and maintenance costs are expensed as incurred. Depreciation and amortization are calculated using the straight-line method over the estimated useful lives of the assets of *three* to *five* years. Depreciation expense includes the amortization of assets acquired under capital leases and equipment located at customer sites. Equipment held by customers is comprised of the Lightboxes located at customer sites under a lease or placement agreement and are recorded at cost. Upon execution of a lease or placement agreement, the related equipment is reclassified from inventory to the property and equipment account. Depreciation expense for equipment held by customers is recorded as a component of cost of revenues. Leasehold improvements and assets recorded under capital leases are amortized using the straight-line method over the shorter of the lease term or estimated useful economic life of the asset.

Deferred Offering Costs

Deferred offering costs, which primarily consist of direct incremental legal and accounting fees relating to the Company's offerings of equity securities to Lincoln Park, were capitalized. The deferred offering costs were be offset

against proceeds from the public offering upon the effectiveness of the public offerings in fiscal *2018.* As of *December 31, 2018* and *2017,* there were *zero* and *$464,000* deferred offering costs capitalized in other assets on the balance sheet. Amortization of these deferred offering costs during *2018* is included in selling, general and administrative expense in the statement of operations and comprehensive loss.

Impairment of Long-Lived Assets

The Company reviews long-lived assets, including property and equipment, for impairment whenever events or changes in business circumstances indicate that the carrying amount of the assets *may not* be fully recoverable. If indicators of impairment exist, an impairment loss would be recognized when estimated undiscounted future cash flows expected to result from the use of the asset and its eventual disposition are less than its carrying amount. Impairment, if any, is measured as the amount by which the carrying amount of the long-lived asset exceeds its fair value. The Company has *not* recorded any impairment of long-lived assets since inception through *December 31, 2018.*

Revenue Recognition

The Company’s revenues are derived from (*1*) sale of its Lightbox (*2*) sale of disposables, which consist of catheters and accessories, and (*3*) sale of customer service contracts. The Company sells its products directly to hospitals and medical centers as well as through distributors. The Company recognizes revenue in accordance with ASC *605-10,* Revenue Recognition, when persuasive evidence of an arrangement exists, the fee is fixed or determinable, collection of the fee is probable and delivery has occurred. For all sales, the Company uses either a signed agreement or a binding purchase order as evidence of an arrangement.

The Company’s revenue recognition policies generally result in revenue recognition at the following points:

1. Lightbox sales: The Company sells its products directly to hospitals and medical centers. Provided all other criteria for revenue recognition have been met, the Company recognizes revenue for Lightbox sales directly to end customers when delivery and acceptance occurs, which is defined as receipt by the Company of an executed form by the customer acknowledging that the training and installation process is complete.

2. Sales of disposables: Disposable revenues consist of sales of the Company's catheters and accessories and are recognized when the product has shipped, risk of loss and title has passed to the customer and collectability is reasonably assured.

3. Service revenue: Service revenue is recognized ratably over the term of the service period. To date service revenue has been insignificant.

The Company offers its customers the ability to purchase or lease its Lightbox. In addition, the Company provides a Lightbox under a limited commercial evaluation program to allow certain strategic accounts to install and utilize the Lightbox for a limited trial period of *three* to *six* months. When a Lightbox is placed under a lease agreement or under a commercial evaluation program, the Company retains title to the equipment and it remains capitalized on its balance sheet under property and equipment. Depreciation expense on these placed Lightboxes is recorded to cost of revenues on a straight-line basis. The costs to maintain these placed Lightboxes are charged to cost of revenues as incurred.

The Company assessed whether the embedded lease is an operating lease or sales-type lease. Based on the Company's assessment of the guidance and given that any payments under the lease agreements are dependent upon contingent future sales, it was determined that collectability of the minimum lease payments is *not* reasonably predictable. Accordingly, the Company concluded the embedded lease did *not* meet the criteria of a sales-type lease and accounts for it as an operating lease. The Company recognizes revenue allocated to the lease as the contingent disposable product purchases are delivered and are included in revenues within the statement of operations and comprehensive loss.

For sales through distributors, the Company recognizes revenue when title to the product and the risk of loss transfers from the Company to the distributor. The distributors are responsible for all marketing, sales, training and warranty in their respective territories. The standard terms and conditions contained in the Company's distribution agreements do *not* provide price protection or stock rotation rights to any of its distributors. In addition, its distributor agreements do *not* allow the distributor to return or exchange products, and the distributor is obligated to pay the Company upon invoice regardless of its ability to resell the product.

The Company estimates reductions in revenue for potential returns of products by customers. In making such estimates, management analyzes historical returns, current economic trends and changes in customer demand and acceptance of its products. The Company expenses shipping and handling costs as incurred and includes them in the cost of revenues. In those cases where the Company bills shipping and handling costs to customers, it will classify the amounts billed as a component of revenue.

Cost of Revenues

Cost of revenues consists primarily of manufacturing overhead costs, material costs and direct labor. A significant portion of the Company's cost of revenues currently consists of manufacturing overhead costs. These overhead costs include the cost of quality assurance, material procurement, inventory control, facilities, equipment and operations supervision and management. Cost of revenues also includes depreciation expense for the Lightboxes under lease agreements, product warranty costs, product written-off due to obsolescence, and certain direct costs such as shipping costs.

Product Warranty Costs

The Company typically offers a *one*-year warranty for parts and labor on its products commencing upon the transfer of title and risk of loss to the customer. The Company accrues for the estimated cost of product warranties upon invoicing its customers, based on historical results. Warranty costs are reflected in the statement of operations and comprehensive loss as a cost of revenues. The warranty obligation is affected by product failure rates, material usage and service delivery costs incurred in correcting a product failure. Should actual product failure rates, material usage or service delivery costs differ from these estimates, revisions to the estimated warranty liability would be required. Periodically the Company assesses the adequacy of its recorded warranty liabilities and adjusts the amounts as necessary. Warranty provisions and claims are summarized as follows (in thousands):

	2018	**2017**
Balance, beginning of year	$*390*	$*509*
Warranty provision	*333*	*306*
Usage/Release	*(451)*	*(425)*
Balance, end of year	$*272*	$*390*

Research and Development

The Company expenses research and development costs as incurred. Research and development expenses include personnel and personnel-related costs, costs associated with pre-clinical and clinical development activities, and costs for prototype products that are manufactured prior to market approval for that prototype product; internal and external costs associated with the Company's regulatory compliance and quality assurance functions, including the costs of outside consultants and contractors that assist in the process of submitting and maintaining regulatory filings, and overhead costs, including allocated facility and related expenses.

Clinical Trials

The Company accrues and expenses costs for its clinical trial activities performed by *third* parties, including clinical research organizations and other service providers, based upon estimates of the work completed over the life of the individual study in accordance with associated agreements. The Company determines these estimates through discussion with internal personnel and outside service providers as to progress or stage of completion of trials or services pursuant to contracts with clinical research organizations and other service providers and the agreed-upon fee to be paid for such services.

Common Stock Valuation and Stock-Based Compensation

Stock-based compensation for the Company includes amortization related to all stock options, restricted stock units ("RSUs") and shares issued under the employee stock purchase plan ("ESPP"), based on the grant-date estimated fair value. The fair value of stock options is estimated on the date of grant using the Black-Scholes option pricing model and recognized as expense on a straight-line basis over the vesting period of the award. The Company measures the fair value of RSUs using the closing stock price of a share of the Company's common stock on the grant date and is recognized as expense on a straight-line basis over the vesting period of the award. Because noncash stock-based compensation expense is based on awards ultimately expected to vest, it is reduced by an estimate for future forfeitures. The Company estimates a forfeiture rate for its stock options and RSUs based on an analysis of its actual forfeiture experience and other factors. Forfeitures are estimated at the time of grant and revised, if necessary, in subsequent periods if actual forfeitures differ from estimates.

Prior to the Company's IPO in *January 2015,* the fair value of the Company's common stock was determined by its Board of Directors with assistance from management and *third*-party valuation specialists. Management's approach to estimate the fair value of the Company's common stock was consistent with the methods outlined in the American Institute of Certified Public Accountants Practice Aid, Valuation of Privately-Held Company Equity Securities Issued as Compensation. Management considered several factors to estimate enterprise value, including significant milestones that would generally contribute to increases in the value of the Company's common stock. Following the closing of the Company's IPO, the fair value of its common stock is determined based on the closing price of its common stock on The Nasdaq Capital Market.

Foreign Currency

The Company records net gains and losses resulting from foreign exchange transactions as a component of foreign currency exchange losses in other income (expense), net. During the years ended *December 31, 2018* and *2017,* the Company recorded (*$13,000*) and *$11,000* of foreign currency exchange net (gains)/losses, respectively.

Income Taxes

The Company utilizes the liability method of accounting for income taxes. Under this method, deferred tax assets and liabilities are determined based on differences between financial reporting and tax reporting bases of assets and liabilities and are measured using enacted tax rates and laws that are expected to be in effect when the differences are expected to reverse. Valuation allowances are established when necessary to reduce deferred tax assets to the amounts expected to be realized. The Company's policy is to record interest and penalties on uncertain tax positions as income tax expense when they occur. During the years ended *December 31, 2018* and *2017,* the Company did *not* recognize accrued interest or penalties related to unrecognized tax benefits.

Net Loss per Share Attributable to Common Stockholders

Basic net loss per share attributable to common stockholders is computed by dividing the net loss attributable to common stockholders by the weighted average number of shares of common stock outstanding during the period, without consideration for potential dilutive common shares. Diluted net loss per share attributable to common stockholders is computed by dividing the net loss attributable to common stockholder by the weighted average number of shares of common stock and dilutive potential shares of common stock outstanding during the period. Any common stock shares subject to repurchase are excluded from the calculations as the continued vesting of such shares is contingent upon the holders' continued service to the Company. As of *December 31, 2018* and *2017,* there were *no* shares subject to repurchase. Since the Company was in a loss position for all periods presented, basic net loss per share attributable to common stockholders is the same as diluted net loss per share attributable to common stockholders as the inclusion of all potentially dilutive common shares would have been anti-dilutive.

Net loss per share attributable to common stockholders was determined as follows (in thousands, except per share data):

	Year Ended December 31,	
	2018	**2017**
Net loss attributable to common stockholders	$*(35,692)*	$*(48,732)*
Weighted average common stock outstanding	*10,687*	*652*
Net loss per share attributable to common stockholders, basic and diluted	$*(3.34)*	$*(74.74)*

The following potentially dilutive securities outstanding have been excluded from the computations of diluted weighted average shares outstanding because such securities have an antidilutive impact due to losses reported:

	Year Ended December 31,	
	2018	**2017**
Common stock options	*71,799*	*76,644*
Convertible preferred stock	*41,398*	-
Unvested restricted stock units	*922,456*	*5,089*
Common stock warrants	*20,778,711*	*53,715*
	21,814,364	*135,448*

Comprehensive Loss

For the years ended *December 31, 2018* and *2017,* there was *no* difference between comprehensive loss and the Company's net loss.

Segment and Geographical Information

The Company operates and manages its business as *one* reportable and operating segment. The Company's chief executive officer, who is the chief operating decision maker, reviews financial information on an aggregate basis for purposes of allocating resources and evaluating financial performance. Primarily all of the Company's long-lived assets are based in the United States. Long-lived assets are comprised of property and equipment. For the years ended *December 31, 2018* and *2017, 94%* and *95%,* respectively, of the Company's revenues were in the United States, based on the shipping location of the external customer.

Recent Accounting Pronouncements

Adopted:

In *May 2014,* the FASB issued ASU *No. 2014-09, "*Revenue from Contracts with Customers (Topic *606*)*"*, which supersedes the revenue recognition requirements in ASC *605,* Revenue Recognition. This ASU is based on the principle that revenue is recognized to depict the transfer of 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 ASU also requires additional disclosure about the nature, amount, timing and uncertainty of revenue and cash flows arising from customer contracts, including significant judgments and changes in judgments and assets recognized from costs incurred to obtain or fulfill a contract. In *August 2015,* FASB issued ASU *No. 2015-14,* Revenue from Contracts with Customers (Topic *606*): Deferral of the Effective Date, which effectively delayed the adoption date by *one* year, to an effective date for public entities for annual and interim periods beginning after *December 15, 2017.*

In *March 2016,* the FASB issued ASU *No. 2016-08,* Revenue from Contracts with Customers (Topic *606*): Principal Versus Agent Considerations (Reporting Revenue Gross Versus Net), to clarify certain aspects of the principal-versus-agent guidance in its new revenue recognition standard.

In *April 2016,* the FASB issued ASU *No. 2016-10,* Revenue from Contracts with Customers (Topic *606*): Identifying Performance Obligations and Licensing to clarify how to identify the performance obligations and the licensing implementation guidance in its new revenue recognition standard.

In *May 2016,* the FASB issued ASU *No. 2016-12,* Revenue from Contracts with Customers (Topic *606*): Narrow-Scope Improvements and Practical Expedients, to address certain issues identified by the Transition Resource Group, (the "TRG") in the guidance on assessing collectability, presentation of sales tax, noncash consideration, and completed contracts and contracts modifications at transition.

The Company adopted ASC *606* and related ASUs on *January 1, 2018,* using the modified retrospective approach. The adoption did *not* have a material impact on the Company's financial statements.

In *May 2017,* the FASB issued ASU *No. 2017-09,* Compensation—Stock Compensation (Topic *718*): Scope of Modification Accounting, which provides guidance on determining which changes to the terms and conditions of share-based payment awards require an entity to apply modification accounting under Topic *718.* The amendments in this ASU should be applied prospectively to an award modified on or after the adoption date. The Company adopted this guidance on *January 1, 2018* and such adoption did *not* have a material impact on the Company's financial statements.

In *August 2016,* the FASB issued ASU *No. 2016-15,* Statement of Cash Flows (Topic *230*): Classification of Certain Cash Receipts and Cash Payments. This update clarifies how certain cash receipts and cash payments are presented and classified in the statement of cash flows. This ASU is effective for public business entities for fiscal years beginning after *December 15, 2017,* and for interim periods therein with early adoption permitted and must be applied retrospectively to all periods presented. The Company adopted this guidance on *January 1, 2018* and such adoption did *not* have a material impact on the Company's financial statements.

In *November 2016,* the FASB issued ASU *No. 2016-18,* Statement of Cash Flows (Topic *230*): Restricted Cash (a consensus of the FASB Emerging Issues Task Force). ASU *2016-18* requires that a statement of cash flows explain the change during the period in the total of cash, cash equivalents, and amounts generally described as restricted cash or restricted cash equivalents. Therefore, amounts generally described as restricted cash and restricted cash equivalents should be included with cash and cash equivalents when reconciling the beginning-of-period and end-of-period total amounts shown on the statement of cash flows. ASU *2016-18* is effective for all interim and annual reporting periods beginning after *December 15, 2017.* The Company adopted this guidance on *January 1, 2018* and such adoption did *not* have a material impact on the Company's financial statements.

Pending Adoption:

In *February 2016,* the FASB issued ASU *No. 2016-02* Leases (Topic *842*). Topic *842* amends a number of aspects of lease accounting, including requiring lessees to recognize leases with a term greater than *one* year as a right-of-use asset and corresponding liability, measured at the present value of the lease payments. In *July,* the FASB issued supplemental adoption guidance and clarification to Topic *842* within ASU *No. 2018-10,* Codification Improvements to Topic *842,* Leases and ASU *No. 2018-11,* Leases (Topic *842*): Targeted Improvements. The guidance will become effective for us beginning in the *first* quarter of *2019* and is required to be adopted using a modified retrospective approach.

The Company has evaluated the impact of the adoption of these standards on *January 1, 2019,* and anticipates recognition of an asset and a corresponding liability related to the lease on the balance sheet of approximately *$1.8* million with *no* material impact to the statements of operations and comprehensive loss. The Company plans to elect the practical expedients upon transition that will retain the lease classification and initial direct costs for any leases that existed prior to the adoption of these new standards.

In *June 2018,* the FASB issued ASU *No. 2018-07,* Compensation-Stock Compensation (Topic *718*): Improvements to Nonemployee Share-Based Payment Accounting, which expands the scope of Topic *718* to include share based payment transactions for acquiring goods and services from nonemployees and applies to all share-based payment transactions in which a grantor acquires goods or services to be used or consumed in a grantor's own operations by issuing share-based payment awards. Topic *718* does *not* apply to share-based payments used to effectively provide (*1*) financing to the issuer or (*2*) awards granted in conjunction with selling goods or services to customers as part of a contract accounted for under Topic *606.* This update is effective for public business entities for fiscal years beginning after *December 15, 2018,* including interim periods within that fiscal year. Early adoption is permitted, but *no* earlier than an entity's adoption date of Topic *606.* The Company has evaluated the impact of the adoption of these standards on *January 1, 2019* and does *not* anticipate that the adoption will have a material impact on its condensed financial statements.

3. **Fair Value Measurements**

The Company measures certain financial assets and liabilities at fair value on a recurring basis. Fair value is an exit price, representing the amount that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants. As such, fair value is a market-based measurement that should be determined based on assumptions that market participants would use in pricing an asset or a liability. A *three*-tier fair value hierarchy is established as a basis for considering such assumptions and for inputs used in the valuation methodologies in measuring fair value:

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

Level *2*—*Inputs* other than quoted prices included within Level *1* that are observable, either directly or indirectly, such as quoted prices for similar assets or liabilities; quoted prices in markets that are *not* active; or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities.

Level *3*—*Unobservable* inputs that are supported by little or *no* market activity and that are significant to the fair value of the assets or liabilities.

As of *December 31, 2018* and *2017,* cash equivalents were all categorized as Level *1* and consisted of money market funds. As of *December 31, 2018* and *2017,* there were *no* financial assets and liabilities categorized as Level *2.* During the year ended *December 31, 2018,* the Company issued warrants to purchase common stock categorized as Level *3.*. As of *December 31, 2017,* there were *no* financial assets or liabilities categorized as Level *3.* There were *no* transfers between fair value hierarchy levels during the years ended *December 31, 2018* and *2017.*

4. **Inventories**

Inventories consisted of the following (in thousands):

	December 31,	
	2018	**2017**
Raw materials	$*1,162*	$*1,286*
Work-in-process	*158*	-
Finished products	*2,102*	*3,009*
Total inventories	$*3,422*	$*4,295*

5. **Property and Equipment, Net**

Property and equipment, net, consisted of the following (in thousands):

	December 31,	
	2018	**2017**
Computer software	$*124*	$*248*
Computer equipment	*197*	*717*
Machinery and equipment	*1,784*	*3,351*
Furniture and fixture	*78*	*517*
Leasehold improvements	*326*	*638*
Equipment held by customers	*2,718*	*2,997*
	5,227	*8,468*
Less: Accumulated depreciation and amortization	*(3,155)*	*(5,564)*
Add: Construction-in-progress	*6*	*46*
	$*2,078*	$*2,950*

Depreciation expense for the years ended *December 31, 2018* and *2017,* was *$934,000* and *$1,476,000,* respectively. Property and equipment includes certain equipment that is leased to customers and located at customer premises. The Company retains the ownership of the equipment held for evaluation and has the right to remove the equipment if it is *not* being utilized according to expectations. Depreciation expense relating to the leased equipment held by customers of *$499,000* and *$735,000,* was recorded in cost of revenues during the years ended *December 31, 2018* and *2017,* respectively. The net book value of this equipment was *$1,399,000* and *$1,811,000* at *December 31, 2018* and *2017,* respectively.

6. **Accrued Expenses and Other Current Liabilities**

Accrued expenses and other current liabilities consisted of the following (in thousands):

	December 31,	
	2018	**2017**
Accrued litigation settlement	$-	$*1,760*
Accrued interest payable	-	*364*
Accrued sales tax	*435*	-
Accrued professional fees	*41*	*288*

Accrued travel expenses	*74*	*90*
Accrued product warranty costs	*272*	*390*
Accrued clinical trial costs	*111*	*57*
Accrued restructuring charge	*98*	*98*
Other accrued liabilities	*418*	*550*
	$*1,449*	$*3,597*

***7.* Borrowings**

CRG

On *September 22, 2015,* the Company entered into a Term Loan Agreement (the "Loan Agreement") with CRG under which, subject to certain conditions, the Company had the right to borrow up to *$50,000,000* in principal amount from CRG on or before *March 29, 2017.* The Company borrowed *$30,000,000* on *September 22, 2015.* The Company borrowed an additional *$10,000,000* on *June 15, 2016* under the Loan Agreement. The Company would have been eligible to borrow an additional *$10,000,000,* on or prior to *March 29, 2017,* upon achievement of certain revenue milestones, among other conditions, but those milestones were *not* achieved.

On *October 28, 2016,* the Company and CRG amended the Loan Agreement to reduce the minimum revenue that the Company was required to achieve in *2016* to *$18,000,000.* On *February 14, 2018,* the Company and CRG further amended the Loan Agreement concurrent with the conversion of *$38,000,000* of the principal amount of the senior secured term loan (plus *$3,800,000* in back-end fees and prepayment premium applicable thereto) into a newly authorized Series A convertible preferred stock (see Note *7,* below). For the year ended *December 31, 2018,* the *$3,800,000* was accounted for in the statement of operations and comprehensive loss as interest expense.

Under the Loan Agreement, as in effect prior to amendment, the *first sixteen* quarterly payments were to be interest only payments, and the last *eight* quarterly payments were to be equal installments in which interest and principal amounts would be paid. Interest is calculated at a fixed rate of *12.5%* per annum. The Company makes quarterly payments of interest only in arrears commencing on *September 30, 2015.* During the interest only period, the Company had the right to elect to make the *12.5%* interest payment by making a cash payment for *8.5%* per annum of interest and making a payment-in-kind ("PIK") for the remaining amount, for which the *4.0%* per annum of interest would be added to the outstanding principal amount of the borrowings. To date, the Company has elected the PIK interest option to the extent available and has made a cash payment for the remaining amount. Principal is repayable in *eight* equal quarterly installments during the final *two* years of the term. Under the original Loan Agreement, all unpaid principal, and accrued and unpaid interest, was to be due and payable in full on *September 30, 2021.*

The Company *may* voluntarily prepay the borrowings in full, with a prepayment premium beginning at *5.0%* and declining by *1.0%* annually thereafter, with *no* premium being payable if prepayment occurs after the *fifth* year of the loan. Each tranche of borrowing required the payment, on the borrowing date, of a financing fee equal to *1.5%* of the borrowed loan principal, which is recorded as a discount to the debt. In addition, a facility fee equal to *7.0%* of the amounts borrowed plus any PIK was to be payable at the end of the term or when the borrowings are repaid in full. A long-term liability is being accreted using the effective interest method for the facility fee over the term of the Loan Agreement with a corresponding discount to the debt. The borrowings are collateralized by a security interest in substantially all of the Company's assets. The Loan Agreement requires that the Company adheres to certain affirmative and negative covenants, including financial reporting requirements, certain minimum financial covenants for pre-specified liquidity and revenue requirements and a prohibition against the incurrence of indebtedness, or creation of additional liens, other than as specifically permitted by the terms of the Loan Agreement. In particular, the covenants of the original Loan Agreement included a covenant that the Company maintain a minimum of *$5,000,000* of cash and certain cash equivalents, and the Company had to achieve minimum revenue of *$7,000,000* in *2015, $23,000,000* in *2016, $40,000,000* in *2017, $50,000,000* in *2018, $60,000,000* in *2019* and *$70,000,000* in *2020* and in each year thereafter, as applicable. If the Company fails to meet the applicable minimum revenue target in any calendar year, the Loan Agreement provides the Company with a cure right if it prepays a portion of the outstanding principal equal to *2.0* times the revenue shortfall. In addition, the Loan Agreement prohibits the payment of cash dividends on the Company's capital stock and also places restrictions on mergers, sales of assets, investments, incurrence of liens, incurrence of indebtedness and transactions with affiliates. CRG *may* accelerate the payment terms of the Loan Agreement upon the occurrence of certain events of default set forth therein, which include the failure of the Company to make timely payments of amounts due under the Loan Agreement, the failure of the Company to adhere to the covenants set forth in the Loan Agreement, the insolvency of the Company or upon the occurrence of a material adverse change.

On *January 24, 2018,* we entered into a waiver agreement (the "Waiver") with CRG. The Waiver provided for the waiver of the *$5,000,0000* minimum liquidity financial covenant and reduced it to *$2,500,000* for the period beginning *January 1, 2018* through *February 28, 2018,* as required under the terms of the Loan Agreement and waived any event of default resulting from non-compliance with the *$5,000,000* minimum liquidity financial covenant.

On *February 14, 2018,* the Company entered into Amendment *No. 2* to the Loan Agreement to, among other things:

extend the interest only payment period and the period during which the Company *may* elect to pay a portion of the interest in PIK interest payments through *June 30, 2021;*
provide for a *15%* facility fee to be paid on the maturity date;
permit the Company to make the entire interest payment for payment dates in *2018* and *2019* in PIK interest payments, provided *no* default has occurred and is continuing;
extend the maturity date to *June 30, 2023;*
modify certain of the covenants, including the indebtedness covenant, lien covenant and restricted payments covenant, to eliminate or modify permitted exceptions to the restrictions in those covenants;
modify the financial covenants to reduce the minimum liquidity requirement to *$3,500,000* at all times, to eliminate the minimum revenue requirements for *2018* and *2019,* and to reduce the minimum revenue requirements to *$15,000,000* million for *2020, $20,000,000* for *2021* and *$25,000,000* for *2022;* and
provide CRG with board observer rights.

As of *December 31, 2018,* the Company was in compliance with all applicable covenants under the Loan Agreement.

As of *December 31, 2018,* principal and PIK payments under the Loan Agreement were as follows (in thousands):

Period Ending December 31,	Principal and PIK Loan Repayments
2019	$ —
2020	—
2021	—
2022	—
2023 and after	*2,000*
	2,000
Add: PIK	*6,243*
	8,243
Less: Amount representing debt financing costs	*(757*)
Borrowings, as of December 31, 2018	$ *7,486*

Contemporaneously with the execution of the Loan Agreement in *September 2015,* the Company entered into a Securities Purchase Agreement (the "CRG Purchase Agreement") with CRG which allowed it to purchase up to *$5,000,000* of the Company's common stock. CRG purchased *8,705* shares of common stock on *September 22, 2015* at a price of *$559.64* per share, which is the *10*-day average of closing prices of the Company's common stock ending on *September 21, 2015.* The closing price on *September 22, 2015* was *$558.80* yielding a *$0.84* per share premium. Both the premium and the issuance costs were allocated to the borrowings under Loan Agreement and the common stock purchase under the CRG Purchase Agreement based on the relative fair values of each security. The portion of the premium allocated to the borrowings is being amortized over the term of the Loan Agreement. Pursuant to the CRG Purchase Agreement, the Company filed a shelf registration statement covering, among other things, the resale of the shares sold to CRG and must comply with certain affirmative covenants during the time that such registration statement remains in effect.

In connection with the initial drawdown under the Loan Agreement, the Company recorded a debt discount of *$876,000* as contra-debt. The debt discount comprised financing fees of *$450,000,* paid directly to CRG, and an allocation of the other costs directly attributable to the Loan Agreement and CRG Securities Purchase Agreement of *$541,000* net of the common stock premium of *$115,000* based on the relative fair values of each security. In connection with the *June 2016* drawdown under the Loan Agreement in *February 2018,* the Company recorded a debt discount of *$275,000* which comprised financing fees of *$150,000,* paid directly to CRG, and other costs directly attributable to the Loan Agreement with CRG of *$125,000.* Concurrent with the Amendment *No.2* to the Loan Agreement in *February 2018,* the Company recorded an additional debt discount of *$154,000* of issuance costs. The debt discount is being amortized as non-cash interest expense using the effective interest method over the term of the Loan Agreement. As of *December 31, 2018* and *2017,* the balance of the aggregate debt discount was approximately *$757,000* and *$716,000,* respectively. The Company's interest expense associated with the amortization of debt

discount amounted to *$117,000* and *$203,000* during the years ended *December 31, 2018* and *2017,* respectively.

As noted in Note *1* to these financial statements, due to the substantial doubt about the Company's ability to continue operating as a going concern and the material adverse change clause in the CRG Loan Agreement, the entire amount of borrowings at *December 31, 2018* and *2017* has been classified as current in these financial statements. CRG has *not* invoked the material adverse change clause.

***8*. Commitments and Contingencies**

Lease Commitments

The Company's operating lease obligations primarily consist of leased office, laboratory, and manufacturing space under a non-cancelable operating lease that expires in *November 2019.* The lease agreement includes a renewal provision allowing the Company to extend this lease for an additional period of *three* years. In addition to the minimum future lease commitments presented below, the lease requires the Company to pay property taxes, insurance, maintenance, and repair costs. The lease includes a rent holiday concession and escalation clauses for increased rent over the lease term. Rent expense is recognized using the straight-line method over the term of the lease. The Company records deferred rent calculated as the difference between rent expense and the cash rental payments. In connection with the facility lease, the landlord also provided incentives of *$369,000* to the Company in the form of leasehold improvements. These amounts were reflected as deferred rent and were amortized as a reduction to rent expense over the original term of the Company's operating lease. Rent expense was approximately *$1,015,000* and *$1,833,000* for the years ended *December 31, 2018* and *2017,* respectively. Deferred rent was insignificant for all years presented.

On *October 19, 2017,* the Company entered into an agreement to sublease *one* of its facilities. The sublease agreement commenced on approximately *December 1, 2017* and is scheduled to expire on *November 15, 2019* (which is *15* days prior to the expiration of the facility lease). The sublessee pays a base rent of *$79,950* per month, increasing to a base rent of *$82,410* per month as of *December 1, 2018.* In addition to the base rent, the sublessee pays the Landlord's operating expenses and property taxes due and payable with respect to the subleased facility.

The future aggregate minimum lease payments, net of sublease income, as of *December 31, 2018,* amount to *$899,000,* due within the year ending *December 31, 2019.*

Indemnification

In the normal course of business, the Company enters into contracts and agreements that contain a variety of representations and warranties and *may* provide for indemnification of the counterparty. The Company's exposure under these agreements is unknown because it involves claims that *may* be made against it in the future, but have *not* yet been made. To date, the Company has *not* been subject to any claims or been required to defend any action related to its indemnification obligations.

The Company indemnifies each of its directors and officers for certain events or occurrences, subject to certain limits, while the director is or was serving at the Company's request in such capacity, as permitted under Delaware law and in accordance with its certificate of incorporation and bylaws. The term of the indemnification period lasts as long as a director *may* be subject to any proceeding arising out of acts or omissions of such director in such capacity. The maximum amount of potential future indemnification is unlimited; however, the Company currently holds director liability insurance. This insurance allows the transfer of risk associated with the Company's exposure and *may* enable it to recover a portion of any future amounts paid. The Company believes that the fair value of these indemnification obligations is minimal. Accordingly, it has *not* recognized any liabilities relating to these obligations for any period presented.

Legal Proceedings

Except as set forth below, we are *not* involved in any pending legal proceedings that we believe could have a material adverse effect on our financial condition, results of operations or cash flows. From time to time we *may* be involved in legal proceedings or investigations, which could harm our reputation, business and financial condition and divert the attention of our management from the operation of our business.

Between *May 22, 2017* and *May 25, 2017, three* class actions were filed in the Superior Court of the State of California, County of San Mateo, or the State Court, against us and certain of our officers and directors. The underwriters of our IPO in *January 2015* are also named as defendants. The actions were captioned Grotewiel v. Avinger, Inc., et al., *No. 17*-CIV-*02240,* Gonzalez v. Avinger, Inc., et al., *No. 17*-CIV-*02284,* and Olberding v. Avinger, Inc., et al., *No. 17*-CIV-*02307.* These lawsuits allege that the registration statement for our IPO made false and misleading statements and omissions in violation of the Securities Act of *1933.* Plaintiffs seek to represent a class of purchasers of our common stock in and/or traceable to our IPO. Plaintiffs seek, among other things, unspecified compensatory damages, interest, costs, recission, and attorneys' fees. On *June 12, 2017,* defendants removed these actions to the United States District Court for the Northern District of California, or Federal Court.

On *June 22, 2017,* and *June 23, 2017,* plaintiffs Olberding and Gonzalez moved to remand their cases to the State Court. Defendants opposed these motions. On *July 21, 2017,* the Federal Court granted the motions to remand the Olberding and Gonzalez actions to the State Court. On *August 9, 2017,* the State Court consolidated the Olberding and Gonzalez actions under the caption Gonzalez v. Avinger, Inc., et al., *No. 17*-CIV-*02284,* or State Action. On *September 22, 2017,* an amended complaint was filed in the State Action. On *October 31, 2017,* the parties in the State Action stipulated to a stay of proceedings until judgment is entered in the federal Grotewiel action, or Federal Action. On *June 20, 2018,* the State Court dismissed the State Action pursuant to the proposed settlement described below.

On *October 11, 2017,* the Federal Court appointed a lead plaintiff and approved the selection of a lead counsel in the Federal Action. On *November 21, 2017,* an amended complaint was filed in the Federal Action. Defendants filed a motion to dismiss that complaint on *January 26, 2018.* On *March 19, 2018,* plaintiff in the Federal Action filed a further amended complaint, on behalf of a class of purchasers of our common stock in and/or traceable to our IPO, as well as purchasers of our common stock during the period *January 30, 2015,* to *April 10, 2017.*

The Company and its directors believe that the foregoing lawsuits were without merit; however, in the interest of avoiding the cost and disruption of continuing to defend against these lawsuits, the Company entered into a settlement of the actions. The settlement is for a total of *$5* million. The Company's total contribution to the settlement fund is *$1.76* million, which the Company paid in *March 2018.* On *October 24, 2018,* the court approved the settlement.

***9*. Restructuring Charges and Expenses**

In *April 2017,* the Company undertook an organizational realignment which included a reduction in force, lowering its total headcount by approximately *33%.* Accordingly, the Company recorded a restructuring charge of approximately *$519,000,* relating to severance related costs at that time. As of *December 31, 2018,* all of the total severance related costs related to the *April 2017* termination of *44* employees had been paid.

In *September 2017,* the Company effected a cost reduction plan, which included a company-wide reduction in force, lowering its total headcount by *24* employees. The Company recorded a restructuring charge of approximately *$416,000,* relating to severance related costs at that time. In *October 2017,* the Company subleased *one* of its facilities and ceased to use the facility as part of the cost reduction plan. The Company recorded a restructuring charge of approximately *$388,000* relating to the cost to exit the facility. As of *December 31, 2018,* all of the severance related costs related to the termination of *24* employees had been paid. As of *December 31, 2018* and *2017, $98,000* of the total costs to exit the facility was included within accrued expenses and other current liabilities.

***10*. Stockholders' Equity (Deficit)**

Convertible Preferred Stock

As of *December 31, 2018,* the Company's certificate of incorporation, as amended and restated, authorizes the Company to issue up to *5,000,000* shares of convertible preferred stock with *$0.001* par value per share, of which *45,671* shares were issued and outstanding.

Series A Convertible Preferred Stock

On *February 14, 2018,* the Company entered into a Series A Purchase Agreement with CRG, pursuant to which it agreed to convert *$38,000,000* of the outstanding principal amount of its senior secured term loan (plus *$3,800,000* in back-end fees, accrued interest, debt discount and prepayment premium applicable thereto), totaling *$42.8* million, into a newly authorized Series A convertible preferred stock (the "Series A preferred stock"). The Series A preferred stock is initially convertible into *20,900,000* shares of common stock subject to certain limitations contained in the Series A Purchase Agreement. Under the terms of the Series A Purchase Agreement, the holders of Series A preferred stock are entitled to receive annual accruing dividends at a rate of *8%,* payable in additional shares of Series A

preferred stock or cash, at the Company's option. The shares of Series A preferred stock have *no* voting rights and rank senior to all other classes and series of the Company's equity in terms of repayment and certain other rights. The Series A preferred stock and any of the Company's common stock issued upon conversion of the Series A preferred stock are subject to a lockup agreement through *February 14, 2019.* As of *December 31, 2018, 41,800* shares of Series A preferred stock were outstanding. The Series A preferred stock accrued dividends through *December 31, 2018* of approximately *$2.9* million.

Series B Convertible Preferred Stock

On *February 16, 2018,* the Company completed a public offering of *17,979* shares of Series B convertible preferred stock (the "Series B preferred stock"). As a result, the Company received net proceeds of approximately *$15.5* million after underwriting discounts, commissions, legal and accounting fees. The Series B preferred stock has a liquidation preference of *$0.001* per share, full ratchet price based anti-dilution protection, has *no* voting rights and is subject to certain ownership limitations. The Series B preferred stock is immediately convertible at the option of the holder, has *no* stated maturity, and does *not* pay regularly stated dividends or interest. As of *December 31, 2018, 16,278* shares of Series B preferred stock had been converted into *8,139,000* shares of common stock and *1,701* shares of Series B preferred stock remained outstanding.

The Company evaluated the Series B convertible preferred stock issuance in accordance with the provisions of ASC *815,* Derivatives and Hedging, including consideration of embedded derivatives requiring bifurcation. The issuance of the convertible preferred stock could generate a beneficial conversion feature ("BCF"), which arises when a debt or equity security is issued with an embedded conversion option that is beneficial to the investor or in the money at inception because the conversion option has an effective conversion price that is less than the market price of the underlying stock at the commitment date. The Company recognized the BCF by allocating the intrinsic value of the conversion option, which is the number of shares of common stock available upon conversion multiplied by the difference between the effective conversion price per share and the fair value of common stock per share on the commitment date, to additional paid-in capital, resulting in a discount on the convertible preferred stock. As the Series B convertible preferred stock *may* be converted immediately, the Company recognized a BCF of *$5.2* million as a deemed dividend in the statements of operations as of *February 16, 2018.* This *one*-time, non-cash charge impacted net loss attributable to common stockholders and net loss per share attributable to common stockholders for the year ended *December 31, 2018.*

Series C Convertible Preferred Stock

On *November 1, 2018,* the Companycompleted a public offering of *7,285,000* shares of common stock and *8,586* shares of Series C convertible preferred stock (the "Series C preferred stock"). As a result, we received net proceeds of approximately *$10.2* million after underwriting discounts, commissions, legal and accounting fees. Upon any dissolution, liquidation or winding up, whether voluntary or involuntary, holders of Series C preferred stock will be entitled to receive distributions out of our assets, whether capital or surplus, of an amount equal to *$0.001* per share of Series C preferred stock before any distributions shall be made on the common stock but after distributions shall be made on any outstanding Series A preferred stock and any of our existing or future indebtedness. As of *December 31, 2018, 6,416* shares of Series B preferred stock had been converted into *16,040,000* shares of common stock and *2,170* shares of Series C preferred stock remained outstanding. The Series C preferred stock has *no* voting rights.

Common Stock

At *December 31, 2018,* the Company's certificate of incorporation, as amended and restated, authorizes the Company to issue up to *100,000,000* shares of common stock with *$0.001* par value per share, of which *34,921,999* shares were issued and outstanding.

Common Stock Warrants

In connection with the issuance of the Company's Series E convertible preferred stock in *September 2014* through *January 2015,* the Company issued warrants to purchase an aggregate of up to the number of shares of common stock equal to *50%* of the number of shares of the Company's Series E Convertible preferred stock purchased by such investor. As of *December 31, 2018* there were *53,803* warrants outstanding with an exercise price of *$504.00* per share. These warrants expire upon the earlier of *September 2, 2019* or upon consummation of a change in control of the Company.

On *February 16, 2018,* in connection with the Company's completed public offering of Series B preferred stock, the Company issued *two* series of warrants that together provide for the purchase, by the investors in that offering, of an aggregate of *17,979,000* shares of common stock (the "Series B Warrants"). Each share of Series B preferred stock is accompanied by *one* warrant to purchase common stock at *$0.40* per share that expires on the *seventh* anniversary of the date of issuance to purchase up to *500* shares of common stock and *one* warrant that expires on the earlier of (i) the *seventh* anniversary of the date of issuance or (ii) the *60th* calendar day following the receipt and announcement of FDA clearance of the Company's Pantheris below-the-knee device (or the same or similar product with a different name) to purchase up to *500* shares of common stock; provided, however, if at any time during such *60*-day period the volume weighted average price for any trading day is less than the then effective exercise price, the termination date

shall be extended to the *seven* year anniversary of the initial exercise date. The Company assessed the Series B Warrants under ASC *480* and determined that the Series B Warrants were outside the scope of ASC *480.* The Company next assessed the Series B Warrants under ASC *815.* Under the related guidance, a reporting entity shall *not* consider a contract to be a derivative instrument if the contract is both (*1*) indexed to the entity's own stock and (*2*) classified in stockholders' equity. The Company determined that the Series B Warrants were indexed to the Company's stock, as the agreements do *not* contain any exercise contingencies and the Series B Warrants' settlement amount equals the difference between the fair value of the Company's common stock price and the Series B Warrant strike price. The Company also assessed the classification as stockholders' equity and determined the Series B Warrants met all of the criteria for classification as equity under ASC *815.* Based on this analysis, the Company determined that the Series B Warrants should be classified as equity. During the year ended *December 31, 2018,* certain of the Series B Warrants were exercised and *290,500* shares of the Company's common stock were issued to the warrant holders in return. As of *December 31, 2018,* Series B Warrants to purchase an aggregate of *17,688,500* shares of common stock remain outstanding.

On *July 13, 2018,* in connection with the Company's completed public offering of *2,166,180* shares of common stock, the Company issued warrants that provide for the purchase of *1,083,091* shares of common stock at *$1.58* per share. Each share of common stock is accompanied by *one* half of *one* warrant that expires on the *third* anniversary of the date of issuance. The Company assessed these warrants under ASC *480* and determined that they were outside the scope of ASC *480.* The Company next assessed the warrants under ASC *815.* Under the related guidance, a reporting entity shall *not* consider a contract to be a derivative instrument if the contract is both (*1*) indexed to the entity's own stock and (*2*) classified in stockholders' equity. The Company determined that the warrants were indexed to the Company's stock. The Company also assessed the classification as stockholders' equity and determined the warrants met all of the criteria for classification as equity under ASC *815.* Based on this analysis, the Company determined that the warrants should be classified as equity. As of *December 31, 2018* all *1,083,091* of these warrants remain outstanding.

On *November 1, 2018,* in connection with the Company's completed public offering of *7,285,000* shares of common stock and *8,586* shares of Series C convertible preferred stock, the Company issued warrants to provide for the purchase of *28,750,000* shares of common stock. Each share of common stock is accompanied by *one* warrant to purchase *one* share of common stock at *$0.40* per share. These warrants expire on the 5th anniversary of the date of issuance. Each share of preferred stock is accompanied by *one* warrant to purchase *2,500* shares of common stock. The Company assessed these warrants under ASC *480* and determined that they were outside the scope of ASC *480.* The Company next assessed the warrants under ASC *815.* Under the related guidance, a reporting entity shall *not* consider a contract to be a derivative instrument if the contract is both (*1*) indexed to the entity's own stock and (*2*) classified in stockholders' equity. The Company determined that the warrants were indexed to the Company's stock. The Company also assessed the classification as stockholders' equity and determined the warrants met all of the criteria for classification as equity under ASC *815.* Based on this analysis, the Company determined that the warrants should be classified as equity. As of *December 31, 2018* all *28,750,000* of these warrants remain outstanding.

The Company accounted for the common stock warrants issued during the year ended *December 31, 2018* as issuance costs relating to the respective equity financing, and used the Black-Scholes method to estimate their fair value. The fair value of the common stock warrants issued in *November 2018* is *not* significant. The assumptions used to estimate the fair value of the common stock warrants issued in *February 2018* are as follows:

Expected term (years)	*7*
Expected volatility	*55 %*
Risk-free interest rate	*2.0%*
Dividend rate	—

As of *December 31, 2018* and *December 31, 2017,* warrants to purchase an aggregate of *47,575,393* and *53,803* shares of common stock were outstanding, respectively.

Stock Plans

In *January 2015,* the Board of Directors adopted and the Company's stockholders approved the *2015* Equity Incentive Plan (*"2015* Plan"). The *2015* Plan replaced the *2009* Stock Plan (the *"2009* Plan") which was terminated immediately prior to consummation of the Company's IPO (collectively the "Plans.)" The *2015* Plan provides for the grant of incentive stock options ("ISOs") to employees and for the grant of nonstatutory stock options ("NSOs"), restricted stock, RSUs, stock appreciation rights, performance units and performance shares to employees, directors and consultants. Initially a total of *33,000* shares of common stock were reserved for issuance pursuant to the *2015* Plan. The shares reserved for issuance under the *2015* Plan included shares reserved but *not* issued under the *2009* Plan, plus any share awards granted under the *2009* Plan that expire or terminate without having been exercised in full or that are forfeited or repurchased. In addition, the number of shares available for issuance under the *2015* Plan includes an automatic

annual increase on the *first* day of each fiscal year beginning in fiscal *2016,* equal to the lesser of *42,250* shares, *5.0%* of the outstanding shares of common stock as of the last day of the immediately preceding fiscal year or an amount as determined by the Board of Directors. For fiscal *2018,* the common stock available for issuance under the *2015* Plan was increased by *41,674* shares of common stock. In addition, during fiscal *2018,* the Board of Directors approved an additional *3,000,000* shares of common stock for issuance under the *2015* Plan. The Company's stockholders approved this increase on *June 8, 2018.* As of *December 31, 2018, 126,686* shares were available for grant under the *2015* Plan.

Pursuant to the Plans, ISOs and NSOs *may* be granted with exercise prices at *not* less than *100%* of the fair value of the common stock on the date of grant and the exercise price of ISOs granted to a stockholder, who, at the time of grant, owns stock representing more than *10%* of the voting power of all classes of the stock of the Company, shall be *not* less than *110%* of the fair market value per share of common stock on the date of grant. The Company's Board of Directors determines the vesting schedule of the options. Options granted generally vest over *four* years and expire *ten* years from the date of grant.

Stock option activity under the Plans is set forth below:

	Number of Shares (in thousands)	Weighted Average Exercise Price	Weighted Average Remaining Contractual Life (in years)	Intrinsic Value (in thousands)
Balance at December 31, 2017	*76,645*	$ *291.73*		$ —
Options granted	*31,000*	$ *1.67*		
Options exercised	—	$ —		
Options expired	*(25,506)*	*272.58*		
Options forfeited	*(2,594)*	$ *349.37*		
Balance at December 31, 2018	*79,545*	$ *170.73*	*7.69*	$ —
Exercisable at December 31, 2018	*43,305*	$ *246.97*	*6.41*	—
Vested and expected to vest at December 31, 2018	*79,545*	$ *170.73*	*7.69*	$ —

Additional information related to the status of options as of *December 31, 2018* is summarized as follows:

Options Outstanding				Options Vested	
Exercise Price	Options Outstanding (in thousands)	Weighted Average Remaining Contractual Life	Weighted Average Exercise Price	Number Exercisable (in thousands)	Weighted Average Exercise Price
$ *1.67*	*31,000*	*9.44*	$ *1.67*	—	$ *1.67*
$ *20.40*	*50*	*8.56*	$ *20.40*	*17*	$ *20.40*
$ *82.00*	*7,983*	*8.21*	$ *82.00*	*6,793*	$ *82.00*

$*105.20*	*475*	*8.18*	$ *105.20*	*247*	$ *105.20*
$*142.00*	*688*	*7.84*	$ *142.00*	*688*	$ *142.00*
$*147.20*	*115*	*7.80*	$ *147.20*	*63*	$ *147.20*
$*162.00*	*70*	*0.44*	$ *162.00*	*70*	$ *162.00*
$*180.00*	*27,041*	*5.99*	$ *180.00*	*27,041*	$ *180.00*
$*198.00*	*251*	*1.33*	$ *198.00*	*251*	$ *198.00*
$*436.40*	*100*	*6.18*	$ *436.40*	*93*	$ *436.40*
$*440.40*	*234*	*7.44*	$ *440.40*	*234*	$ *440.40*
$*495.20*	*175*	*7.33*	$ *495.20*	*120*	$ *495.20*
$*504.00*	*1,037*	*2.57*	$ *504.00*	*1,037*	$ *504.00*
$*518.40*	*1,499*	*7.19*	$ *518.40*	*1,030*	$ *518.40*
$*519.60*	*3,005*	*7.17*	$ *519.60*	*2,365*	$ *519.60*
$*594.00*	*109*	*2.74*	$ *594.00*	*109*	$ *594.00*
$*608.40*	*107*	*6.58*	$ *608.40*	*95*	$ *608.40*
$*784.40*	*1,180*	*6.89*	$ *784.40*	*915*	$ *784.40*
$*810.00*	*3,793*	*7.22*	$ *810.00*	*1,861*	$ *810.00*
$*882.00*	*633*	*8.20*	$ *882.00*	*276*	$ *882.00*
	79,545	*7.69*	$ *247.03*	*43,305*	$ *246.97*

There were *no* options exercised during the year ended *December 31, 2018.* As of *December 31, 2018,* there was approximately *$430,000* of remaining unamortized stock-based compensation expense associated with unvested stock options, which will be expensed over a weighted average remaining service period of approximately *1.3* years. Because of the Company's net operating losses, the Company did *not* realize any tax benefits from share-based payment arrangements for the years ended *December 31, 2018* and *2017.*

The Company's RSUs generally vest annually over *three* or *four* years in equal increments. The Company measures the fair value of RSUs using the closing stock price of a share of the Company's common stock on the grant date and is recognized as expense on a straight-line basis over the vesting period of the award. A summary of all RSU activity is presented below:

	Number of Shares	Weighted Average Grant Date Fair Value	Weighted Average Remaining Contractual Term
Awards outstanding at December 31, 2017	*5,089*	$ *237.78*	*2.87*
Awarded	*2,977,536*	$ *1.50*	
Released	*(1,281)*	$ *273.97*	
Forfeited	*(40,682)*	$ *5.97*	
Awards outstanding at December 31, 2018	*2,940,662*	$ *1.73*	*3.09*

As of *December 31, 2018,* there was approximately *$4.3* million of remaining unamortized stock-based compensation expense associated with RSUs, which will be expensed over a weighted average remaining service period of approximately *2.5* years. The *2.9* million outstanding non-vested and expected to vest RSUs have an aggregate intrinsic value of approximately *$0.9* million. The Company used the closing market price of *$0.30* per share at *December 31, 2018,* to determine the aggregate intrinsic value for the RSUs outstanding at that date. For the years ended *December 31, 2018* and *2017,* the fair value of RSUs vested was approximately *$1,500* and *$97,000,* respectively. For the year ended *December 31, 2017,* the weighted average grant date fair value of RSUs granted was *$114.41.*

2018 **Officer and Director Share Purchase Plan**

On *August 22, 2018,* the Board of Directors of the Company approved the adoption of an Officer and Director Share Purchase Plan ("ODPP"), which allows executive officers and directors to purchase shares of our common stock at fair market value in lieu of salary or, in the case of directors, director fees. Eligible individuals *may* voluntarily participate in the ODPP by authorizing payroll deductions or, in the case of directors, deductions from director fees for the purpose of purchasing common stock. Elections to participate in the ODPP *may* only be made during open trading windows under our insider trading policy when the participant does *not* otherwise possess material non-public information concerning the Company. The Board of Directors has authorized *200,000* shares to be made available for purchase by officers and directors under the ODPP. Common stock issued under the ODPP during the year ended *December 31, 2018* totaled *44,012* shares.

***11*. Stock-Based Compensation**

Stock-based compensation for the Company includes amortization related to all stock options, RSUs and shares issued under the ODPP and the Company's ESPP, based on the grant-date estimated fair value. The Company estimates the fair value of stock options and shares issued under the ESPP on the date of grant using the Black-Scholes option-pricing model. The Black-Scholes model determines the fair value of stock-based payment awards based on the fair market value of the Company's common stock on the date of grant and is affected by assumptions regarding a number of complex and subjective variables. These variables include, but are *not* limited to, the fair value of the Company's common stock, and the volatility over the expected term of the awards. The Company has opted to use the "simplified method" for estimating the expected term of options, whereby the expected term equals the arithmetic average of the vesting term and the original contractual term of the option. Prior to the Company's IPO in *January 2015,* due to the Company's limited operating history and a lack of company specific historical and implied volatility data, the Company based its estimate of expected volatility on the historical volatility of a group of similar companies that are publicly traded. When selecting these public companies on which it has based its expected stock price volatility, the Company selected companies with comparable characteristics to it, including enterprise value, stage of development, risk profile, and position within the industry as well as selecting companies with historical share price information sufficient to meet the expected life of the stock-based awards. The historical volatility data was computed using the daily closing prices for the selected companies' shares during the equivalent period of the calculated expected term of the share-based payments.. The Company will continue to analyze the historical stock price volatility and expected term assumptions as more historical data for the Company's common stock becomes available. The risk-free rate assumption is based on the U.S. Treasury instruments with maturities similar to the expected term of the Company's stock options. The expected dividend assumption is based on the Company's history of *not* paying dividends and its expectation that it will *not* declare dividends for the foreseeable future.

As noncash stock-based compensation expense recognized in the financial statements is based on awards ultimately expected to vest, it has been reduced for estimated forfeitures. Effective *January 1, 2017,* the Company adopted ASU *2016-09* and elected to recognize forfeitures when they occur using a modified retrospective approach. Prior to *January 1, 2017,* the Company estimated a forfeiture rate for its stock options and RSUs based on an analysis of its actual forfeitures based on actual forfeiture experience and other factors. Forfeitures are estimated at the time of grant and revised, if necessary, over the service period to the extent that actual forfeitures differ, or are expected to differ, from prior estimates. Forfeitures are estimated based on estimated future employee turnover and historical experience.

Total noncash stock-based compensation expense relating to the Company's stock options, ODPP, ESPP and RSUs recognized, before taxes, during the years ended *December 31, 2018* and *2017,* is as follows (in thousands):

	Year Ended December 31,	
	2018	**2017**
Cost of revenues	$*97*	$*269*
Research and development expenses	*547*	*1,766*
Selling, general and administrative expenses	*2,436*	*2,931*
	$*3,080*	$*4,966*

***12*. Income Taxes**

For the years ended *December 31, 2018* and *2017,* the Company's provision for income taxes consisted of *zero* state income tax expense. A reconciliation of the statutory U.S. federal rate to the Company's effective tax rate is as follows (in thousands):