Penumbra

2020 PROXY STATEMENT

2019 ANNUAL REPORT

Penumbra

April 23, 2020

Dear Fellow Stockholders:

I write this annual shareholder letter to you during the middle of an extremely challenging time in the world—the global COVID-19 pandemic. The impact on our society, health, and economy is of historic proportions. While Penumbra has handled challenging times in our history, we have never faced anything like this. Our culture and our mission have been important guides in helping us navigate this unprecedented period.

Before I share some of the specific actions our company has taken since early March, and how we are preparing the company for the new environment that will likely emerge as a result of this pandemic, I want to share a few important updates from 2019 that show how Penumbra entered 2020 before the beginning of the COVID-19 outbreak. From a financial metrics standpoint, 2019 was an exceptional year. Our total annual revenues were $547.4 mm, which represented growth of 23.0% over 2018. We ended the year generating $47.5 mm in operating income and ended with a strong balance sheet with over $189 mm in cash, cash equivalents and marketable investments and no debt.

Importantly, we made great progress in 2019 towards our mission of helping more and more patients around the world. On December 3rd, we held our first Investor Day during which we outlined several key themes that have been important to Penumbra's growth and success since our IPO in 2015. These same themes will remain key to our future over the next several years.

First, innovation.

Since 2015 we have launched over 18 new products. Our innovation-driving engine is getting more powerful every year. Last year, the greatest demonstration of this was the launch of Penumbra JET™7 with XTRA FLEX technology. This latest stroke technology has been a significant step forward for Penumbra, and for the field. In addition, we are confident in a strong upcoming pipeline and cadence of new technology launches in 2020 and beyond.

Second, patient markets.

We expanded the number of patients that we can help in 2019. Within our vascular business, we gained FDA clearance for our Indigo® System for the treatment of pulmonary embolism. With the inclusion of pulmonary embolism, we believe that there are approximately 425,000 addressable patients each year in the United States that can be treated with our Indigo System. By comparison, this represents over twice the addressable patient opportunity in ischemic stroke in the United States.

In addition, we expanded the global reach of our neuro business in 2019. It was the first full year of launch in China for the Penumbra System® for ischemic stroke. We see vast opportunities in bringing our latest, cutting edge technologies to the rest of the world.

Third, new medical conditions.

We are continually looking to pursue the development of new medical conditions. As an example, last year we announced the FDA clearance of the REAL™ System for neuro rehabilitation, the next milestone in what has been a multiyear development project at Penumbra. In 2019 we began growing a dedicated team to support the ongoing development and commercial launch of the REAL System. This has been an exciting new endeavor for our company. It will allow us to work more deeply with physicians and providers and to bring better solutions to potentially millions of patients in aftercare. This is a great example of how we look to 'do things that matter' and grow our company.

In summary, we entered 2020 with a broader business and greater growth opportunities than ever before.

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Penumbra

As 2020 evolved, the COVID-19 outbreak became a more and more urgent issue. Since early March, we have taken a number of specific actions in response to the COVID-19 pandemic, many of which are discussed on our website (https://www.penumbrainc.com/covid-19-pandemic/). Penumbra's talented leadership team has played an important role in the quick and decisive actions that we were able to take early on in this crisis. Our actions have been guided by our commitment to our employees and their families, as well our commitment to our customers, suppliers, and business partners—all of which allow us to serve our first priority, patients.

While many actions are yet to come on how we will 'return' to work and operate in this new environment, I am proud that we have already taken significant structural actions that can help us in the future. In particular, we have reorganized our manufacturing operations to keep our employees safe while producing our critical products. In addition, more than twenty senior executives have voluntarily taken substantial salary reductions during this time. It has taken significant time and resources to grow the talent and capabilities within this organization, and our leadership team has decided to make their own personal sacrifices to protect our employees and ensure that we can invest in the areas that will allow us to emerge from this crisis with strength and a deepened commitment to Penumbra and its mission.

It is an honor to work with such an extraordinary group of people and I look forward to the important work ahead.

Thank you for your ongoing support of Penumbra.

Sincerely,

Adam Elsesser
Chairman and Chief Executive Officer

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Forward-Looking Statements

Except for historical information, certain statements in this report are forward-looking in nature and are subject to risks, uncertainties and assumptions about us. Our business and operations are subject to a variety of risks and uncertainties and, consequently, actual results may differ materially from those projected by any forward-looking statements. Factors that could cause actual results to differ from those projected include, but are not limited to: the impact of the COVID-19 pandemic on our business, results of operations and financial condition; failure to sustain or grow profitability or generate positive cash flows; failure to effectively introduce and market new products; delays in product introductions; significant competition; inability to further penetrate our current customer base, expand our user base and increase the frequency of use of our products by our customers; inability to achieve or maintain satisfactory pricing and margins; manufacturing difficulties; permanent write-downs or write-offs of our inventory; product defects or failures; unfavorable outcomes in clinical trials; inability to maintain our culture as we grow; fluctuations in foreign currency exchange rates; and potential adverse regulatory actions. These risks and uncertainties, as well as others, are discussed in greater detail in our filings with the Securities and Exchange Commission, including our Quarterly Reports on Form 10-Q and our Annual Report on Form 10-K for the year ended December 31, 2019. There may be additional risks of which we are not presently aware or that we currently believe are immaterial which could have an adverse impact on our business. Any forward-looking statements are based on our current expectations, estimates and assumptions regarding future events and are applicable only as of the dates of such statements. We make no commitment to revise or update any forward-looking statements in order to reflect events or circumstances that may change.

PENUMBRA, INC.

NOTICE OF ANNUAL MEETING OF STOCKHOLDERS

TO BE HELD ON JUNE 3, 2020

April 23, 2020

Dear Stockholder:

You are cordially invited to attend the 2020 Annual Meeting of the Stockholders (the Annual Meeting) of Penumbra, Inc., a Delaware corporation (we, us, Penumbra or the Company). The Annual Meeting will be held on Wednesday, June 3, 2020 at 11:00 a.m. (Pacific Daylight Time), in building 1301 on the Company's campus at One Penumbra Place, Alameda, CA 94502 for the following purposes:

1. To elect the nominees for Class II director to serve until the 2023 annual meeting of stockholders and until their successors are duly elected and qualified;

2. To ratify the selection of Deloitte & Touche LLP as the independent registered public accounting firm for Penumbra for the fiscal year ending December 31, 2020;

3. To approve, on an advisory basis, the compensation of the Company's named executive officers; and

4. To conduct any other business properly brought before the Annual Meeting.

These items of business are more fully described in the proxy statement accompanying this Notice of Annual Meeting of Stockholders (the Proxy Statement).

The record date for the Annual Meeting is Wednesday, April 15, 2020 (the Record Date). Only stockholders of record at the close of business on the Record Date may vote at the Annual Meeting or any adjournment thereof. A complete list of such stockholders will be available for examination by any stockholder for any purpose germane to the Annual Meeting during ordinary business hours at the Company's principal executive offices at One Penumbra Place, Alameda, CA 94502 for a period of 10 days prior to the Annual Meeting.

In the event of a change in the time, date or location of the Annual Meeting, we will make an announcement, issue a press release or post information on the Investors section of our website at www.penumbrainc.com to notify stockholders, as appropriate. As a result of the evolving COVID-19 pandemic and government response, we may impose additional procedures or limitations on Annual Meeting attendees, or may decide to hold the Annual Meeting in a different location or solely by means of remote communication. If we take any such step, we will announce the decision in advance, and details on the change and how stockholders may participate in the Annual Meeting will be available on the Investors section of our website at www.penumbrainc.com. Information on or accessible through our website is not incorporated by reference in this Proxy Statement.

Important Notice Regarding the Availability of Proxy Materials for the Annual Meeting to be held on

June 3, 2020 at 11:00 a.m.
in building 1301 on the Company's campus at One Penumbra Place, Alameda, CA 94502

The Proxy Statement and annual report to stockholders are available at: www.proxyvote.com.

By Order of the Board of Directors

Johanna Roberts
Executive Vice President, General Counsel and Secretary
Alameda, California

ALL STOCKHOLDERS ARE CORDIALLY INVITED TO ATTEND THE ANNUAL MEETING IN PERSON. WHETHER OR NOT YOU EXPECT TO ATTEND THE ANNUAL MEETING, PLEASE COMPLETE, DATE, SIGN AND RETURN THE ACCOMPANYING PROXY CARD, OR VOTE OVER THE TELEPHONE OR INTERNET AS INSTRUCTED IN THESE MATERIALS, AS PROMPTLY AS POSSIBLE IN ORDER TO ENSURE YOUR REPRESENTATION AT THE ANNUAL MEETING. EVEN IF YOU HAVE VOTED BY PROXY, YOU MAY STILL VOTE IN PERSON IF YOU ATTEND THE ANNUAL MEETING. PLEASE NOTE, HOWEVER, THAT IF YOUR SHARES ARE HELD OF RECORD BY A BROKER, BANK OR OTHER NOMINEE AND YOU WISH TO VOTE AT THE ANNUAL MEETING, YOU MUST OBTAIN A PROXY ISSUED IN YOUR NAME FROM THAT RECORD HOLDER IN ORDER TO BE ENTITLED TO VOTE IN PERSON AT THE ANNUAL MEETING.

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Penumbra, Inc.
One Penumbra Place
Alameda, CA 94502

PROXY STATEMENT

FOR THE 2020 ANNUAL MEETING OF STOCKHOLDERS

QUESTIONS AND ANSWERS ABOUT THESE PROXY MATERIALS AND VOTING

Why did I receive a one-page notice in the mail regarding the Internet availability of proxy materials instead of a full set of proxy materials?

Pursuant to "Notice and Access" rules adopted by the Securities and Exchange Commission (the SEC), we have elected to provide access to our proxy materials over the Internet. Accordingly, we are sending an Important Notice Regarding the Availability of Proxy Materials (the Proxy Availability Notice) to our stockholders of record. All stockholders will have the ability to access the proxy materials on the website referred to in the Proxy Availability Notice free of charge or request to receive a printed set of the proxy materials for the Annual Meeting. Instructions on how to access the proxy materials over the Internet or to request a printed copy may be found in the Proxy Availability Notice.

We provided some of our stockholders, including stockholders who have previously asked to receive paper copies of the proxy materials, with paper copies of the proxy materials instead of the Proxy Availability Notice. If you received paper copies of the proxy materials, we encourage you to help us save money and reduce the environmental impact of delivering paper proxy materials to stockholders by signing up to receive all of your future proxy materials electronically.

We expect that this Proxy Statement and the other proxy materials will be available to stockholders on or about April 23, 2020.

What does it mean if I receive more than one Proxy Availability Notice?

If you receive more than one Proxy Availability Notice, your shares may be registered in more than one name or in different accounts. Please follow the voting instructions on each Proxy Availability Notice to ensure that all of your shares are voted.

How do I attend the Annual Meeting?

The Annual Meeting will be held on Wednesday, June 3, 2020 at 11:00 a.m. (Pacific Daylight Time) in building 1301 on the Company's campus at One Penumbra Place, Alameda, CA 94502. You may contact Investor Relations at investors@penumbrainc.com to obtain directions to the Annual Meeting. Information on how to vote in person at the Annual Meeting is discussed below. If you plan to attend the Annual Meeting, please note that attendance will be limited to stockholders as of the Record Date. Each stockholder may be asked to present valid photo identification, such as a driver's license or passport. Stockholders holding stock in brokerage accounts or by a bank or other nominee may be required to show a brokerage statement or account statement reflecting stock ownership as of the Record Date. Cameras, recording devices, and other electronic devices will not be permitted at the Annual Meeting.

In the event of a change in the time, date or location of the Annual Meeting, we will make an announcement, issue a press release or post information on the Investors section of our website at www.penumbrainc.com to notify stockholders, as appropriate. As a result of the evolving COVID-19 pandemic and government response, we may impose additional procedures or limitations on Annual Meeting attendees, or may decide to hold the Annual Meeting in a different location or solely by means of remote communication. If we take any such step, we will announce the decision in advance, and details on the change and how stockholders may participate in the Annual

Meeting will be available on the Investors section of our website at www.penumbrainc.com. Information on or accessible through our website is not incorporated by reference in this Proxy Statement.

Who can vote at the Annual Meeting?

Only stockholders of record at the close of business on the Record Date of April 15, 2020, will be entitled to vote at the Annual Meeting. On the Record Date, there were 35,072,846 shares of common stock outstanding and entitled to vote.

Stockholder of Record: Shares Registered in Your Name

If, on April 15, 2020, your shares were registered directly in your name with Penumbra's transfer agent, American Stock Transfer & Trust Company, LLC (AST), then you are a stockholder of record. As a stockholder of record, you may vote in person at the Annual Meeting or vote by proxy. Whether or not you plan to attend the Annual Meeting, we urge you to vote by proxy over the telephone or on the Internet as instructed below (See "*How do I vote?*" below) or complete, date, sign and return the proxy card mailed to you to ensure your vote is counted.

Beneficial Owner: Shares Registered in the Name of a Broker, Bank or Other Nominee

If, on April 15, 2020, your shares were held, not in your name, but rather in an account at a brokerage firm, bank, dealer or other similar organization, then you are the beneficial owner of shares held in "street name" and the Proxy Availability Notice will be forwarded to you by the organization that holds your account. The organization holding your account is considered to be the stockholder of record for purposes of voting at the Annual Meeting. As a beneficial owner, you have the right to direct your broker, bank or other nominee regarding how to vote the shares in your account. You are also invited to attend the Annual Meeting. However, since you are not the stockholder of record, you may not vote your shares in person at the Annual Meeting unless you request and obtain a valid proxy from your broker, bank or other nominee.

What am I voting on?

There are three matters scheduled for a vote at the Annual Meeting:

- Election of three Class II directors;
- Ratification of the selection by the Board of Directors of the Company (the Board or the Board of Directors) of Deloitte & Touche LLP (Deloitte) as the Company's independent registered public accounting firm for the Company's fiscal year ending December 31, 2020; and
- Advisory vote on the compensation of the Company's named executive officers.

What if another matter is properly brought before the Annual Meeting?

The Board knows of no other matters that will be presented for consideration at the Annual Meeting. If any other matters are properly brought before the Annual Meeting, the persons named in the accompanying proxy will vote the shares for which you grant your proxy on those matters in accordance with their best judgment.

What is the Board's voting recommendation?

The Board recommends that you vote your shares:

- "For" the election of all nominees for director;
- "For" the ratification of the selection by the Board of Deloitte as the Company's independent registered public accounting firm for the Company's fiscal year ending December 31, 2020; and
- "For" the approval, on an advisory basis, of the compensation of the Company's named executive officers.

How do I vote?

With regard to the election of directors, you may either vote "For" all nominees to the Board or you may "Withhold" your vote for any nominee you specify. For each of the other matters to be voted on, you may vote "For" or "Against" or abstain from voting.

The procedures for voting depend on whether your shares are registered in your name or are held by a bank, broker or other nominee:

Stockholder of Record: Shares Registered in Your Name

If you are a stockholder of record, you may vote in person at the Annual Meeting, vote by proxy over the telephone, vote by proxy through the Internet, or vote by proxy using a proxy card that you receive or may request. Whether or not you plan to attend the Annual Meeting, we urge you to vote by proxy to ensure your vote is counted. You may still attend the Annual Meeting and vote in person even if you have already voted by proxy. Voting in person will have the effect of revoking your previously submitted proxy (see "*Can I change my vote after submitting my proxy?*" below).

- To vote over the telephone, dial toll-free 1-800-690-6903 using a touch-tone phone and follow the recorded instructions. You will be asked to provide the company number and control number from the Proxy Availability Notice. Your vote must be received by 11:59 p.m., Eastern Daylight Time on June 2, 2020 to be counted.

- To vote through the Internet, go to http://www.proxyvote.com to complete an electronic proxy card. You will be asked to provide the company number and control number from the Proxy Availability Notice. Your vote must be received by 11:59 p.m., Eastern Daylight Time, on June 2, 2020 to be counted.

- To vote using the proxy card, simply complete, sign and date the proxy card that may be delivered to you and return it promptly in the envelope provided. If you return your signed proxy card to us and we receive it before the Annual Meeting, we will vote your shares as you direct.

- To vote in person, come to the Annual Meeting and we will give you a ballot when you arrive.

Beneficial Owner: Shares Registered in the Name of Broker, Bank or Other Nominee

If you are a beneficial owner of shares registered in the name of your broker, bank, or other nominee, you should have received a Proxy Availability Notice containing voting instructions from that organization rather than from Penumbra. Simply follow the voting instructions in the Proxy Availability Notice to ensure that your vote is counted. To vote in person at the Annual Meeting, you must obtain a valid proxy from your broker, bank or other nominee. Follow the instructions from your broker, bank or other nominee included with these proxy materials, or contact your broker, bank or other nominee to request a proxy form.

How many votes do I have?

On each matter to be voted upon, you have one vote for each share of common stock you own as of April 15, 2020, the Record Date.

What if I return a proxy card or otherwise vote but do not make specific choices?

If you return a signed and dated proxy card or otherwise vote without marking voting selections, your shares will be voted, as applicable, "For" the election of all nominees for director, "For" the ratification of Deloitte as the Company's independent registered public accounting firm, and "For" the advisory approval of the compensation of the Company's named executive officers. If any other matter is properly presented at the Annual Meeting, your proxy holder (one of the individuals named on your proxy card) will vote your shares using his or her best judgment.

Will my vote be kept confidential?

Proxies, ballots and voting tabulations are handled on a confidential basis to protect your voting privacy. This information will not be disclosed, except as required by law.

Who is paying for this proxy solicitation?

The accompanying proxy is solicited on behalf of the Board for use at the Annual Meeting. Accordingly, the Company will pay for the entire cost of soliciting proxies. In addition to these proxy materials, our directors and employees may also solicit proxies in person, by telephone, or by other means of communication. Directors and employees of the Company will not be paid any additional compensation for soliciting proxies. We may also reimburse brokerage firms, banks and other nominees for the cost of forwarding proxy materials to beneficial owners.

Can I change my vote after submitting my proxy?

Yes. You can revoke your proxy at any time before the final vote at the Annual Meeting. If you are the record holder of your shares, you may revoke your proxy in any one of the following ways:

- You may submit another properly completed and signed proxy card with a later date.
- You may submit a subsequent proxy by telephone or through the Internet.
- You may send a timely written notice that you are revoking your proxy to Penumbra's Secretary or Chief Executive Officer at One Penumbra Place, Alameda, CA 94502.
- You may attend the Annual Meeting and vote in person. Simply attending the Annual Meeting will not, by itself, revoke your proxy.

Your most current proxy card or telephone or Internet proxy is the one that is counted, so long as it is provided within the applicable deadline. If your shares are held by your broker, banker or other nominee, you should follow the instructions provided by your broker, bank or other nominee to change your vote or revoke your proxy.

When are stockholder proposals for inclusion in our proxy statement for next year's annual meeting due?

Stockholders wishing to present proposals for inclusion in the proxy statement for our 2021 annual meeting of stockholders (the 2021 Annual Meeting) pursuant to Rule 14a-8 of the Securities Exchange Act of 1934, as amended (the Exchange Act), must submit their proposals so that they are received by us at our principal executive offices no later than December 24, 2020. Proposals should be sent to our Secretary at One Penumbra Place, Alameda, CA 94502.

When are other proposals and stockholder nominations for next year's annual meeting due?

With respect to proposals and nominations not to be included in the proxy statement for the 2021 Annual Meeting pursuant to Rule 14a-8 of the Exchange Act, our Amended and Restated Bylaws (our Bylaws) provide that stockholders who wish to nominate a director or propose other business to be brought before the stockholders at an annual meeting of stockholders must notify our Secretary by a written notice, which notice must be received at our principal executive offices not less than 120 days nor more than 150 days prior to the anniversary date of the immediately preceding year's annual meeting of stockholders.

Stockholders wishing to submit director nominations or proposals for consideration at the 2021 Annual Meeting under these provisions of our Bylaws must submit their nominations or proposals so that they are received at our principal executive offices not earlier than January 4, 2021 and not later than February 3, 2021 in order to be considered. In the event that the 2021 Annual Meeting is to be held on a date that is not within 30 days before or 70 days after the 1-year anniversary of the Annual Meeting, then a stockholder's notice must be received by our Secretary no earlier than 120 days prior to the date of the 2021 Annual Meeting and no later than the later of 70 days prior to the date of the 2021 Annual Meeting or the 10th day following the day on which we make a public announcement of the date of the 2021 Annual Meeting.

Nominations or proposals should be sent in writing to our Secretary at One Penumbra Place, Alameda, CA 94502. A stockholder's notice to nominate a director or bring any other business before the 2021 Annual Meeting must set forth certain information, which is specified in our Bylaws. A complete copy of our Bylaws can be found in the Investors section of our website at www.penumbrainc.com under "Governance—Corporate Governance." Information on or accessible through our website is not incorporated by reference in this Proxy Statement.

How are votes counted?

Votes will be counted by the inspector of election appointed for the Annual Meeting, who will separately count "For" and "Withhold" votes and any broker non-votes for the proposal to elect directors, and with respect to other proposals, votes "For", "Against", "Abstain" and broker non-votes (if applicable).

What are "broker non-votes"?

Broker non-votes occur when a beneficial owner of shares held in "street name" does not give instructions to the broker, bank or other nominee holding the shares as to how to vote. Generally, if shares are held in street name, the beneficial owner of the shares is entitled to give voting instructions to the broker, bank or other nominee holding the shares. If the beneficial owner does not provide voting instructions, the broker, bank or other nominee can still vote the shares with respect to matters that are considered to be "routine," but cannot vote the shares with respect to "non-routine" matters. Under the rules and interpretations of the New York Stock Exchange (the NYSE), which generally apply to all brokers, bank or other nominees, on voting matters characterized by the NYSE as "routine," NYSE member firms have the discretionary authority to vote shares for which their customers do not provide voting instructions. On non-routine proposals, such "uninstructed shares" may not be voted by member firms. Only the proposal to ratify the selection of our independent registered public accounting firm is considered a "routine" matter for this purpose and brokers, banks or other nominees generally have discretionary voting power with respect to such proposal. Broker non-votes will be counted for the purpose of determining whether a quorum is present at the Annual Meeting.

What is the effect of abstentions and broker non-votes?

Abstentions: Under Delaware law (under which Penumbra is incorporated), abstentions are counted as shares present and entitled to vote at the Annual Meeting, but they are not counted as shares cast. Our Bylaws provide that a stockholder action (other than the election of directors) shall be decided by the vote of the holders of a majority of the total number of votes of the Company's capital stock cast on the matter. Therefore, abstentions will have no effect on Proposal No. 2— Ratification of the Selection of the Independent Registered Public Accounting Firm for Penumbra, and Proposal No. 3—Advisory Vote on the Compensation of the Company's Named Executive Officers.

Broker Non-Votes: A "broker non-vote" occurs when a broker, bank or other nominee holding your shares in street name does not vote on a particular matter because you did not provide the broker, bank or other nominee with voting instructions and the broker, bank or other nominee lacks discretionary voting authority to vote the shares because the matter is considered "non-routine" under NYSE rules. The "non-routine" matters on the agenda for the Annual Meeting include Proposal No. 1—Election of Directors and Proposal No. 3—Advisory Vote on the Compensation of the Company's Named Executive Officers.

Broker non-votes will be counted for the purpose of determining whether a quorum is present at the Annual Meeting. However, because broker non-votes are not considered under Delaware law to be entitled to vote on non-routine proposals, they will have no effect on the outcome of the vote on Proposal No. 1—Election of Directors or Proposal No. 3—Advisory Vote on the Compensation of the Company's Named Executive Officers. As a result, if you hold your shares in street name and you do not instruct your broker, bank or other nominee how to vote your shares in the election of directors or the advisory vote on the compensation of the Company's named executive officers, no votes will be cast on your behalf on these proposals. **Therefore, it is critical that you indicate your vote on these proposals if you want your vote to be counted.** The proposal to ratify the selection by the Board of Deloitte as our independent registered public accounting firm for the fiscal year ending December 31, 2020 is considered a "routine" matter under NYSE rules. Therefore, your broker, bank or other nominee will be able to vote on Proposal No. 2— Ratification of the Selection of the Independent Registered Public Accounting Firm for Penumbra even if it does not receive instructions from you, so long as it holds your shares in its name.

How many votes are needed to approve each proposal?

Proposal	Vote Required	Discretionary Voting Allowed?
No. 1. Election of Directors	Plurality	No
No. 2. Ratification of the Selection by the Board of the Company's Independent Registered Public Accounting Firm	Majority Cast	Yes
No. 3. Advisory Vote on Compensation of Named Executive Officers	Majority Cast	No

A "Plurality," with regard to the election of directors, means that the three nominees who receive the most "For" votes cast by the holders of shares either present in person or represented by proxy will be elected to our Board. A "Majority Cast," with regard to the advisory vote on the compensation of our named executive officers and the ratification of the selection by the Board of our independent registered public accounting firm, means that a majority of the votes cast on the proposal are voted "For" the proposal.

Accordingly:

- Proposal No. 1: For the election of directors, the three nominees receiving the most "For" votes from the holders of shares present in person or represented by proxy and entitled to vote on Proposal No. 1 will be elected as Class II directors to hold office until the 2023 annual meeting of stockholders. Only votes "For" or "Withheld" will affect the outcome, and therefore broker non-votes will not affect the outcome of Proposal No. 1.

- Proposal No. 2: To be approved, a majority of the total votes cast on Proposal No. 2 must be voted "For" the ratification of the selection by the Board of Deloitte as the Company's independent registered public accounting firm for the fiscal year ending December 31, 2020. Abstentions will not be considered votes cast on Proposal No. 2, and since the ratification of the selection by the Board of Deloitte is a matter on which a broker, bank or other nominee has discretionary voting authority, we do not expect any broker non-votes with respect to Proposal No. 2.

- Proposal No. 3: To be approved, a majority of the total votes cast on Proposal No. 3 must be voted "For" the approval on an advisory basis of the compensation of our named executive officers. Abstentions and broker non-votes will not be considered votes cast on Proposal No. 3, and therefore will not affect the outcome of Proposal No. 3.

None of the proposals, if approved, entitles stockholders to appraisal rights under Delaware law or our charter.

What is the quorum requirement?

A quorum of stockholders is necessary to hold a valid stockholder meeting. A quorum will be present if stockholders holding at least a majority of the outstanding shares entitled to vote are present in person or represented by proxy at the Annual Meeting. On the Record Date, there were 35,072,846 shares outstanding and entitled to vote. Thus, the holders of at least 17,536,424 shares must be present in person or represented by proxy at the Annual Meeting to have a quorum.

Your shares will be counted towards the quorum only if you submit a valid proxy by mail, over the phone or through the Internet (or one is submitted on your behalf by your broker, bank or other nominee) or if you vote in

person at the Annual Meeting. Abstentions and broker non-votes will be counted towards the quorum requirement. If there is no quorum, then either the chair of the Annual Meeting or the holders of a majority of the shares present at the Annual Meeting in person or represented by proxy may adjourn the meeting to another date. At any adjourned Annual Meeting at which a quorum is present, any business may be transacted that might have been transacted at the Annual Meeting as originally notified. If the adjournment is for more than 30 days, or if after that adjournment a new record date is fixed for the adjourned Annual Meeting, a notice of the adjourned Annual Meeting shall be given to each stockholder of record entitled to vote at the adjourned Annual Meeting.

How can I find out the results of the voting at the Annual Meeting?

Preliminary voting results will be announced at the Annual Meeting. In addition, final voting results will be reported in a Current Report on Form 8-K (Form 8-K) that we expect to file with the SEC within four business days after the Annual Meeting. If final voting results are not available to us in time to file a Form 8-K with the SEC within four business days after the Annual Meeting, we intend to file a Form 8-K to report the preliminary voting results within four business days after the Annual Meeting and to file an additional Form 8-K (or an amendment to the Form 8-K reporting the preliminary voting results) to report the final voting results within four business days after the final voting results are known to us.

INTEREST OF CERTAIN PERSONS IN MATTERS TO BE ACTED UPON

The Board of Directors knows of no matters to come before the Annual Meeting other than the matters referred to in this Proxy Statement. However, if any other matters should properly come before the meeting, the persons named in the enclosed proxy intend to vote in accordance with their best judgment. No director, nominee for election as director, or executive officer of Penumbra has any special interest in any matter to be voted upon other than election to the Board of Directors.

PROPOSAL NO. 1: ELECTION OF DIRECTORS

The Company's Board of Directors is presently comprised of eight members, who are divided into three classes, designated as Class I, Class II and Class III. One class of directors is elected by the stockholders at each annual meeting to serve from the time of their election until the third annual meeting of stockholders following their election. Class I directors consist of Don Kassing, Thomas Wilder, and Janet Leeds; Class II directors consist of Arani Bose, M.D., Bridget O'Rourke and Surbhi Sarna; and Class III directors consist of Adam Elsesser and Harpreet Grewal.

The Nominating and Corporate Governance Committee of the Board (the NCG Committee) has renominated each of our Class II directors, Dr. Bose and Mses. O'Rourke and Sarna, as nominees for a three-year term expiring at the 2023 annual meeting of stockholders and until their respective successors are duly elected and qualified, or, if sooner, until the director's death, resignation or removal. Each of Dr. Bose and Mses. O'Rourke and Sarna is currently a director of the Company. Directors are elected by a plurality of the votes of the holders of shares present in person or represented by proxy at the Annual Meeting and entitled to vote on the election of directors. The three nominees receiving the highest number of affirmative votes will be elected.

Proxies cannot be voted for a greater number of persons than the number of nominees named in this Proxy Statement. If any nominee should become unavailable to serve for any reason, it is intended that votes will be cast for a substitute nominee designated by the NCG Committee and approved by the Board. We have no reason to believe that Dr. Bose, Ms. O'Rourke, or Ms. Sarna will be unable to serve if elected.

Nominees for Director, Continuing Directors, and Persons Chosen to Become Director

The names and ages of the nominees for director, continuing directors, and persons chosen to become director, and their principal occupations, length of service with the Company and Board committee memberships are set forth in the table below.

Name	Age	Director Since	Current Term Expires	Occupation	Independent	AC	CC	NCG	EC
Nominees									
Arani Bose, M.D.	58	June 2004	2020 Annual Meeting	Chief Innovator, Penumbra	No	—	—	—	—
Bridget O'Rourke	52	April 2017	2020 Annual Meeting	Former human resources executive	Yes	C, F	—	M	—
Surbhi Sarna	34	July 2019	2020 Annual Meeting	CEO and Founder, nVision Medical Corp	Yes	M	—	M	—
Continuing Directors									
Adam Elsesser[(1)]	58	June 2004	2021 Annual Meeting	Chief Executive Officer, Penumbra	No	—	—	—	C
Harpreet Grewal	53	April 2015	2021 Annual Meeting	Chief Operating Officer, Volante Technologies Inc.	Yes	—	M	—	—
Don Kassing[(2)]	78	February 2008	2022 Annual Meeting	President Emeritus, San Jose State University	Yes	—	M	M	M
Janet Leeds	58	January 2019	2022 Annual Meeting	Administrative Director, Seattle Cancer Care Alliance	Yes	—	M	C	—
Thomas Wilder	56	January 2017	2022 Annual Meeting	Chief Executive Officer, Neuros Medical, Inc.	Yes	M, F	C	—	M

AC: Audit Committee	EC: Executive Committee	F: Financial Expert
CC: Compensation Committee	C: Chair	
NCG: Nominating and Corporate Governance Committee	M: Member	

(1) Chair of the Board.
(2) Presiding Director.

A brief biography of each nominee for director, continuing director and person chosen to become director is also set forth below, which includes information, as of the date of this Proxy Statement, regarding the specific and particular experience, qualifications, attributes or skills of each nominee for director and continuing director that led the NCG Committee to believe that the director should continue to serve on the Board:

Director Nominees

Arani Bose, M.D., co-founded Penumbra in June 2004 and has served as a member of the Board since our inception. Dr. Bose was Chairman of the Board and Chief Medical Officer from 2005 until 2015 and currently serves as Chief Innovator. Prior to founding Penumbra, Dr. Bose was an Assistant Professor of Radiology and Neurology at New York University (NYU) School of Medicine from 1997 to 2004, where he also had a clinical practice. While at NYU, Dr. Bose co-founded SMART Therapeutics. Dr. Bose received a B.A. from Stanford University and an M.D. from the University of Colorado School of Medicine with residency and fellowships at Yale University School of Medicine and NYU Medical Center.

The Board has nominated Dr. Bose based on his extensive knowledge of the Company and the medical device industry, his training and expertise in interventional radiology and neurology, and his skills and experience in clinical research and device development and commercialization.

Bridget O'Rourke has served on the Board since April 2017. Ms. O'Rourke has held a number of executive and leadership positions over more than twenty years, with expertise across different industries. Most recently, Ms. O'Rourke served as Executive Director of the executive search and consulting practice of O'Rourke & Associates, a boutique firm providing services exclusively for the credit union industry, from July 2016 until May 2017. From August 2008 to June 2016, Ms. O'Rourke was Head of Human Resources at Passport Capital, LLC, a global asset management firm. Prior to Passport Capital, LLC, from 1997 to 2007 Ms. O'Rourke served in various positions in the financial services and executive search industries, including as Executive Search Director at O'Rourke Career Connections, Controller at Sigma Partners, a multi-fund venture capital firm, and Vice President for Citibank Global Asset Management's Alternative Investment Strategies group. From July 1991 to December 1996, Ms. O'Rourke held audit and internal audit consulting positions of increasing responsibility at Coopers & Lybrand (now known as PricewaterhouseCoopers). Ms. O'Rourke received a B.A. from the University of California, Santa Barbara and became a Certified Public Accountant in 1995. She currently serves on the Board of Directors of the San Francisco Fire Credit Union.

The Board has nominated Ms. O'Rourke based on her extensive business and leadership experience, including valuable skills related to human resources management and financial accounting.

Surbhi Sarna has served on the Board since July 2019. Ms. Sarna is the CEO and founder of nVision Medical Corp (nVision), a healthcare company developing pioneering technology to enable early detection of ovarian cancer. Ms. Sarna founded nVision in 2011, with the intention of fulfilling an unmet clinical need. She has led the company from its inception and through its earliest days of product development, funding and initial clinical trials. In April 2018, nVision was acquired by Boston Scientific. Ms. Sarna now leads the efforts to commercialize the technology developed by nVision at Boston Scientific. Prior to her founding of nVision, Ms. Sarna held a variety of roles in healthcare, including roles at BioCardia and Abbott Vascular. Ms. Sarna received a B.A. from the University of California, Berkeley.

The Board has nominated Ms. Sarna based on her valuable experience as Chief Executive Officer of a pioneering medical device company.

Continuing Directors

Adam Elsesser co-founded Penumbra and has served as Chief Executive Officer and a member of the Board since our inception in June 2004, as Chairman of the Board since January 2015, and as President from January 2015 until August 2019. Prior to Penumbra, Mr. Elsesser led SMART Therapeutics, Inc. (SMART Therapeutics), a medical device company focused on devices for neuro-intervention, as its Chief Executive Officer from 2000 to 2002 and, after its acquisition by Boston Scientific Corporation, as President of SMART Therapeutics within Boston Scientific Corporation from 2002 to 2005. Before his work in the medical device industry, Mr. Elsesser was a partner in the law firm of Shartsis Friese LLP. Mr. Elsesser received a B.A. from Stanford University and a J.D. from Hastings College of the Law.

Mr. Elsesser brings to the Board his extensive knowledge of the Company, the medical device industry and the competitive landscape, as well as his expertise in building and commercializing medical devices.

Harpreet Grewal has served on the Board since April 2015. Since September 2019, Mr. Grewal has served as Chief Operating Officer of Volante Technologies Inc., a global provider of software for the integration, processing and orchestration of payments and financial messages, where he also serves on the Board of Directors and served as Executive in Residence from April 2018 to March 2019. From February 2016 through April 2017, Mr. Grewal served as General Manager of Constant Contact, Inc. (Constant Contact), a technology company primarily focused on marketing tools and a wholly-owned indirect subsidiary of Endurance International Group Holdings, Inc. (Endurance). Prior to the acquisition of Constant Contact by Endurance, from 2010 to February 2016, Mr. Grewal served as Executive Vice President and Chief Financial Officer of Constant Contact. In December 2019, Mr. Grewal agreed to settle litigation instituted by the SEC alleging that Mr. Grewal violated the antifraud provisions of Section 17(a) of the Securities Act, Section 10(b) of the Exchange Act and Rule 10b-5 promulgated under the Exchange Act, and violated, or aided and abetted the violation of, the reporting, record-keeping and internal controls requirements of Section 13(a), Section 13(b)(2)(A) and related rules under the Exchange Act in connection with his position at Constant Contact. Without admitting or denying the SEC's allegations, Mr. Grewal consented to the entry of a Final Judgment that permanently enjoined him from future violations of Section 17(a) of the Securities Act and from aiding and abetting future violations of Section 13(a) or Section 13(b)(2)(A) of the Exchange Act, and required him to pay a fine of $350,000, including a $100,000 civil penalty. From 2008 to 2009, Mr. Grewal worked as an independent consultant to small businesses and early-stage entrepreneurs. From 2006 through 2008, Mr. Grewal was Executive Vice President and Chief Financial Officer of VistaPrint, Ltd., a publicly-traded online printing and marketing services company. Prior to VistaPrint, Mr. Grewal was Senior Vice President and Chief Financial Officer of GoldenSource Corporation, a data management company, from 2002 to 2006, Chief Financial Officer of eGain Communications Corporation, a customer engagement services company, from 1999 to 2002, and held various financial and strategic planning positions with PepsiCo, Inc., a publicly-traded food and beverage company, from 1996 to 1999. Mr. Grewal received a B.A. from the University of California, Berkeley and a M.A. from Johns Hopkins University.

Mr. Grewal brings to the Board his extensive business and leadership experience, including financial expertise and strategic planning skills, at a range of high growth companies, both private and public.

Don Kassing has served on the Board since February 2008 and as Presiding Director of the Board since August 2015. Mr. Kassing is President Emeritus of San Jose State University. Mr. Kassing served as President of San Jose State University from 2004 to 2008, Interim President from 2010 to 2011, and Vice President, Administration and Finance and Chief Financial Officer from 1993 to 2004. Prior to his tenure at San Jose State University, Mr. Kassing spent 18 years in higher education and 11 years in private industry, including eight years in merchandising/marketing and operations management at Caleres, Inc. (formerly known as the Brown Group, Inc.), a leading footwear retailer and wholesaler, and spent 3 years in corporate finance at the General Motors Corporation. Mr. Kassing received a B.A. and an M.B.A. from Saint Louis University.

Mr. Kassing brings to the Board his extensive business and leadership experience, including valuable skills related to strategic planning, based on his long tenure leading a major educational institution, including overseeing the development and construction of two high-profile campus facilities and having primary responsibility for university business and financial affairs.

Janet Leeds has served on the Board since January 2019. Ms. Leeds has held a number of leadership and consulting roles in academic healthcare settings over more than thirty years. Currently, Ms. Leeds serves as an Administrative Director at the Seattle Cancer Care Alliance (SCCA), a cancer center comprising Fred Hutchinson

Cancer Research Center, Seattle Children's Hospital and UW Medicine. From 2005 to 2009, Ms. Leeds served as the Administrator for the Fred Hutchinson/University of Washington Cancer Consortium. From 2000 to 2005, Ms. Leeds served as the Director of Planning at the Fred Hutchinson Cancer Research Center. From 1996 to 2000, Ms. Leeds served in various positions that were instrumental to the formation and development of the SCCA. Prior to that, from 1987 to 1995, Ms. Leeds held management consultant positions of increasing responsibility at ECG Management Consultants, where she primarily consulted with academic medical centers. Ms. Leeds received a B.A. from Stanford University and an M.B.A. from the University of Washington.

Ms. Leeds brings to the Board her strong healthcare background with extensive experience in organizational development and governance.

Thomas Wilder has served on the Board since January 2017. Since August 2017, Mr. Wilder has served as the Chief Executive Officer of Neuros Medical, Inc., a neuro-modulation company. From February 2010 through July 2016, Mr. Wilder served as the Chief Executive Officer of Sequent Medical, Inc., a company dedicated to the development of innovative catheter-based neurovascular technologies. From April 2006 to 2009, Mr. Wilder served as the President and CEO of PhotoThera, Inc., a company that was developing a unique therapy for acute ischemic stroke patients. From 2002 to 2006, he served as the President and CEO of MicroTherapeutics, Inc. (MTIX), a company also focused on the neurovascular space. Mr. Wilder served in positions of increasing responsibility at Medtronic, Inc. from 1991 through 2002, most recently as Vice President and General Manager of its endovascular stent grafts division. Mr. Wilder began his career in the Financial Statement Audit Practice of Price Waterhouse, where he worked from 1986 to 1989. He received a B.A. from Stanford University and an M.B.A. from Northwestern University's Kellogg Graduate School of Management and currently serves on the Board of Directors of Endologix, Inc. (ELGX).

Mr. Wilder brings to the Board his valuable experience based on his tenure as Chief Executive Officer at several medical device companies, as well as his tenure as a financial executive at a large medical device company.

THE BOARD OF DIRECTORS RECOMMENDS
A VOTE IN FAVOR OF EACH NAMED NOMINEE.

INFORMATION REGARDING THE BOARD OF DIRECTORS AND CORPORATE GOVERNANCE

This section sets forth certain information regarding our Board of Directors and its committees and describes key corporate governance guidelines and practices that we have adopted. Complete copies of our Corporate Governance Guidelines, the charters of the committees of the Board and our Code of Business Conduct and Ethics, described below, can be found in the Investors section of our website at www.penumbrainc.com under "Governance—Corporate Governance." Alternatively, you can request a copy of any of these documents free of charge by writing to: Penumbra, Inc., One Penumbra Place, Alameda, CA 94502, Attention: Secretary. Information on or accessible through our website is not incorporated by reference in this Proxy Statement.

BOARD COMPOSITION

Our Board currently consists of eight members. In accordance with our Restated Certificate of Incorporation and our Bylaws, our Board is divided into three classes with staggered terms. At each annual meeting of stockholders, the successors to directors whose terms then expire will be elected to serve from the time of election and qualification until the third annual meeting following election. The authorized number of directors may be changed by resolution of the Board. Our directors are divided among the three classes as follows:

- Class I directors consist of Don Kassing, Janet Leeds, and Thomas Wilder, whose terms expire at the 2022 annual meeting of stockholders;
- Class II directors consist of Arani Bose, M.D., Bridget O'Rourke and Surbhi Sarna, whose terms expire at the Annual Meeting; and
- Class III directors consist of Adam Elsesser and Harpreet Grewal, whose terms expire at the 2021 annual meeting of stockholders.

Only one class of directors will be elected at each annual meeting of our stockholders, with the other classes continuing for the remainder of their respective terms. Each director's term continues until the election and qualification of his or her successor, or his or her earlier death, resignation or removal.

INDEPENDENCE OF THE BOARD OF DIRECTORS

The Board has affirmatively determined that all of the director nominees and continuing directors, other than Mr. Elsesser and Dr. Bose due to their status as employees of the Company, are independent directors within the meaning of the applicable NYSE listing standards and relevant securities and other laws, rules and regulations regarding the definition of "independent" (the Independent Directors). There are no family relationships between any director and any of our executive officers. All members of the Audit Committee of the Board (the Audit Committee), the NCG Committee and the Compensation Committee of the Board (the Compensation Committee) are Independent Directors.

BOARD LEADERSHIP STRUCTURE

The Board believes that it is important to retain the flexibility to allocate the responsibilities of the offices of Board Chair and Chief Executive Officer in any manner that it determines to be in the best interests of the Company at any point in time.

The Board reviews its leadership structure periodically as part of its annual self-assessment process. In addition, the Board continues to monitor developments in corporate governance as well as the approaches our peers undertake. Since January 2015, the Board has determined to combine the roles of Board Chair and Chief Executive Officer under the leadership of our co-founder Adam Elsesser. At the present time, the Board believes that this is the most effective leadership structure for Penumbra. We believe that combining the Chief Executive Officer and Board Chair positions helps ensure that the Board and management act with a common purpose. The Board believes that Mr. Elsesser's combined role enables strong leadership, creates clear accountability and enhances our ability to communicate our message and strategy clearly and consistently to stockholders. In addition, we believe that a combined Chief Executive Officer and Board Chair is better positioned to act as a bridge between management and the Board, maintaining the regular flow of information. The Board believes that the current board leadership structure, coupled with a strong emphasis on board independence, provides effective independent oversight of management while allowing the Board and management to benefit from Mr. Elsesser's demonstrated senior leadership skills, expertise from years of experience in the medical device industry, and his experience and familiarity with our business as co-founder and Chief Executive Officer. Our Independent Directors bring experience, oversight and expertise from outside of our Company, while Mr. Elsesser brings company-specific experience and expertise.

The Board does not have a lead independent director. Our Corporate Governance Guidelines note that all directors are elected by the stockholders and all have an equal voice. The Board, therefore, does not believe it appropriate or necessary in serving the best interests of the Company to designate a lead independent director. The Board Chair and the Chief Executive Officer are free, as is the Board as a whole, to call upon any one or more directors to provide leadership in a given situation should a special need arise.

Pursuant to our Corporate Governance Guidelines, the non-management directors regularly hold executive sessions in which management does not participate. The Board has designated Don Kassing as the Presiding Director to lead such meetings of the non-employee directors. If the designated Presiding Director is not present for a meeting, the other non-employee directors appoint one of their number to act as Presiding Director for such meeting. In addition, the chairs of the Audit Committee, Compensation Committee and NCG Committee have authority to hold executive sessions without management and non-Independent Directors present.

The Board, including each of its committees, also has complete and open access to any member of the Company's management and the authority to retain independent advisors as the Board or such committee deems appropriate.

ROLE OF THE BOARD IN RISK OVERSIGHT

One of the Board's key functions is informed oversight of the Company's risk management process. The Board believes that its current leadership structure facilitates its risk oversight responsibilities. In particular, the Board believes the majority-independent Board and independent Board committees provide a well-functioning and effective balance to an experienced Board Chair. The Board does not have a standing risk management committee, but rather administers this oversight function directly through the Board as a whole, as well as through the various standing Board committees that address risks inherent in their respective areas of oversight. For example, the Board acts as the ultimate decision-making body of the Company and advises and oversees management, who are responsible for the day-to-day operations and management of the Company. The Audit Committee monitors compliance with legal and regulatory requirements, in addition to oversight of the performance of our internal audit function, and reviews the Company's policies and practices with respect to risk assessment and risk management. The NCG Committee monitors the effectiveness of our corporate governance guidelines and policies and the operation of the Board. The Compensation Committee assesses and monitors whether any of our compensation programs, policies and practices has the potential to encourage excessive risk-taking.

It is the responsibility of the committee chairs to report findings regarding material risk exposures to the Board as quickly as possible. The Company's Executive Vice President, General Counsel and Secretary, and President (formerly Chief Financial Officer) coordinate between the Board and management with regard to the determination and implementation of responses to any risk management issues.

MEETINGS OF THE BOARD OF DIRECTORS

The Board oversees our business. It establishes overall policies and standards and reviews the performance of management. During the fiscal year ended December 31, 2019, the Board held nine meetings and took action by

unanimous written consent on one occasion. Each Board member attended 75% or more of the aggregate meetings of the Board and of the committees on which he or she served held during the period for which he or she was a director or committee member. The Company's directors are encouraged to attend our annual meetings of stockholders, but we do not currently have a policy relating to director attendance. One of the seven directors serving at the time of the 2019 Annual Meeting of Stockholders attended that meeting.

In accordance with NYSE listing standards, the Board typically holds an executive session of non-employee directors (all of whom are Independent Directors), presided over by the Presiding Director, as a part of every regularly scheduled quarterly meeting of the Board.

INFORMATION REGARDING COMMITTEES OF THE BOARD OF DIRECTORS

The Board has a number of committees that perform certain functions for the Board. The current committees of the Board are the Audit Committee, the Compensation Committee, the NCG Committee, and the Executive Committee. Below is a description of each committee of the Board. Each of the committees has authority to engage legal counsel or other experts or consultants as it deems appropriate to carry out its responsibilities. The Board has determined that each member of the Audit Committee, the Compensation Committee, and the NCG Committee meets the applicable NYSE listing standards and relevant securities and other laws, rules and regulations regarding "independence" and that each member of the Audit Committee, the Compensation Committee, and the NCG Committee is free of any relationship that would impair his or her individual exercise of independent judgment with regard to our Company in carrying out the responsibilities of a director.

Audit Committee

The Board has a separately designated standing Audit Committee established in accordance with Section 3(a)(58) of the Exchange Act. The Audit Committee was established by the Board to assist the Board in its oversight of the integrity of our financial statements, financial reporting processes and internal controls, the design, implementation and performance of our internal audit function, and our compliance with applicable legal and regulatory requirements. In addition, the Audit Committee assists the Board in its oversight of the qualification, independence and performance of our independent registered public accounting firm and recommends to the Board the appointment of our independent registered public accounting firm.

The Audit Committee was established in August 2015 and currently consists of three directors: Mses. O'Rourke (Chair) and Sarna and Mr. Wilder. In connection with the periodic review by the Board of the composition of the Board and Board committees and consideration of the rotation of committee members and committee chairs, (i) effective May 3, 2019, Mr. Kassing was removed as a member of the Audit Committee and (ii) effective August 2, 2019, Mr. Grewal was removed as a member of the Audit Committee, Ms. O'Rourke was appointed as the Chair of the Audit Committee, replacing Mr. Grewal, and Ms. Sarna was appointed as a member of the Audit Committee. The Audit Committee met six times during 2019.

The Audit Committee is governed by a written charter, which was adopted by the Board in August 2015. The Audit Committee charter can be found in the Investors section of our website at www.penumbrainc.com under "Governance—Corporate Governance." Information on or accessible through our website is not incorporated by reference in this Proxy Statement. The Audit Committee charter grants the Audit Committee authority to obtain, at our expense, advice and assistance from internal and external legal, accounting or other advisors and consultants and other external resources that the Audit Committee considers necessary or appropriate in the performance of its duties.

As required by its charter, the Audit Committee conducts a self-evaluation at least annually. The Audit Committee also reviews and assesses the adequacy of its charter at least annually and recommends any proposed changes to the Board for its consideration.

The Board annually reviews the NYSE listing standards' definition of independence for Audit Committee members and has determined that all members of our Audit Committee are "independent" and "financially literate" under the NYSE listing standards and that members of the Audit Committee received no compensation from the Company other than for service as a director. The Board has determined that each of Ms. O'Rourke and Mr. Wilder qualifies as an "audit committee financial expert," as defined in applicable SEC rules. In making that determination, the Board relied on the past business experience of Ms. O'Rourke and Mr. Wilder, as described above under the heading "*Nominees for Director and Continuing Directors*."

Report of the Audit Committee of the Board of Directors

The Audit Committee reviews the Company's financial reporting process on behalf of the Board. Management has the primary responsibility for the preparation and integrity of the consolidated financial statements and the reporting process, including establishing and monitoring the system of internal financial controls. In this context, during fiscal year 2019, the Audit Committee met and held discussions with management and Deloitte & Touche LLP (Deloitte), the Company's independent registered public accounting firm. Management has represented to the Audit Committee that the Company's consolidated financial statements as of and for the fiscal year ended December 31, 2019 were prepared in accordance with accounting principles generally accepted in the United States of America, and the Audit Committee has reviewed and discussed the audited financial statements of the Company with management of the Company and with Deloitte. In addition, the Audit Committee has discussed with Deloitte the matters required to be discussed by the applicable requirements of the Public Company Accounting Oversight Board (PCAOB) and the SEC. The Audit Committee has received from Deloitte the written disclosures and the letter required by applicable requirements of the PCAOB regarding Deloitte's communications with the Audit Committee concerning independence, and has discussed with Deloitte the independence of Deloitte from the Company and its management. The Audit Committee has also concluded that the provision by Deloitte of non-audit services to the Company in fiscal year 2019 was compatible with Deloitte's independence. Based on the foregoing, the Audit Committee recommended to the Board, and the Board approved, that the audited financial statements be included in the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2019 for filing with the SEC. The Audit Committee and the Board have also approved the selection of Deloitte as the Company's independent registered public accounting firm for the year ending December 31, 2020.

The material in this report is not deemed "soliciting material," is not deemed "filed" with the SEC, is not subject to Regulation 14A or 14C, except to the extent provided in Item 407 of Regulation S-K promulgated under the Securities Act of 1933, as amended (the Securities Act) (Regulation S-K), or to the liabilities of Section 18 of the Exchange Act, and is not to be incorporated by reference into any filing of Penumbra under the Securities Act or the Exchange Act, whether made before or after the date hereof and irrespective of any general incorporation language in any such filing.

Respectfully submitted on April 13, 2020 by the members of the Audit Committee of the Board of Directors:

Bridget O'Rourke, Chair
Surbhi Sarna
Thomas Wilder

Compensation Committee

The Compensation Committee acts on behalf of the Board to oversee the Company's executive compensation and benefits programs and policies, evaluate executive officer performance and compensation, review and assess risks arising from the Company's employee compensation policies and practices, and review the Company's management succession plan. Among other things, the Compensation Committee is responsible for:

- reviewing and approving, or recommending that the Board approve, the compensation of our executive officers;
- administering our stock and equity incentive plans;
- reviewing and approving, or making recommendations to the Board with respect to, incentive compensation and equity plans in which our executive officers participate; and
- reviewing our overall compensation philosophy.

The Compensation Committee was established in June 2015 and currently consists of four directors: Messrs. Wilder (Chair), Grewal, and Kassing, and Ms. Leeds. In connection with the periodic review by the Board of the composition of the Board and Board committees and consideration of the rotation of committee members and committee chairs, (i) effective May 3, 2019, Ms. O'Rourke and Mr. Grewal were removed as members of the Compensation Committee and Ms. Leeds was appointed as a member of the Compensation Committee, (ii) effective July 1, 2019, Ms. Sarna was appointed as a member of the Compensation Committee and (iii) effective August 2, 2019, Ms. Sarna was removed as a member of the Compensation Committee and Mr. Grewal was appointed as a

member of the Compensation Committee. The Compensation Committee met seven times during 2019. The Board has determined that all members of our Compensation Committee meet the independence requirements applicable to directors and compensation committee members under SEC rules and NYSE listing standards.

The Compensation Committee is governed by a written charter, which was adopted by the Board in August 2015. The Compensation Committee charter can be found in the Investors section of our website at www.penumbrainc.com under "Governance—Corporate Governance." Information on or accessible through our website is not incorporated by reference in this Proxy Statement. The Compensation Committee charter grants the Compensation Committee sole authority to retain or obtain the advice of a compensation consultant, legal counsel or other adviser, including the authority to approve the consultant's reasonable compensation. The Compensation Committee may select such advisers, or receive advice from any other adviser, only after taking into consideration all factors relevant to that person's independence from management, including those independence factors enumerated by NYSE listing standards.

Under the Compensation Committee charter, the Compensation Committee may, in its discretion, delegate its duties to a subcommittee or to the Chair of the Compensation Committee.

As required by its charter, the Compensation Committee conducts a self-evaluation at least annually. The Compensation Committee also annually reviews and assesses the adequacy of its charter and recommends any proposed changes to the Board for its consideration.

In November 2015, the Board created an Equity Award Committee, consisting solely of Mr. Elsesser, our Chairman and Chief Executive Officer. The Board has delegated to the Equity Award Committee the authority to make equity grants under our Amended and Restated 2014 Equity Incentive Plan (the 2014 Equity Incentive Plan) to non-executive employees and consultants in connection with their commencement of employment with, or provision of services to, us, in connection with promotions, and to reward exceptional achievements, and performance-based equity awards to sales personnel, in each case within guidelines established by the Board or the Compensation Committee.

Compensation Committee Processes and Procedures

The implementation of our compensation philosophy is carried out under the supervision of the Compensation Committee. The Compensation Committee charter requires that the Compensation Committee meet as often as it determines is appropriate to carry out its responsibilities under the charter. The agenda for each meeting is usually developed by the Chair of the Compensation Committee, in consultation with management and the Compensation Committee's compensation consultant. Our Chief Executive Officer, our President, our Chief Financial Officer, our Executive Vice President and Chief Business Officer, and our Executive Vice President, General Counsel and Secretary, in addition to the Compensation Committee's compensation consultant, may attend portions of Compensation Committee meetings for the purpose of providing analysis and information to assist the Compensation Committee on various compensation matters. None of our executive officers participated in the discussion or decisions of the Compensation Committee regarding his or her own 2019 compensation.

Since August 2015 the Compensation Committee has engaged Compensia, Inc. (Compensia) as an independent adviser to the Compensation Committee. For 2019, Compensia conducted analysis and provided information and advice on, among other things, the Company's executive compensation programs and the development of the Company's peer group. Compensia reports directly to the Compensation Committee, which retains sole authority to direct the work of and engage Compensia.

In February 2020, the Compensation Committee, taking into account the various factors prescribed by the NYSE regarding the independence of compensation consultants, reaffirmed the independence of Compensia as a compensation advisor.

For additional information regarding the Compensation Committee's processes and procedures for the consideration and determination of executive compensation, including the role of Compensia, see the section below entitled "*Compensation Discussion and Analysis*."

Compensation Committee Interlocks and Insider Participation

The members of our Compensation Committee during 2019 were Messrs. Wilder (Chair), Grewal, and Kassing, and Mses. Leeds, O'Rourke and Sarna. None of these directors has ever been an officer or employee of us or any of our subsidiaries. None of our executive officers currently serves, or served during 2019, on the compensation committee or board of directors of any other entity that has one or more executive officers serving as a member of the Board or the Compensation Committee. No director that served on our Compensation Committee during 2019 had any relationship requiring disclosure by us under Item 404 of Regulation S-K.

Compensation Committee Report

The Compensation Committee has reviewed and discussed the Compensation Discussion and Analysis contained herein with management, and based on such review and discussions, the Compensation Committee recommended to the Board that the Compensation Discussion and Analysis be included in this Proxy Statement and incorporated into the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2019.

The material in this report is not deemed "soliciting material," is not deemed "filed" with the SEC, is not subject to Regulation 14A or 14C, except to the extent provided in Item 407 of Regulation S-K, or to the liabilities of Section 18 of the Exchange Act, and is not to be incorporated by reference into any filing of Penumbra under the Securities Act or the Exchange Act, whether made before or after the date hereof and irrespective of any general incorporation language in any such filing.

Respectfully submitted on April 13, 2020 by the members of the Compensation Committee of the Board of Directors:

Thomas Wilder, Chair
Harpreet Grewal
Don Kassing
Janet Leeds

Equity Compensation Plan Information

The following table provides certain information with respect to all of Penumbra's equity compensation plans as of December 31, 2019.

Plan Category	Number of securities to be issued upon exercise of outstanding options, warrants and rights	Weighted-average exercise price of outstanding options, warrants and rights	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a))
	(a)	(b)	(c)
Equity compensation plans approved by stockholders	1,605,281 (1)	$22.58 (3)	8,055,150 (4)(5)
Equity compensation plans not approved by stockholders	145,000	$7.75	—
Total	1,750,281 (2)	$21.02 (3)	8,055,150

(1) Amount does not include any shares of common stock issuable under our Employee Stock Purchase Plan (the ESPP). The Company issues shares under the ESPP once every six months based on employee contributions in the preceding six months. Pursuant to the terms of the ESPP, the number of shares to be issued and the price per share is not determined until immediately before the date of issuance.

(2) As of December 31, 2019, the weighted-average remaining term of the 1,379,075 options outstanding was 5.0 years.

(3) Excludes restricted stock units (RSUs), which have no exercise price.

(4) Includes 6,959,455 shares available for future issuance under the 2014 Equity Incentive Plan and 1,095,695 shares available for future issuance under the ESPP.

(5) The number of shares available for issuance under the 2014 Equity Incentive Plan increases automatically on the first day of each fiscal year of the Company beginning with the 2016 fiscal year and ending with the 2025 fiscal year, in an amount equal to the least of (i) 2,500,000 shares, (ii) 5% of the outstanding shares on the last day of the immediately preceding fiscal year, or (iii) such number of shares determined by the Board. The number of shares available for issuance under the ESPP increases automatically on the first day of each fiscal year of the Company beginning with the 2016 fiscal year and ending with the 2025 fiscal year, in an amount equal to the least of (i) 500,000 shares, (ii) 1% of the outstanding shares on the last day of the immediately preceding fiscal year or (iii) such number of shares determined by the Board.

Effective January 1, 2019, the number of shares available for issuance under the 2014 Equity Incentive Plan increased by 1,730,115 shares and the number of shares available for issuance under the ESPP increased by 346,023 shares, in each case pursuant to the automatic increase provisions contained in the respective plans discussed above. However, due to the fact that the Company (i) had not registered the offering of such shares under the Securities Act as of December 31, 2019, (ii) has not registered the offering of such shares under the Securities Act since December 31, 2019, and (iii) has no current plans to register the offering of such shares under the Securities Act or issue such shares under the 2014 Equity Plan or the ESPP, respectively, the Company deems such shares to not be available for issuance under the 2014 Equity Incentive Plan and the ESPP, respectively, as of December 31, 2019. For 2020, the Board elected not to increase the number of shares available for issuance under the 2014 Equity Incentive Plan or the ESPP.

Nominating and Corporate Governance Committee

The NCG Committee is generally responsible for identifying qualified Board candidates, recommending director nominees and appointments to Board committees, evaluating Board performance, overseeing director compensation and developing, recommending to the Board and overseeing compliance with our corporate governance guidelines and policies. To that end, the NCG Committee is responsible for, without limitation:

- identifying and recommending candidates for membership on the Board;
- recommending directors for appointment to Board committees;
- reviewing and recommending to the Board the compensation of our directors;
- developing and recommending to the Board our corporate governance guidelines and policies;
- reviewing proposed waivers of our Corporate Governance Guidelines and Code of Business Conduct and Ethics for directors, executive officers and other senior financial officers;
- overseeing the process of evaluating the performance of the Board;
- reviewing related party transactions;
- overseeing our director education programs; and
- assisting the Board on other corporate governance matters.

A detailed discussion of the NCG Committee's procedures for recommending candidates for election as a director appears below under the section entitled "*Procedures of the Nominating and Corporate Governance Committee*."

The NCG Committee was established in August 2015 and currently consists of four directors: Mses. Leeds (Chair), O'Rourke and Sarna and Mr. Kassing. In connection with the periodic review by the Board of the composition of the Board and Board committees and consideration of the rotation of committee members and committee chairs, (i) effective May 3, 2019, Mr. Wilder was removed as a member of the NCG Committee and Ms. Leeds was appointed as a member of the NCG Committee, (ii) effective July 1, 2019, Ms. Sarna was appointed as a member of the NCG Committee and (iii) effective August 2, 2019, Mr. Grewal was removed as a member of the NCG Committee and Ms. Leeds was appointed as the Chair of the NCG Committee, replacing Mr. Kassing as Chair. The NCG Committee met six times during 2019. The Board has determined that all members of our NCG Committee meet the independence requirements applicable to directors and nominating and corporate governance committee members under SEC rules and NYSE listing standards.

The NCG Committee is governed by a written charter, which was adopted by the Board in August 2015. The NCG Committee charter can be found in the Investors section of our website at www.penumbrainc.com under "Governance—Corporate Governance." Information on or accessible through our website is not incorporated by reference in this Proxy Statement. The NCG Committee charter complies with the guidelines established by the NYSE. The charter of the NCG Committee grants the NCG Committee authority to retain and terminate any advisers, including search firms to identify director candidates, compensation consultants as to director compensation and legal counsel, including sole authority to approve all such advisers' fees and other retention terms.

As required by its charter, the NCG Committee conducts a self-evaluation at least annually. The NCG Committee also periodically reviews and assesses the adequacy of its charter and recommends any proposed changes to the Board for approval.

Procedures of the Nominating and Corporate Governance Committee

In connection with nominating directors for election at the Annual Meeting and periodically throughout the year, the NCG Committee considers the composition of the Board and each committee of the Board to evaluate its effectiveness and whether or not changes should be considered to either the Board or any of the committees. In support of this process, the Board has determined that the Board as a whole must have the right diversity, mix of characteristics and skills for the optimal functioning of the Board in its oversight of our Company. The NCG Committee considers the following factors and qualifications:

- the appropriate size and the diversity of the Board;
- the needs of the Board with respect to the particular talents and experience of its directors;
- the knowledge, skills and experience of nominees, including experience in the industry in which the Company operates, business, finance, management or public service, in light of prevailing business conditions, and the knowledge, skills and experience already possessed by other members of the Board;
- familiarity with domestic and international business matters;
- legal and regulatory requirements; and
- experience with accounting rules and practices.

Pursuant to the NCG Committee charter, the NCG Committee periodically reviews the composition of the Board in light of the current challenges and needs of the Board and the Company, and determines whether it may be appropriate to add or remove individuals after considering issues of judgment, diversity, skills, background and experience. Although the NCG Committee does not have a formal policy respecting diversity on the Board, the NCG Committee is sensitive to the importance of nominating persons with different perspectives and experience to enhance the deliberation and decision-making processes of the Board.

Once the NCG Committee and the Board determine that it is appropriate to add a new director, either as a replacement or as a new position, the NCG Committee uses a flexible set of procedures in selecting individual director candidates. This flexibility allows the NCG Committee to adjust the process to best satisfy the objectives it is attempting to accomplish in any director search. The first step in the process is to identify the type of candidate the NCG Committee may desire for a particular opening, including establishing the specific target skill areas, experiences and backgrounds that are to be the focus of a director search. The NCG Committee may consider candidates recommended by management, by other members of the NCG Committee, by the Board, by stockholders, or it may engage a third party to conduct a search for possible candidates based on criteria specified by the NCG Committee. In considering candidates submitted by stockholders, the NCG Committee will take into consideration the needs of the Board and the qualifications of the candidate.

In order for a stockholder to have a candidate considered by the NCG Committee, a stockholder should submit a written recommendation that includes (A) as to each person whom the stockholder proposes to nominate for election or reelection as director: (1) all information relating to such person that is required to be disclosed in solicitations of proxies for election of directors, or is otherwise required, in each case pursuant to Regulation 14A under the Exchange Act, including such person's written consent to being named in the proxy statement as a nominee and to

serving as a director if elected; and (2) a reasonably detailed description of any compensatory, payment or other financial agreement, arrangement or understanding that such person has with any other person or entity other than the Company including the amount of any payment or payments received or receivable thereunder, in each case in connection with candidacy or service as a director of the Company, and (B) as to the stockholder giving the notice and the beneficial owner, if any, on whose behalf the proposal is made: (1) the name and address of such stockholder (as they appear on the Company's books) and any such beneficial owner; (2) for each class or series, if any, the number of shares of capital stock of the Company that are held of record or are beneficially owned by such stockholder and by any such beneficial owner; (3) a description of any agreement, arrangement or understanding between or among such stockholder and any such beneficial owner, any of their respective affiliates or associates, and any other person or persons (including their names) in connection with the proposal of such nomination; (4) a description of any agreement, arrangement or understanding (including, regardless of the form of settlement, any derivative, long or short positions, profit interests, forwards, futures, swaps, options, warrants, convertible securities, stock appreciation or similar rights, hedging transactions and borrowed or loaned shares) that has been entered into by or on behalf of, or any other agreement, arrangement or understanding that has been made, the effect or intent of which is to create or mitigate loss to, manage risk or benefit of share price changes for, or increase or decrease the voting power of, such stockholder or any such beneficial owner or any such nominee with respect to the Company's securities; (5) a representation that the stockholder is a holder of record of stock of the Company entitled to vote at such meeting and intends to appear in person or by proxy at the meeting to bring such nomination before the meeting; (6) a representation as to whether such stockholder or any such beneficial owner intends or is part of a group that intends to (i) deliver a proxy statement and/or form of proxy to holders of at least the percentage of the voting power of the Company's outstanding capital stock required to elect each such nominee and/or (ii) otherwise to solicit proxies from stockholders in support of such nomination; and (7) any other information relating to such stockholder, beneficial owner, if any, or director nominee that would be required to be disclosed in a proxy statement or other filing required to be made in connection with the solicitation of proxies in support of such nominee pursuant to Section 14 of the Exchange Act. Stockholder recommendations should be addressed to the NCG Committee in care of our Secretary at the address set forth below under the section entitled "*Stockholder Communications with the Board of Directors*."

Once candidates are identified, the NCG Committee conducts an evaluation of qualified candidates. The evaluation generally includes interviews and background and reference checks. There is no difference in the evaluation process of a candidate recommended by a stockholder as compared to the evaluation process of a candidate identified by any of the other means described above. In identifying and evaluating potential nominees to serve as directors, the NCG Committee will examine each nominee on a case-by-case basis regardless of who recommended the nominee and take into account all factors it considers appropriate.

If the NCG Committee determines that a candidate should be nominated as a candidate for election to the Board, the candidate's nomination is then recommended to the Board, and the Board may in turn conduct its own review to the extent it deems appropriate. When the Board has agreed upon a candidate, such candidate is recommended to the stockholders for election at an annual meeting of stockholders or appointed as a director by a vote of the Board, as appropriate.

Each of the current Class II directors has been recommended by the NCG Committee to the Board for re-election as a Class II director at the Annual Meeting, and the Board has approved such recommendations.

Executive Committee

The Executive Committee is vested with the authority to exercise certain functions of the Board when the Board is not in session, subject to restrictions imposed by applicable law, NYSE listing standards and any other limitations prescribed by the Board.

The Executive Committee was established in May 2015 and is composed of three directors: Messrs. Elsesser (Chair), Kassing, and Wilder. Two of the three members of the Executive Committee are "independent" under the listing standards of the NYSE. The Executive Committee met one time during 2019.

STOCKHOLDER COMMUNICATIONS WITH THE BOARD OF DIRECTORS

Our relationship with our stockholders is an important part of our corporate governance program. Engaging with our stockholders helps us to understand how they view us, to set goals and expectations for our performance,

and to identify emerging issues that may affect our strategies, corporate governance, compensation practices or other aspects of our operations. Our stockholder and investor outreach practices include investor road shows, analyst meetings, and investor conferences and meetings. We also communicate with stockholders and other stakeholders through various media, including our annual report to stockholders, SEC filings, news releases, and our website. Our conference calls in connection with quarterly earnings releases are open to the public in real time and available as archived webcasts on our website for a period of time.

The Board has adopted a process for stockholders and other interested parties to send communications to the Board or any director(s), including the Presiding Director. All such communications should be sent by mail addressed to the Board or any particular director(s) (including the Presiding Director) at One Penumbra Place, Alameda, CA 94502, c/o Secretary of Penumbra, Inc. All communications received by the Secretary will be sent directly to the Board or the relevant director(s).

CODE OF BUSINESS CONDUCT AND ETHICS

The Board has adopted a Code of Business Conduct and Ethics that applies to all employees and directors, including our principal executive officer, principal financial officer, principal accounting officer, other executive officers, and other senior financial personnel. A copy of our Code of Business Conduct and Ethics is available in the Investors section of our website at www.penumbrainc.com under "Governance—Corporate Governance." Information on or accessible through our website is not incorporated by reference in this Proxy Statement. If we make any substantive amendment to a provision of our Code of Business Conduct and Ethics that applies to, or grant any waiver from a provision of our Code of Business Conduct and Ethics to, our principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions, we will promptly disclose the date and nature of the amendment or waiver (including the name of the person to whom the waiver was granted) on our website in accordance with the requirements of Item 5.05 of Form 8-K.

DIRECTOR STOCK OWNERSHIP GUIDELINES

Our Corporate Governance Guidelines include stock ownership guidelines for our non-employee directors, which the Board considers an important tool in aligning the interests of our non-employee directors with the long-term interests of our stockholders.

Under the stock ownership guidelines for non-employee directors approved by the Board in April 2017, our non-employee directors are expected to hold shares of the Company's common stock with a dollar value equal to at least three times (3x) the non-employee director annual cash retainer (the Ownership Requirement). The NCG Committee measures compliance with the Ownership Requirement as of the last business day of each calendar year (the Determination Date), based on the adjusted closing price of our common stock as reported by the NYSE on the Determination Date. When a non-employee director is newly appointed to the Board, that director shall have a period of three years to accumulate the shares required to satisfy the Ownership Requirement. In addition, in the event the non-employee director annual retainer increases, the NCG Committee will recommend an appropriate period of time for each non-employee director to acquire any additional shares needed to satisfy the Ownership Requirement.

For purposes of determining compliance with the Ownership Requirement, the following shares are treated as owned: (i) shares of our common stock owned individually, either directly or indirectly, including shares underlying unvested restricted stock awards and RSUs; and (ii) shares of our common stock owned jointly or separately by a spouse, domestic partner and/or minor children. No other rights to acquire shares of our common stock (including stock options or similar rights) are considered shares of our common stock owned for purposes of meeting the Ownership Requirement.

Should a non-employee director fail to comply with the Ownership Requirement at any Determination Date, the NCG Committee, in its sole discretion, may review and address any such shortfall in ownership as it deems appropriate.

As of December 31, 2019, each of our non-employee directors met the Ownership Requirement.

The Board has also adopted stock ownership guidelines for our Chief Executive Officer. These requirements are discussed in greater detail below under the section entitled "*Executive Compensation—Compensation Discussion and Analysis—Other Compensation-Related Policies—Stock Ownership Guidelines*."

ANTI-HEDGING AND ANTI-PLEDGING POLICY

The Board has adopted a formal anti-hedging and anti-pledging policy for our employees (including our executive officers) and directors. Under our Policy Concerning Trading in Company Securities, which was adopted by the Board in August 2015, our employees (including our executive officers) and directors are prohibited from engaging in any hedging transactions (including transactions involving options, puts, calls, prepaid variable forward contracts, equity swaps, collars and exchange funds or other derivatives) that are designed to hedge or speculate on any change in the market value of the Company's equity securities, or pledging Company securities in any circumstance, including by purchasing Company securities on margin or holding Company securities in a margin account.

DIRECTOR COMPENSATION

Our directors play a critical role in guiding our strategic direction and overseeing the management of Penumbra. The many responsibilities and risks and the substantial time commitment of being a director require that we provide adequate compensation commensurate with our directors' workload and opportunity costs. Our non-employee directors receive compensation in the form of an annual cash retainer and initial and annual refresh grants of RSUs, as described in greater detail below. Our two employee directors, Mr. Elsesser and Dr. Bose, receive no separate compensation for their service as directors. For information regarding the compensation we pay to Mr. Elsesser and our other executive officers, please see the section below entitled "*Executive Compensation*."

In January 2019, the Board, following input from Compensia and upon the recommendation of the NCG Committee, approved an increase to the target value of the initial and annual RSU grants for non-employee directors from three times (3x) to three and one-half times (3.5x) the non-employee director annual cash retainer. Under the Company's director compensation policy, as updated by the Board in January 2019, each non-employee director receives an annual cash retainer of $40,000. The Audit Committee Chair receives an additional annual cash retainer of $25,000 in recognition of the responsibilities and level of participation required of such role. Each non-employee director also receives (i) an initial grant of RSUs upon joining the Board and (ii) an annual refresh grant of RSUs, in each case in an amount equal to three and one-half times (3.5x) the non-employee director annual cash retainer (currently $40,000), divided by the adjusted closing price of Penumbra's common stock on the date of grant, rounded up or down to the nearest whole share. The initial RSU grant vests over four years in equal quarterly installments beginning on the last day of the calendar quarter in which the director joined the Board, and the annual RSU grants vest in equal quarterly installments on the last day of each calendar quarter of the applicable year, beginning on the last day of the calendar quarter in which the grants are made (new directors receive a prorated annual RSU grant), subject in each case to the applicable director's continued service on the Board through the applicable vesting date.

The following table is a summary of the annual cash compensation paid to our non-employee directors for 2019. Each applicable line item is an additional element of compensation.

Director Position	Annual Cash Compensation[1][2]
All Non-Employee Directors	$ 40,000
Audit Committee Chair	$ 25,000

(1) The annual cash compensation that the Company pays to its Board members, other than Mr. Elsesser and Dr. Bose, is based on their positions on the Board, and the Company does not compensate the Board members on a per meeting basis. The amounts reflected in the table above were approved by the Board in January 2019.

(2) This annual cash compensation is paid quarterly in arrears.

Mses. Leeds and Sarna received initial RSU grants upon joining the Board on January 17, 2019 and July 1, 2019, respectively. Ms. Leeds received an initial grant of 1,011 RSUs under the 2014 Equity Incentive Plan, which award vests in sixteen approximately equal quarterly installments on the last day of each calendar quarter beginning with the calendar quarter ended March 31, 2019. Ms. Sarna received an initial grant of 872 RSUs under the 2014 Equity Incentive Plan, which award vests in sixteen approximately equal quarterly installments on the last day of each calendar quarter beginning with the calendar quarter ended September 30, 2019.

Additionally, on February 8, 2019, each of our non-employee directors (other than Ms. Sarna) received an annual grant of 949 RSUs under the 2014 Equity Incentive Plan, which awards vested in four approximately equal

installments on the last day of each calendar quarter of 2019. Ms. Sarna received a prorated annual grant of 436 RSUs under the 2014 Equity Incentive Plan on July 1, 2019, which award vested in two equal installments on each of September 30, 2019 and December 31, 2019.

The following table lists actual compensation paid to each of our non-employee directors for 2019.

2019 Director Compensation Table

Name	Fees Earned or Paid in Cash ($)[1]	Stock Awards ($)[3]	Total ($)
Harpreet Grewal[2]	55,625	139,968	195,593
Don Kassing	40,000	139,968	179,968
Janet Leeds	40,000	279,931	319,931
Bridget O'Rourke[2]	49,375	139,968	189,343
Surbhi Sarna	20,000	209,895	229,895
Thomas Wilder	40,000	139,968	179,968

(1) Director fees are generally paid quarterly in arrears. Accordingly, director fees earned in the fourth quarter of 2019 were paid in early 2020.

(2) Effective August 2, 2019, Ms. O'Rourke was appointed as the Chair of the Audit Committee, replacing Mr. Grewal. Each of Ms. O'Rourke and Mr. Grewal received a cash retainer of $3,125 for their respective service as Audit Committee Chair during the third quarter of 2019.

(3) The amounts in this column reflect the aggregate grant date fair value of the stock awards granted to our non-employee directors computed in accordance with the Financial Accounting Standards Board's Accounting Standards Codification (FASB ASC) Topic 718 (excluding the effect of estimated forfeitures). The grant date fair value of the initial RSU grant for Ms. Leeds was measured based on the closing price of Penumbra's common stock on January 17, 2019 ($138.44). The grant date fair values of the initial and annual RSU grants for Ms. Sarna were measured based on the closing price of Penumbra's common stock on July 1, 2019 ($160.47). The grant date fair value of the annual RSU grants for non-employee directors (other than Ms. Sarna) was measured based on the closing price of Penumbra's common stock on February 8, 2019 ($147.49). For the assumptions used in determining these grant date fair values, see Notes 2 and 11 to the consolidated financial statements contained in the Company's Annual Report on Form 10-K for the year ended December 31, 2019, as filed with the SEC on February 26, 2020. There were no unvested awards as of December 31, 2019, except for (i) 443 RSUs remaining unvested from Ms. O'Rourke's initial RSU grant, (ii) 758 RSUs remaining unvested from Ms. Leeds' initial RSU grant, and (iii) 763 RSUs remaining unvested from Ms. Sarna's initial RSU grant.

PROPOSAL NO. 2: RATIFICATION OF THE SELECTION OF THE INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM FOR PENUMBRA

On April 13, 2020, the Board selected Deloitte & Touche LLP (Deloitte) as the Company's independent registered public accounting firm for the fiscal year ending December 31, 2020. Deloitte has served as our independent registered public accounting firm since September 17, 2008. Representatives of Deloitte plan to attend the Annual Meeting and will be available to answer appropriate questions from stockholders. They will have the opportunity to make a statement if they desire to do so.

Neither our Bylaws nor other governing documents or applicable law require stockholder ratification of the selection of Deloitte as our independent registered public accounting firm. However, the Board is submitting the selection of Deloitte to our stockholders for ratification as a matter of good corporate practice. If our stockholders fail to ratify the selection, the Board will reconsider whether or not to retain Deloitte. Even if the selection is ratified, the Board in its discretion may direct the appointment of a different independent registered public accounting firm at any time during the year if the Board determines that such a change would be in the best interest of the Company and our stockholders.

Independent Registered Public Accounting Firm Fee Information

The following is a summary of the services provided by Deloitte to the Company for fiscal years 2018 and 2019 and related fees billed in connection therewith:

	Fiscal Year Ended December 31,	
Description of Services Provided by Deloitte	**2019**	**2018**
Audit Fees [1]	$ 2,151,140	$ 2,176,530
Audit-Related Fees	$ —	$ —
Tax Fees [2]	$ 261,404	$ 143,830
All Other Fees	$ —	$ —
TOTAL	$ 2,412,544	$ 2,320,360

(1) Audit fees for Deloitte for 2019 and 2018 were for professional services rendered in connection with the audits of our financial statements and of our internal control over financial reporting and the review of our interim financial statements, and for services that are normally provided by Deloitte in connection with statutory and regulatory filings or engagements.

(2) Tax fees for Deloitte for 2019 and 2018 were for tax consulting and compliance services.

Pursuant to its charter, the Audit Committee is required to pre-approve all audit and non-audit services provided by our independent registered public accounting firm, as well as all associated fees and terms, pursuant to pre-approval policies and procedures established by the Audit Committee. The Audit Committee may delegate its authority to pre-approve services to one or more committee members, provided that such member(s) present any such approvals to the full Audit Committee at the next Audit Committee meeting. The Audit Committee evaluates the independent registered public accounting firm's qualifications, performance and independence, and presents its conclusions to the full Board on at least an annual basis.

All of the services provided by Deloitte for fiscal years 2018 and 2019, as well the fees for such services described above, were pre-approved by the Audit Committee in accordance with these standards.

Approval of this proposal requires the affirmative vote of a majority of shares cast by the holders of shares present in person or represented by proxy and entitled to vote at the Annual Meeting. Abstentions will not count as votes cast on this proposal and therefore will not affect the outcome of this proposal.

THE BOARD OF DIRECTORS RECOMMENDS A VOTE IN FAVOR OF PROPOSAL NO. 2.

PROPOSAL NO. 3: ADVISORY VOTE ON THE COMPENSATION OF THE COMPANY'S NAMED EXECUTIVE OFFICERS

Background and Purpose of Proposal

In accordance with rules promulgated pursuant to Section 14A of the Exchange Act, stockholders are being asked to approve, on an advisory and non-binding basis, the compensation of the Company's NEOs (as defined below) as disclosed in this Proxy Statement. This is commonly referred to as a "Say-on-Pay" proposal. This advisory vote is not intended to address any specific item of compensation, but rather the overall compensation of the Company's NEOs and the philosophy, policies and practices described in this Proxy Statement. At the 2017 annual meeting of stockholders, our stockholders expressed the preference that we hold an advisory vote on named executive officer compensation each year. The Board affirmed the stockholders' preference and will hold "Say-on-Pay" votes on an annual basis until the next required stockholder vote on "Say-on-Pay" frequency, which is scheduled to be held at our 2023 annual meeting of stockholders.

The compensation of the Company's NEOs subject to this advisory vote is disclosed in this Proxy Statement under the section entitled "*Executive Compensation*," including the "*Compensation Discussion and Analysis*," the compensation tables, and the related narrative disclosure contained therein. As described in detail in these disclosures, the Company's compensation philosophy is to maintain a transparent and simple executive compensation program that fosters an ownership mentality by emphasizing targeted long-term equity compensation coupled with cash compensation solely in the form of a base salary. Please read the section below entitled "*Executive Compensation—Compensation Discussion and Analysis*" and the compensation tables and related narrative disclosure that follow it for additional information regarding the Company's 2019 executive compensation program, including information about the 2019 compensation of the Company's NEOs.

Accordingly, the Board is asking the stockholders to indicate their support for the compensation of the Company's NEOs as described in this Proxy Statement by casting a non-binding advisory vote "FOR" the following resolution:

"**RESOLVED,** that the compensation paid to the Company's NEOs for fiscal 2019, as disclosed in this Proxy Statement pursuant to the compensation disclosure rules of the SEC, including the Compensation Discussion & Analysis, compensation tables, and narrative discussion and any related material, is APPROVED."

The "*Executive Compensation—Compensation Discussion and Analysis*" section of this Proxy Statement contains more information on the Company's executive compensation program and we urge you to read it carefully before casting your vote on this proposal. Because the vote is advisory, it is not binding on the Company, the Board or the Compensation Committee. Nevertheless, the views expressed by the stockholders, whether through this vote or otherwise, are important to our management, the Board and the Compensation Committee. Our management, Board and Compensation Committee all intend to consider the results of this vote in making determinations in the future regarding our executive compensation arrangements and the Company's executive compensation program, policies and practices.

Advisory approval of this proposal requires the affirmative vote of a majority of shares cast by the holders of shares present in person or represented by proxy and entitled to vote at the Annual Meeting. Abstentions and broker non-votes will not count as votes cast on this proposal and therefore will not affect the outcome of this proposal.

THE BOARD OF DIRECTORS RECOMMENDS A VOTE IN FAVOR OF PROPOSAL NO. 3.

OTHER INFORMATION RELATED TO PENUMBRA, ITS DIRECTORS AND EXECUTIVE OFFICERS

Security Ownership of Certain Beneficial Owners and Management

The following tables set forth certain information known to us regarding beneficial ownership of our common stock as of March 31, 2020 by:

- each person known by us to be the beneficial owner of more than 5% of any class of our voting securities;
- each of our named executive officers;
- each of our directors; and
- all current executive officers and directors as a group.

Beneficial ownership is determined in accordance with SEC rules, and generally includes voting power and/or investment power with respect to the securities held. Shares of common stock subject to options currently exercisable or exercisable within 60 days of March 31, 2020 are deemed outstanding and beneficially owned by the person holding such options for purposes of computing the number of shares and percentage beneficially owned by such person, but are not deemed outstanding for purposes of computing the percentage beneficially owned by any other person. Except as indicated in the footnotes to this table and subject to applicable community property laws, to our knowledge the persons or entities named in this table have sole voting and investment power with respect to all shares of our common stock shown as beneficially owned by them. The table below is based upon information furnished to us by our executive officers, directors and principal stockholders and Schedules 13G (or amendments thereto) filed with the SEC.

Unless otherwise indicated, the mailing address of each of the stockholders below is c/o Penumbra, Inc., One Penumbra Place, Alameda, California 94502.

Principal Stockholders

Name of Beneficial Owner	Amount and Nature of Beneficial Ownership	Percentage of Common Stock[1]
5% stockholders		
FMR LLC[2]	5,237,124	14.9 %
BlackRock, Inc. [3]	3,091,875	8.8 %
The Vanguard Group[4]	2,919,125	8.3 %

(1) Based on 35,071,008 shares of common stock outstanding on March 31, 2020.

(2) Beneficial ownership is as of December 31, 2019 and is based solely on information contained in the Schedule 13G/A filed with the SEC on February 7, 2020, by FMR LLC and Abigail P. Johnson (as Director, Chairman, and Chief Executive Officer of FMR LLC). FMR LLC, in its capacity as a parent holding company or control person for various subsidiaries, may be deemed to beneficially own the indicated shares and has sole dispositive power over 5,237,124 shares and sole voting power over 962,798 shares. FMR LLC reported its beneficial ownership on behalf of itself and the following direct and indirect subsidiaries and affiliates: FIAM LLC, Fidelity Management & Research Company (FMR Co), Fidelity Personal Trust Company, FSB SA, FMR Co., Inc. (Fidelity), and Strategic Advisers LLC.

Fidelity, a wholly-owned subsidiary of FMR LLC, is the beneficial owner of 5% or greater of our outstanding common stock. Neither FMR LLC nor Abigail P. Johnson has the sole power to vote or direct the voting of the shares owned directly by the various investment companies registered under the Investment Company Act (Fidelity Funds) advised by FMR Co, a wholly owned subsidiary of FMR LLC, which power resides with the Fidelity Funds' Boards of Trustees. FMR Co carries out the voting of the shares under written guidelines established by the Fidelity Funds' Boards of Trustees.

The address for FMR LLC is 245 Summer Street, Boston, MA 02210.

(3) Beneficial ownership is as of December 31, 2019 and is based solely on information contained in the Schedule 13G filed with the SEC on February 7, 2020, by BlackRock, Inc. (BlackRock). BlackRock, in its

capacity as a parent holding company or control person for various subsidiaries, may be deemed to beneficially own the indicated shares and has sole dispositive power over 3,091,875 shares and sole voting power over 2,970,315 shares. BlackRock reported its beneficial ownership on behalf of itself and the following direct and indirect subsidiaries and affiliates: BlackRock Advisors, LLC, BlackRock (Netherlands) B.V., BlackRock Fund Advisors, BlackRock Institutional Trust Company, National Association, BlackRock Asset Management Ireland Limited, BlackRock Financial Management, Inc., BlackRock Japan Co., Ltd., BlackRock Asset Management Schweiz AG, BlackRock Investment Management, LLC, BlackRock Investment Management (UK) Limited, BlackRock Asset Management Canada Limited, BlackRock Investment Management (Australia) Limited, and BlackRock Advisors (UK) Limited.

BlackRock Fund Advisors, a wholly-owned subsidiary of BlackRock, is the beneficial owner of 5% or greater of our outstanding common stock.

The address for BlackRock is 55 East 52nd Street, New York, NY 10055.

(4) Beneficial ownership is as of December 31, 2019 and is based solely on information contained in the Schedule 13G/A filed with the SEC on February 12, 2020, by The Vanguard Group (Vanguard). The Vanguard Group, a registered investment adviser, has shared voting power with respect to 5,887 shares, shared dispositive power with respect to 20,215 shares, sole dispositive power with respect to 2,898,910 shares, and sole voting power with respect to 18,250 shares. Vanguard filed the report on behalf of itself and its wholly owned subsidiaries, Vanguard Fiduciary Trust Company (beneficial owner of 14,328 shares) and Vanguard Investments Australia, Ltd. (beneficial owner of 9,809 shares).

The address for Vanguard is 100 Vanguard Blvd., Malvern, PA 19355.

Directors and Executive Officers

Name of Beneficial Owner	Amount and Nature of Beneficial Ownership	Percentage of Common Stock[1]
Directors and Named Executive Officers		
Adam Elsesser[2]	1,629,582	4.6 %
Arani Bose, M.D.[3]	580,662	1.7 %
Harpreet Grewal	12,828	*
Don Kassing[4]	9,638	*
Janet Leeds	1,454	*
Bridget O'Rourke	2,746	*
Surbhi Sarna	516	*
Thomas Wilder[5]	3,686	*
Sri Kosaraju[6]	157,851	*
James Pray[7]	455,009	1.3 %
Johanna Roberts[8]	92,806	*
Lynn Rothman[9]	194,319	*
Maggie Yuen	—	*
All current executive officers and directors as a group (14 persons)	3,171,921	8.9 %

* Represents less than 1% of Penumbra's outstanding common stock.

(1) Based on 35,071,008 shares of common stock outstanding on March 31, 2020. Shares of common stock subject to issuance upon vesting of RSUs or exercise of stock options that will vest within 60 days of March 31, 2020 are deemed outstanding and beneficially owned by the person holding the RSUs or stock options for the purpose of computing the percentage ownership of the person or any group including that person but are not treated as outstanding for the purpose of computing the percentage ownership of any other person.

(2) Mr. Elsesser has (i) shared voting and dispositive power with respect to 1,029,582 shares held by the Siegel/Elsesser Revocable Trust, for which Mr. Elsesser acts as Co-Trustee with his wife, and (ii) sole voting

power and sole dispositive power with respect to 600,000 shares issuable upon the exercise of stock options held by Mr. Elsesser that are exercisable within 60 days of March 31, 2020.

(3) Dr. Bose has (i) sole voting power and sole dispositive power with respect to 566,518 shares held by Dr. Bose, and (ii) shared voting and shared investment power with respect to 14,144 shares held by Arani & Shumita Bose.

(4) Mr. Kassing has (i) sole voting power and sole dispositive power with respect to 1,138 shares held by Mr. Kassing, and (ii) shared voting and shared investment power with respect to 8,500 shares held by the Kassing Family Trust, for which Mr. Kassing acts as Co-Trustee with his wife.

(5) Mr. Wilder has (i) sole voting power and sole dispositive power with respect to 189 shares held by Mr. Wilder, and (ii) shared voting power and shared dispositive power with respect to 3,497 shares held by the Thomas and Catharine Wilder Family Trust dated March 31, 2006, for which Mr. Wilder acts as Co-Trustee with his wife.

(6) Mr. Kosaraju has shared voting and dispositive power with respect to 157,851 shares held by the Kosaraju Family Trust, for which Mr. Kosaraju acts as Co-Trustee with his wife.

(7) Mr. Pray has (i) sole voting power and sole dispositive power with respect to 1,578 shares held by Mr. Pray, and (ii) shared voting and dispositive power with respect to 453,431 shares held by the Pray Revocable Trust, for which Mr. Pray acts as Co-Trustee with his wife.

(8) Ms. Roberts has sole voting power and sole dispositive power with respect to (i) 39,056 shares held by Ms. Roberts, (ii) 3,750 shares that are subject to RSUs held by Ms. Roberts that will vest within 60 days of March 31, 2020, and (iii) 50,000 shares issuable upon the exercise of stock options held by Ms. Roberts that are exercisable within 60 days of March 31, 2020.

(9) Ms. Rothman has (i) sole voting and sole dispositive power with respect to (x) 12,332 shares held by Ms. Rothman, and (y) 80,180 shares issuable upon the exercise of stock options held by Ms. Rothman that are exercisable within 60 days of March 31, 2020, and (ii) shared voting and shared investment power with respect to 101,807 shares held by the Trust of Richard E. Koch & Lynn D. Rothman, for which Ms. Rothman acts as Co-Trustee with her husband.

Executive Officers

The following table sets forth certain information concerning our executive officers as of March 31, 2020.

Name	Age	Position with Penumbra
Adam Elsesser	58	Chief Executive Officer
Arani Bose, M.D.	58	Chief Innovator
Sri Kosaraju	42	President
James Pray	56	President, International
Johanna Roberts	48	Executive Vice President, General Counsel and Secretary
Lynn Rothman	59	Executive Vice President and Chief Business Officer
Lambert Shiu	40	Chief Accounting Officer
Maggie Yuen	48	Chief Financial Officer

There are no family relationships between any of our directors and any of our executive officers.

Mr. Elsesser's and Dr. Bose's biographies can be found with the biographies of the other members of the Board beginning on page 9 of this Proxy Statement. Biographies for our other executive officers, including our other named executive officers, are below.

Sri Kosaraju joined Penumbra in 2015. He served as Chief Financial Officer and Head of Strategy from April 2015 until his promotion to President in August 2019, and also served as Chief Financial Officer from August 2019 until December 2019. Prior to joining Penumbra, Mr. Kosaraju had over 16 years of experience in investment banking. Mr. Kosaraju worked for J.P. Morgan Securities LLC (J.P. Morgan) from 1999 until 2015, where he held a variety of positions with successively greater responsibility, most recently Managing Director of Equity Capital Markets, Head of Healthcare Equity Capital Markets and co-Head of Technology, Media, Telecom Equity Capital Markets. Prior to entering J.P. Morgan's equity capital markets group in 2006, Mr. Kosaraju served in various practice groups at J.P. Morgan, including Equity Derivatives from 2003 to 2006 and Technology, Media, Telecom Investment Banking Coverage from 1999 to 2003. Mr. Kosaraju currently serves on the board of directors of 10x

Genomics, Inc. (Nasdaq: TXG), a publicly traded life science technology company. Mr. Kosaraju received a B.S. from Massachusetts Institute of Technology.

James Pray joined Penumbra in 2005. He has served as President, International, since January 2015 and as President from 2005 to January 2015. Prior to joining Penumbra, Mr. Pray had over 15 years of experience in the medical device industry, much of that in the neurovascular arena. Prior to joining Penumbra, Mr. Pray worked for Boston Scientific Corporation, including as the Director of Marketing for the neurovascular division from 2000 to 2005. Mr. Pray also worked as a Research and Development Engineer and Engineering Manager for SCIMED Life Systems, a medical device company, from 1990 to 1996. Mr. Pray received a B.S. and M.S. from the University of Minnesota.

Johanna Roberts joined Penumbra in 2014. She served as Vice President and Deputy General Counsel from July 2015 until her promotion to Executive Vice President, General Counsel and Secretary in September 2018. Prior to joining Penumbra, Ms. Roberts had fifteen years' experience working for several law firms, including Morrison & Foerster LLP in San Francisco. Ms. Roberts received a B.A. from Dartmouth College and J.D. from Harvard Law School.

Lynn Rothman joined Penumbra in 2007. She has served as Executive Vice President and Chief Business Officer since January 2015; as Chief Financial Officer from March 2009 to January 2015; as Vice President, Administration from January 2009 to March 2009, and as Human Resources Manager from 2007 to January 2009. Ms. Rothman joined Penumbra with over 20 years of experience in finance and marketing of medical and emerging growth companies. Ms. Rothman served as Director of Corporate Marketing at Confer Software, Inc., a disease management company, from 1997 to 2000. Prior to that time, Ms. Rothman worked at Robertson, Stephens & Company, a financial services firm, where she worked in both health care research and venture capital focused on potential medical device, service and software investment opportunities. She received a B.A. from Stanford University and an M.B.A. from The Wharton School, University of Pennsylvania.

Lambert Shiu joined Penumbra in 2015, serving as Director of Finance, then as Vice President, Finance and Accounting until his promotion to Chief Accounting Officer in December 2019. Prior to joining Penumbra, Mr. Shiu worked for PricewaterhouseCoopers, LLP (PwC), an accounting firm, for 13 years. He worked on a variety of teams during his tenure at PwC, each role increasing in levels of responsibility and management and spent two years in their National Office. Mr. Shiu is a Certified Public Accountant in California and received a B.A. from the University of California, Davis in 2001.

Maggie Yuen joined Penumbra as Chief Financial Officer in December 2019. Prior to joining Penumbra, Ms. Yuen spent more than 20 years driving scalable finance organizations, processes and infrastructure in the Manufacturing, Medical Devices, and Life Science industries. She served as Vice President of Finance of the Genetic Science Division within Thermo Fisher Scientific, Inc. (NYSE: TMO) (Thermo Fisher), a business focused on instrument platforms, cloud-based software, content and services, from 2016 to 2019. In her role, Ms. Yuen directed finance operations, strategic planning and business development activities, among a number of other executive functions. Prior to Thermo Fisher, Ms. Yuen held leadership positions with increasing responsibility at Mirion Technologies (from 2012 to 2016), and senior finance roles at Boston Scientific (NYSE: BSX) (from 2007 to 2010), Glu Mobile (Nasdaq: GLUU) (from 2004 to 2007), and Johnson & Johnson (NYSE: JNJ) (from 2001 to 2004). She received an MAcc and M.B.A. from the Weatherhead School of Management and a B.S. from Case Western Reserve University.

Legal Proceedings

There are no material legal proceedings in which any director, officer or affiliate of the Company, any owner of record or beneficially of more than 5% of any class of voting securities of the Company, or any associate of any such director, officer, affiliate, or security holder is a party adverse to the Company or any of its subsidiaries or has a material interest adverse to the Company or any of its subsidiaries.

Delinquent Section 16(a) Reports

Section 16(a) of the Exchange Act requires our directors and executive officers and persons who beneficially own more than 10% of a registered class of our equity securities to file reports of ownership and reports of changes in ownership with the SEC.

To the best of our knowledge and based solely on a review of such filed reports and written representations that no other reports were required, during the fiscal year ended December 31, 2019, other than as set forth below, all Section 16(a) filing requirements applicable to our executive officers, directors and greater than ten percent beneficial owners were complied with on a timely basis:

- One report, covering one transaction related to the grant of an award of RSUs on May 15, 2019, was filed late on behalf of Johanna Roberts, our Executive Vice President, General Counsel and Secretary.

EXECUTIVE COMPENSATION

COMPENSATION DISCUSSION AND ANALYSIS

The following Compensation Discussion and Analysis (CD&A) provides information about our 2019 compensation program for the individuals who served as our principal executive officer or principal financial officer and our three other most highly-compensated executive officers, in each case during the year ended December 31, 2019, or our named executive officers (whom we refer to as our NEOs), each of whose compensation is set forth in the Summary Compensation Table and the other compensation tables included in this Proxy Statement. For 2019, our NEOs were:

- Adam Elsesser, our Chairman and Chief Executive Officer (Mr. Elsesser also served as our President until August 29, 2019);
- Sri Kosaraju, our President (Mr. Kosaraju also served as our Chief Financial Officer until December 2, 2019);
- Maggie Yuen, our Chief Financial Officer (Ms. Yuen joined Penumbra effective December 2, 2019);
- Lynn Rothman, our Executive Vice President and Chief Business Officer;
- James Pray, our President, International; and
- Johanna Roberts, our Executive Vice President, General Counsel and Secretary.

This CD&A also discusses our executive compensation philosophy; decisions involving our executive team, including the NEOs, with respect to compensation paid for 2019; the role of Compensia, our compensation consultant; the individual components of our executive compensation program; and certain other policies affecting executive compensation at Penumbra.

Executive Summary

2019 Executive Compensation Highlights

For the year ended December 31, 2019, the key highlights of our executive compensation program included:

- Below Market Chief Executive Officer Total Cash Compensation. Throughout his tenure as our Chief Executive Officer, Mr. Elsesser has expressed a preference to our Compensation Committee that his cash compensation be modest so we could invest in other areas of the business. Mr. Elsesser maintained this preference in fiscal year 2019 and was not granted any new equity grant or cash compensation increases. As such, for 2019 his total cash compensation was below the competitive market 10th percentile.
- Below Market NEO Total Cash Compensation. Because we generally do not pay bonuses or other cash incentive compensation, total cash compensation levels were, as of November 2019, at or below the competitive market 35th percentile for all of our NEOs. Upon joining Penumbra in December 2019, Ms. Yuen's target total cash compensation level approximated the competitive market 80th percentile when including her one-time cash signing bonus, and the 25th percentile of the competitive market when factoring only in her base salary.

- Peer Group. We added six companies to, and removed two companies from, our compensation peer group. The changes to our compensation peer group were made to reflect changes in our revenue, market cap and growth profile.

- Increases to Base Salary. None of our NEOs received an increase to base salary in 2019.

- Short-Term Incentive Compensation Award. Except for Ms. Yuen, who was granted a cash signing bonus in connection with her joining Penumbra in December 2019, none of our NEOs received cash bonus or other short-term incentive compensation in 2019.

- Equity Awards. Except for Ms. Roberts, who was granted an equity award in the form of RSUs in connection with her promotion to Executive Vice President, General Counsel and Secretary in September 2018, and Ms. Yuen, who was granted an equity award in the form of RSUs and stock options in connection with her joining Penumbra in December 2019, none of our NEOs received equity award grants in 2019.

Executive Compensation Philosophy

Our Board and Compensation Committee maintain a simple structure for our executive compensation program focused on base salary and equity ownership. Because we generally do not pay annual bonuses (or other cash incentives), our NEOs' base salaries are at the higher end of the competitive market, but given this is their only cash compensation, our NEOs receive total cash compensation that is typically at the lower end of our competitive market.

We are confident that our streamlined compensation program aligns with our culture of cooperation and that it incentivizes our NEOs to work for the overall long-term good of the Company.

The Compensation Committee periodically reviews our compensation philosophy to determine whether any changes to our current philosophy are required to reward, incentivize, and retain our NEOs, or for other purposes.

Executive Compensation Philosophy, Objectives, Design and Components

It is critical to accomplishing our business objectives that we attract and retain talented executives whose skills and expertise enable them to contribute to our long-term success. As such, the principle objectives of our executive compensation program are to fairly reward, incentivize, and retain members of our executive team so that they perform in a manner that aligns their long-term interests with those of the Company and our stockholders. The following table identifies the main elements of our 2019 executive compensation program, the reasons for each, and the key features of each element within our 2019 executive compensation program:

Element	Reason for Providing Element	Key Features
Base Salary	Provide our NEOs a competitive fixed level of cash compensation for their services based on their knowledge, skills, and experience.	Reviewed annually for market competitiveness, taking into account the fact that we do not offer annual cash incentive compensation to our NEOs. We did not make any increases to the base salaries of our NEOs in 2019.
Long-Term Equity Awards	Provide long-term retention and incentives to our NEOs that align their interests with our stockholders' interests.	We do not have an established annual program of awarding equity grants to our NEOs. However, we continually evaluate whether long-term equity awards are needed for retention, interest alignment, or other purposes. Since 2015, we have granted equity awards to our then-serving NEOs on five occasions, including the equity awards granted to Mses. Roberts and Yuen in 2019.

Since our founding in 2004, we have consistently maintained a transparent and simple executive compensation program that fosters an ownership mentality by emphasizing targeted long-term equity compensation coupled with cash compensation solely in the form of a base salary. The primary components of the compensation program for our NEOs are base salary and equity awards in the form of stock options and RSUs, all subject to time-based vesting. The 2014 Equity Incentive Plan allows us to grant, and we may consider granting, performance awards to our NEOs as an additional component of compensation in the future. To date, we have not established a practice of granting equity awards to our NEOs annually or on any other regular basis.

We are confident that our executive compensation program aligns with our culture of cooperation, and incentivizes our NEOs to work for the overall long-term good of the Company. We believe that short-term incentive compensation or other cash bonus programs can result in individuals adapting their conduct to meet specific short-term goals, the achievement of which may have unintended consequences over the long term. Moreover, differences in compensation resulting from short-term incentive compensation and other cash bonus programs can create distractions that are contrary to our culture of cooperation.

We pay our NEOs cash compensation in the form of a base salary that is at the higher end of the competitive market (at or above the market 65th percentile for all of our NEOs as of November 2019). However, because we generally do not pay bonuses or other cash incentive compensation, our NEO total cash compensation levels are generally at the lower end of the competitive market (at or below the 35th percentile for all of our NEOs as of November 2019). Upon joining Penumbra in December 2019, Ms. Yuen's target total cash compensation level approximated the competitive market 80th percentile when including her one-time cash signing bonus, and the 25th percentile of the competitive market when factoring only in her base salary.

Historically, we have not made regular annual increases to the base salaries of our executive officers. In 2019, we did not make any increases to the annual base salaries of our NEOs.

Since our IPO in September 2015, we have not granted any of our then-serving NEOs, other than Mses. Roberts and Yuen and Daniel Davis, our former President, North America, equity awards or bonuses or other cash incentive compensation. While we constantly evaluate compensation of our NEOs to reward, incentivize and retain them as appropriate, the Compensation Committee concluded that, with the exception of the grant of an equity award to Ms. Roberts in connection with her promotion to Executive Vice President, General Counsel and Secretary in September 2018 and a signing bonus and new hire equity awards to Ms. Yuen in connection with her joining Penumbra in December 2019, no additional equity grants or cash incentive compensation were necessary in 2019.

The Compensation Committee will continue to review our compensation philosophy to determine whether any changes to our current philosophy are required to reward, incentivize, and retain our NEOs, or for other purposes.

2019 Say-on-Pay Vote and Stockholder Engagement

At our 2019 Annual Meeting of Stockholders, approximately 98% of the stockholders voting at the meeting approved the compensation paid to our NEOs in 2018. Although the vote was non-binding, the Compensation Committee believes this level of approval indicates that stockholders strongly support our executive compensation program and policies. Accordingly, the Company has substantially maintained the same approach to executive compensation for 2019.

The Company carefully considers stockholder feedback regarding our executive compensation program. Our senior management team, including our Chief Executive Officer and President (formerly Chief Financial Officer), regularly interacts with our stockholders throughout the year on a number of matters, including executive compensation. Through these and other outreach efforts, we believe we can understand our stockholders' opinions and concerns on executive compensation and gather and convey stockholder views and comments directly to the Compensation Committee and the rest of the Board. For additional information concerning our stockholder outreach efforts, please refer to the section above entitled " *Information Regarding the Board of Directors and Corporate Governance—Stockholder Communications with the Board of Directors*".

The Compensation Committee will consider the results of this year's say-on-pay proposal, as well as feedback from our stockholders, when making future executive compensation decisions.

Roles of Compensation Committee, Management and Compensation Consultant

Role of Compensation Committee. The Compensation Committee charter requires the Compensation Committee to review and approve the compensation of our Chief Executive Officer and each of our other executive officers and to review and evaluate our executive compensation and benefits programs and policies in general. In making its determination about our executive compensation and benefits programs and policies, the Compensation Committee considers a number of factors, including the recruitment, development, promotion, retention and compensation of executive officers and other employees of the Company; the recommendations of the Chief Executive Officer (other than with respect to his own compensation); current and past total direct compensation; current and past equity ownership; competitive market data and analysis provided by the Compensation Committee's compensation consultant; the Company's performance and each executive officer's impact on such performance; our operational goals; internal pay equity considerations; the performance of our common stock; and any other factors that it deems appropriate, with no one factor being determinative. The Compensation Committee also reviews and evaluates our current compensation philosophy, with input from our management and Compensia (including the development of a comparative group of health care equipment, health care supply and healthcare technology companies to use as our peer group for executive compensation decisions), to determine whether any changes to our current philosophy are required going forward.

For additional information regarding the Compensation Committee, see the section above entitled "*Information Regarding the Board of Directors and Corporate Governance—Information Regarding Committees of the Board of Directors—Compensation Committee*" in this Proxy Statement.

Role of Management. In 2019, members of management, including our Chief Executive Officer, our President (formerly our Chief Financial Officer), and our Executive Vice President, General Counsel and Secretary, worked with the Compensation Committee to develop our executive compensation program for the year, including the various elements of executive compensation described below. Our Chief Executive Officer (who also serves on the Board), our Chief Innovator (who also serves on the Board), our President (formerly our Chief Financial Officer), our Executive Vice President and Chief Business Officer, and our Executive Vice President, General Counsel and Secretary attended Compensation Committee meetings as appropriate. None of our NEOs participated in the discussion or decisions relating to his or her own 2019 compensation.

Role of Compensation Consultant. The Compensation Committee is authorized to retain its own advisers to assist it in performing its duties, and the Company pays the fees charged by such advisers. Since 2015, the Compensation Committee has engaged Compensia, a national compensation consulting firm, to assist the Compensation Committee in discharging its responsibilities by conducting analysis and providing information and advice on competitive market compensation practices, including market data on executive compensation, our executive compensation program, compensation trends and developments, and supplying such other information and recommendations as the Compensation Committee may from time to time to request. In 2019, Compensia worked with the Compensation Committee to develop a peer group against which to compare the Company's executive compensation program and prepared reports analyzing the Company's executive compensation program against the competitive market.

Compensation Adjustments and Peer Group Process

We generally review our executive compensation practices on an annual basis over the course of several meetings of the Compensation Committee and the Board. The first step in the process is for the Compensation Committee, with the support of Compensia and management, to review the composition of the peer group. In connection with its analysis of our executive compensation program for 2019, Compensia collected and analyzed compensation data from a comparator group of health care equipment, health care supply and health care technology companies approved by the Compensation Committee (the peer group).

The companies in the peer group are selected based on various criteria including size, location, market capitalization, operating and net income, revenue and total shareholder return. The criteria used to select the peer group for 2019 was drawn from health care equipment, health care supply and health care technology companies:

- with annual revenue generally between $150 million and $850 million;

- with market capitalization generally between $1.0 billion and $18.0 billion;
- with annual operating income generally between a loss of $75 million and income of $225 million;
- with annual net income generally between a loss of $125 million and income of $175 million;
- with an employee population generally between 500 and 5,000 employees;
- with a one-year total shareholder return generally between -50% and 200%; and
- headquartered in the United States.

The companies comprising the 2019 peer group (the 2019 Peer Group), as compared to the 2018 peer group and 2017 peer group, were as follows:

2019 Peer Group	2018 Peer Group	2017 Peer Group
Abaxis[(1)]	Abaxis	Abaxis
ABIOMED	ABIOMED	ABIOMED
AtriCure	AtriCure	AtriCure
CryoLife	CryoLife	CryoLife
DexCom	DexCom	Cynosure
Glaukos	Endologix	DexCom
Inogen	ICU Medical	Endologix
Insulet	Inogen	ICU Medical
Masimo	Insulet	Inogen
Medidata Solutions	Masimo	Insulet
Merit Medical Systems	Neogen	Neogen
Neogen	Nevro	Nevro
Nevro	NxStage Medical	NxStage Medical
NxStage Medical[(1)]	Veeva Systems	Spectranetics
Quidel		Vascular Solutions
Teladoc Health		Veeva Systems
Varex Imaging		ZELTIQ Aesthetics
Veeva Systems		

(1) Abaxis was acquired in 2018 and NxStage Medical was acquired in 2019. However, compensation information was available at the time of Compensia's 2019 peer group review and analysis and therefore they were included in the 2019 Peer Group.

The Compensation Committee reviews and updates the peer group periodically to ensure that the peer group companies satisfy our selection criteria. As a result of such review, the following updates have been made to the peer group since 2017:

- Cynosure, Vascular Solutions, Spectranetics and ZELTIQ Aesthetics were removed as a result of acquisition activity;
- Endologix and ICU Medical were removed based on the updated inclusion criteria; and
- Glaukos, Masimo, Medidata Solutions, Merit Medical Systems, Quidel, Teladoc Health, and Varex Imaging were added based on the updated inclusion criteria.

As of November 2018, as compared to the 2019 Peer Group, we were at approximately the 40th percentile for revenue for the preceding four quarters, at approximately the 65th percentile for market capitalization, at approximately the 45th percentile for operating income for the preceding four quarters, at the 60th percentile for net income for the preceding four quarters, at approximately the 70th percentile for number of employees and at the 55th percentile for one-year total shareholder return.

The Compensation Committee uses the competitive market data provided by Compensia as a reference point, but does not believe it necessary at this stage to target any specific percentile or range of percentiles for cash, equity or total compensation for our executive officers relative to the peer group. The Compensation Committee believes the data provided by Compensia provides a useful tool in its deliberations on executive compensation.

Principal Elements of Compensation

With two exceptions (as described below), the 2019 compensation of our NEOs consisted entirely of base salary. Only one of our NEOs received a cash bonus during 2019 and only two of our NEOs received equity awards during 2019. The mix and amount of compensation elements has been and will continue to be within the discretion and business judgment of our Board and Compensation Committee. The Compensation Committee considered total equity ownership and other factors, including but not limited to those described above under *Role of the Compensation Committee,* in making its compensation decisions, with no one factor being determinative, and concluded that with the two exceptions previously noted, it was not necessary to grant any cash bonuses or equity awards to our NEOs in 2019.

Base Salary. We provide base salaries to our NEOs to compensate them for services rendered on a day-to-day basis and to provide sufficient fixed cash compensation to allow them to fund their personal and household expenses while remaining focused on their responsibilities to the Company. When setting the base salaries of our NEOs, the Compensation Committee considers the knowledge, skills, responsibilities, experience, performance and potential to contribute to our strategic goals of our NEOs, our overall financial performance, internal pay equity as well as competitive market data provided by Compensia. None of our NEOs received an increase to base salary in 2019. The Compensation Committee generally reviews base salary levels on an annual basis and may review them more frequently, for example in connection with a promotion, changes in responsibilities, or general cost of living adjustments.

Annual Cash Incentive Bonuses. We did not offer short-term cash incentive bonus opportunities to any of our NEOs in 2019. Rather, our Board and Compensation Committee continue to believe that our reliance on base salary and long-term incentive compensation in the form of equity awards adequately facilitates the achievement of our corporate operational goals and aligns each NEO's interests with long-term stockholder interests.

We granted a cash signing bonus to Ms.Yuen in the amount of $250,000 in connection with her joining Penumbra in December 2019. The bonus will be repayable by Ms. Yuen in full in the event that she leaves Penumbra within one year of December 2, 2019.

Equity Awards. The Compensation Committee grants equity awards from time to time to our employees, including our executive officers, so that their long-term interests are aligned with those of our stockholders. Equity awards take the form of stock options or RSUs.

Stock options allow our executive officers (including our NEOs) to purchase shares of our common stock at a price per share equal to the fair market value of our common stock on the date of grant. Our stock options generally vest 25% after one year, and then monthly over the subsequent three-year period as to the remaining shares subject to the options, subject to continued service through each vesting date. RSUs allow our executive officers (including our NEOs) to acquire shares of our common stock on vesting. RSUs generally vest in four equal annual installments, subject to continued service through each vesting date.

We do not have a practice of making equity awards annually or on any other regular basis. Rather, awards are generally granted on joining the Company, when a merit-based award is appropriate, in connection with a promotion or other event, or for retention purposes. Awards made to our NEOs in 2019 reflect this philosophy. Only our Chief Financial Officer and our Executive Vice President, General Counsel and Secretary received equity awards in 2019, which were granted upon our Chief Financial Officer joining the Company in December 2019 and in connection with our Executive Vice President, General Counsel and Secretary's promotion in September 2018, respectively. Information about these equity awards can be found in the *2019 Grants of Plan-Based Awards Table and the 2019 Outstanding Equity Awards at Fiscal Year-End Table* below.

We are actively considering the increased use of stock options and performance-based RSUs as a key component of our executive equity compensation program moving forward.

Perquisites, Retirement and Other Benefits. We generally do not provide perquisites or other personal benefits to our NEOs other than those available to our employees generally. We have established a 401(k) tax-deferred savings plan, which permits participants, including our NEOs, to make contributions by salary deduction pursuant to Section 401(k) of the Internal Revenue Code of 1986, as amended (the Code). We are responsible for the administrative costs of the 401(k) plan. We make matching contributions to the 401(k) plan up to specified limits. Three of our NEOs participated in the 401(k) plan in 2019. We provide all employees, including our NEOs, with life insurance equal to twice their annual salary up to a maximum of $1,000,000, as well as with long-term disability insurance.

Our NEOs are eligible to participate in the Company's health, dental, disability and other insurance plans on the same terms and at the same cost as such plans are available to all of the Company's full-time employees. The Company does not have or provide any supplemental executive retirement plan or similar plan that provides for specified retirement payments or benefits. Moreover, the Company does not have or provide any defined contribution plan or other plan that provides for the deferral of compensation on a basis that is not tax-qualified. In 2019, we authorized our Chief Executive Officer to fly on private aircraft at the expense of the Company when traveling on Company-related business to the extent commercial air travel would be impractical.

Additionally, all full-time U.S. employees of the Company, including our NEOs, are eligible to participate in the ESPP. Under the ESPP, all full-time U.S. employees may purchase shares of our common stock by authorizing payroll deductions at a minimum of 1% and up to 15% of his or her eligible compensation for each pay period during the offering period. Unless the participating employee withdraws from the offering, his or her accumulated payroll deductions will be used to purchase our common stock on the last business day of the offering period at a price equal to 85% of the fair market value of our common stock on either the first or the last day of the offering period, whichever is lower, provided that no Company employee is permitted to purchase shares of common stock having a market value of more than $25,000 per calendar year, as calculated under the ESPP (or more than 2,000 shares of the Company's common stock per purchase period if the value of all common stock purchased under the ESPP by such employee in any calendar year is less than $25,000). Employees of the Company's non-U.S. subsidiaries are not eligible to participate in the ESPP but instead participate in the Penumbra, Inc. OUS Employee Stock Purchase Rebate Plan, which was approved by the Company's stockholders at our 2018 Annual Meeting of Stockholders.

Severance and Change in Control Payments and Benefits. None of our current arrangements with our NEOs provide for severance or change in control-related payments or benefits. None of our NEOs is subject to an arrangement that is not terminable at will by the Company.

Equity awards held by our NEOs are subject to the terms of the relevant equity incentive plan and are each governed by an award agreement evidencing such award. The award agreements set forth the terms and conditions of the respective awards and, among other things, describe the effect of various termination events on the vesting of unvested equity awards. The equity awards held by our employees, including our NEOs, provide that all unvested awards will vest immediately upon a change of control of the Company, subject to continued service through the date of such change in control.

No Gross-ups of Parachute Payments and Deferred Compensation. We did not provide any NEO with a "gross-up" or other reimbursement payment for any tax liability that he or she might owe as a result of the application of Sections 280G, 4999, or 409A of the Code during 2019, and we have not agreed and are not otherwise obligated to provide any NEOs with such a "gross-up" or other reimbursement.

Other Compensation-Related Policies

Compensation Recoupment Policy

We maintain a formal policy stating that, in the event that the Company is required to prepare an accounting restatement due to the material noncompliance of the Company with any financial reporting requirement under applicable securities laws, the Company will recover from any current or former executive officer of the Company who received incentive-based compensation (cash or equity subject to performance-based vesting) during the three-year period preceding the date on which the Company is required to prepare an accounting restatement, based on the

erroneous data, the excess, if any, of the incentive-based compensation paid to such executive officer over what would have been paid to the executive officer under the accounting restatement.

Stock Ownership Guidelines

To align our Chief Executive Officer's interests with those of our stockholders, we maintain stock ownership guidelines requiring that our Chief Executive Officer hold Penumbra shares with a value equal to three times (3x) his base salary (the Ownership Requirement). The NCG Committee measures compliance with the Ownership Requirement as of the last business day of each calendar year (the Determination Date), based on the adjusted closing price of our common stock as reported by the NYSE on the Determination Date.

For purposes of determining compliance with the Ownership Requirement, the following shares are treated as owned: (i) shares of our common stock owned individually, either directly or indirectly, including shares underlying unvested restricted stock awards and RSUs; and (ii) shares of our common stock owned jointly or separately by a spouse, domestic partner and/or minor children. No other rights to acquire shares of our common stock (including stock options or similar rights) are considered shares of our common stock owned for purposes of meeting the Ownership Requirement.

Should our Chief Executive Officer fail to comply with the Ownership Requirement at any Determination Date, the NCG Committee, in its sole discretion, may review and address any such shortfall in ownership as it deems appropriate.

As of December 31, 2019, our Chief Executive Officer met the Ownership Requirement.

Anti-Hedging and Anti-Pledging Policy

We maintain a formal anti-hedging and anti-pledging policy for our employees (including our executive officers) and directors. Under our Policy Concerning Trading in Company Securities, which was adopted by the Board in August 2015, our employees (including our executive officers) and directors are prohibited from engaging in any hedging transactions (including transactions involving options, puts, calls, prepaid variable forward contracts, equity swaps, collars and exchange funds or other derivatives) that are designed to hedge or speculate on any change in the market value of the Company's equity securities, or pledging Company securities in any circumstance, including by purchasing Company securities on margin or holding Company securities in a margin account.

Compensation Policies and Practices as they relate to Risk Management

Our Compensation Committee has reviewed our compensation-related risks, and has determined that our compensation policies and practices do not encourage undue or inappropriate risk taking or create risks that are reasonably likely to have a material adverse effect on the Company.

The review conducted by the Compensation Committee focused on the key terms of our compensation programs in 2019, and our plans for such programs in 2020. Among other things, the Compensation Committee focused on whether our compensation programs created incentives for risk-taking behavior and whether existing risk mitigation features and policies were sufficient in light of the overall structure and composition of our compensation policies and programs. Among other things, the Compensation Committee considered the following aspects of our overall compensation policies and programs:

- The base salaries we provide to employees are generally high enough to provide our employees with sufficient income so that they are not dependent on bonus or other income to satisfy their basic cost of living. The base salary for each of our NEOs was at or above the market 65th percentile as of November 2019.

- Generally, it is only our sales employees who receive cash bonuses or other short-term cash incentive opportunities, most often in the form of commissions or bonuses, which are standard in the industry. We pay our sales employees a base salary that is sufficient to satisfy their basic cost of living, which we believe provides balanced incentives for performance while not encouraging excessive risk taking to achieve sales-related goals.

- Most equity awards granted to employees have time-based vesting and are not tied to specific performance milestones. In 2019, we granted performance RSUs to two sales employees, the number of which RSUs would be determined based on the achievement of certain U.S. sales milestones in 2019. Such RSUs vest over a four-year period beginning once the achievement of the performance milestones is determined after the end of the relevant performance period. We plan to continue to grant performance RSUs to select sales personnel in the future.

- The risks presented by our incentive compensation programs, including performance RSUs, are mitigated by the fact that (i) the employees participating in such programs are not dependent on income from such programs to satisfy their basic cost of living, (ii) certain incentive compensation program payouts are not made for significant periods of time, and (iii) the personnel responsible for the design of such programs and for monitoring and measuring achievement of the relevant performance milestones do not participate in such programs.

Tax and Accounting Considerations

Deductibility of Executive Compensation

Section 162(m) of the Code (Section 162(m)) limits the amount that we may deduct from our federal income taxes for remuneration paid to certain of our executive officers to one million dollars ($1,000,000) per executive officer per year. The exemption from the Section 162(m) deduction limit for "performance-based compensation" was repealed by the tax reform legislation signed into law on December 22, 2017, effective for taxable years beginning after December 31, 2017, provided that remuneration in excess of one million dollars ($1,000,000) may still be exempt from this deduction limit if it qualifies as "performance-based compensation" within the meaning of Section 162(m) with respect to taxable years beginning on or before December 31, 2017 and is payable pursuant to a binding written agreement in effect on November 2, 2017.

While our Compensation Committee is mindful of the benefit to us of the full deductibility of compensation and will consider deductibility when analyzing potential compensation alternatives, our Compensation Committee believes that it should not be constrained by the requirements of Section 162(m) where those requirements would impair flexibility in compensating our executive officers in a manner that can best promote our corporate objectives. Therefore, our Compensation Committee has not adopted a policy that requires that all compensation be deductible, and, accordingly, we expect that a portion of our future executive compensation will not be deductible under Section 162(m).

Accounting Treatment

We account for stock compensation in accordance with the authoritative guidance set forth in ASC Topic 718, which requires companies to measure and recognize the compensation expense for all share-based awards made to employees (including executive officers) and directors, including stock options and RSUs, over the period during which the award recipient is required to perform services in exchange for the award (for executive officers, generally the four-year vesting period of the award). We estimate the fair value of stock options using the Black-Scholes option-valuation model. This calculation is performed for accounting purposes and is reported in the compensation tables below.

2019 Summary Compensation Table

The following table discloses compensation paid by us to our NEOs during fiscal 2019 and, where the individual was a NEO for the relevant prior year, fiscal 2018 and 2017:

Name and Principal Position	Year	Salary	Bonus	Stock Awards (1)	Option Awards (1)	Non-Equity Incentive Plan Compensation	All Other Compensation (2)	Total
Adam Elsesser Chief Executive Officer[3]	2019	$ 725,000	–	–	–	–	$ 1,690	$ 726,690
	2018	$ 725,000	–	–	–	–	$ 1,648	$ 726,648
	2017	$ 725,000	–	–	–	–	$ 1,926	$ 726,926
Sri Kosaraju President[4]	2019	$ 600,000	–	–	–	–	$ 10,469	$ 610,469
	2018	$ 550,000	–	–	–	–	$ 5,537	$ 555,537
	2017	$ 500,000	–	–	–	–	$ 1,926	$ 501,926
Maggie Yuen Chief Financial Officer[5]	2019	$ 31,731	$ 250,000	$1,100,185	$ 550,529	–	$ 141	$ 1,932,586
James Pray President, International	2019	$ 500,000	–	–	–	–	$ 4,286	$ 504,286
Lynn Rothman Executive Vice President, Chief Business Officer	2019	$ 600,000	–	–	–	–	$ 5,128	$ 605,128
	2018	$ 550,000	–	–	–	–	$ 3,136	$ 553,136
	2017	$ 500,000	–	–	–	–	$ 3,306	$ 503,306
Johanna Roberts Executive Vice President, General Counsel and Secretary	2019	$ 525,000	–	$2,025,450	–	–	$ 5,921	$ 2,556,371

(1) The amounts reported in this column reflect the aggregate grant date fair value of the equity awards granted to our NEOs computed in accordance with FASB ASC Topic 718. For the assumptions used in determining these grant date fair values, see Notes 2 and 11 to the consolidated financial statements contained in the Company's Annual Report on Form 10-K for the year ended December 31, 2019, as filed with the SEC on February 26, 2020. Unlike the calculations contained in our financial statements, this calculation does not give effect to any estimate of forfeitures related to service-based vesting, but assumes that the NEO will perform the requisite service for the award to vest in full.

(2) These amounts represent (i) life insurance premium payments and short-term and/or long-term disability insurance premium payments for each NEO, (ii) 401(k) matching payments for Messrs. Kosaraju and Pray and Mses. Roberts and Rothman and (iii) a stipend for waiving medical benefits for Ms. Roberts.

(3) Mr. Elsesser also served as our President from January 2015 until August 29, 2019.

(4) Mr. Kosaraju was appointed as our President on August 29, 2019. Mr. Kosaraju also served as our Chief Financial Officer and Head of Strategy from April 2015 until December 2, 2019.

(5) Ms. Yuen joined Penumbra as Chief Financial Officer effective December 2, 2019. The amount shown in the salary column for 2019 represents a partial year's salary based on her December 2, 2019 start date.

Narrative to Summary Compensation Table

2019 Base Salaries

Each of our NEOs is paid a base salary reflecting his or her knowledge, skills, responsibilities, experience, performance and potential to contribute to our strategic goals of our NEOs, our overall financial performance, internal pay equity as well as competitive market data provided by Compensia. The salaries of our NEOs are typically reviewed annually and adjusted when our Board of Directors or Compensation Committee determines an adjustment is appropriate. There were no increases to the base salaries of our NEOs for 2019.

Bonus

We granted a cash signing bonus to Ms. Yuen in the amount of $250,000 in connection with her joining Penumbra in December 2019. The bonus will be repayable by Ms. Yuen in full in the event that she leaves Penumbra within one year of December 2, 2019.

Equity-based compensation

In May 2019, the Compensation Committee granted Ms. Roberts an RSU award for 15,000 shares of our common stock, vesting over four years, in connection with her promotion to Executive Vice President, General Counsel and Secretary in September 2018. In December 2019, the Compensation Committee granted Ms. Yuen an RSU award for 6,950 shares of our common stock and a stock option award for 7,900 shares of our common stock, each vesting over four years, in connection with her joining Penumbra as Chief Financial Officer. Please see the *2019 Grants of Plan-Based Awards Table and the 2019 Outstanding Equity Awards at Fiscal Year-End Table* below for a description of the terms of these equity awards.

2019 Grants of Plan-Based Awards Table

The following table sets forth certain information regarding the plan-based awards granted during 2019 to our NEOs.

	Estimated Future Payouts Under Non-Equity Incentive Plan Awards								
Name	**Threshold ($)**	**Target ($)**	**Maximum ($)**	**Grant Date**	**Date of Approval**	**All Other Stock Awards: Number of Shares of Stock or Units(#)**	**All Other Option Awards: Number of Securities Underlying Options(#)**	**Exercise or Base Price of Option Awards ($/Sh)[1]**	**Grant Date Fair Value of Stock and Option Awards ($)[2]**
Adam Elsesser	–	–	–	–	–	–	–	–	–
Sri Kosaraju	–	–	–	–	–	–	–	–	–
Maggie Yuen	–	–	–	12/16/19	11/11/19	6,950	–	–	1,100,185
Maggie Yuen	–	–	–	12/16/19	11/11/19	–	7,900	158.30	550,529
James Pray.	–	–	–	–	–	–	–	–	–
Lynn Rothman	–	–	–	–	–	–	–	–	–
Johanna Roberts	–	–	–	5/15/19	5/3/19	15,000	–	–	2,025,450

(1) The exercise price per share of the stock options listed in the table above is the closing price of our common stock as reported by the NYSE on the grant date, which represents the fair market value of our common stock on such date.

(2) The amounts presented above represent the grant date fair values of the RSU and stock options awards computed in accordance with FASB ASC Topic 718. For the assumptions used in determining these grant date fair values, see Notes 2 and 11 to the consolidated financial statements contained in the Company's Annual Report on Form 10-K for the year ended December 31, 2019, as filed with the SEC on February 26, 2020. Unlike the calculations contained in our financial statements, this calculation does not give effect to any estimate of forfeitures related to service-based vesting, but assumes that the NEO will perform the requisite service for the award to vest in full.

The number of RSUs and stock options granted to the NEOs is determined by the Compensation Committee. Please see *Compensation Discussion and Analysis* for additional information regarding grant practices. Except as otherwise noted, RSUs vest in four equal annual installments on the anniversary of the grant date and stock options vest as to 25% of the shares subject to the options on the first anniversary of the grant date, and then monthly over the subsequent three-year period as to the remaining shares subject to the options, in each case subject to continued service through each vesting date.

2019 Outstanding Equity Awards at Fiscal Year-End Table

The following table sets forth information regarding stock options and RSUs held by our NEOs as of December 31, 2019.

	Option Awards				Stock Awards	
Name	Number of Securities Underlying Unexercised Options Exercisable (#)	Number of Securities Underlying Unexercised Options Unexercisable (#)	Option Exercise Price ($)	Option Expiration Date	Number of Shares or Units of Stock That Have Not Vested (#)	Market Value of Shares or Units of Stock That Have Not Vested ($)[6]
Adam Elsesser	5,000	—	7.75 [1]	3/20/24	—	—
	145,000	—	7.75 [1]	3/20/24	—	—
	450,000	—	30.00 [2]	9/16/25	—	—
Sri Kosaraju	—	—	—	—	—	—
Maggie Yuen	—	7,900 [3]	158.30 [1]	12/15/29	6,950 [4]	1,141,677
James Pray	—	—	—	—	—	—
Lynn Rothman	45,180	—	3.98 [1]	6/12/21	—	—
	50,000	—	22.04 [1]	8/11/25	—	—
Johanna Roberts	50,000	—	22.04 [1]	8/11/25	15,000 [5]	2,464,050

(1) Represents an amount determined by the Board to be not less than the fair market value of a share of the Company's common stock on the grant date.

(2) Represents the initial public offering price of the Company's common stock as set forth in the final prospectus with respect to the Company's Registration Statement on Form S-1 (No. 333-206412).

(3) Options were granted under the 2014 Equity Incentive Plan and will vest with respect to one-fourth of the shares subject to the options on December 16, 2020, and as to 1/48th of the total shares subject to the options on the 16th day of each month thereafter, subject to Ms. Yuen continuing to provide services to us through each applicable vesting date. In the event of a Change in Control, as defined in the 2014 Equity Incentive Plan, the options will fully vest, subject to Ms. Yuen continuing to provide services to us through the occurrence of the Change in Control, as described in further detail below under "*Potential Payments upon Termination or Change in Control*."

(4) RSUs were granted under the 2014 Equity Incentive Plan and will vest with respect to one-fourth of the shares subject to the RSUs on each of December 16, 2020, 2021, 2022 and 2023, subject to Ms. Yuen continuing to provide services to us through each applicable vesting date. In the event of a Change in Control, as defined in the 2014 Equity Incentive Plan, the RSUs will fully vest, subject to Ms. Yuen continuing to provide services to us through the occurrence of the Change in Control, as described in further detail below under "*Potential Payments upon Termination or Change in Control*."

(5) RSUs were granted under the 2014 Equity Incentive Plan and will vest with respect to one-fourth of the shares subject to the RSUs on each of May 15, 2020, 2021, 2022 and 2023, subject to Ms. Roberts continuing to provide services to us through each applicable vesting date. In the event of a Change in Control, as defined in the 2014 Equity Incentive Plan, the RSUs will fully vest, subject to Ms. Roberts continuing to provide services to us through the occurrence of the Change in Control, as described in further detail below under "*Potential Payments upon Termination or Change in Control*."

(6) Calculated by multiplying the number of RSUs that had not vested as of December 31, 2019 by $164.27, the closing price of our common stock as reported by the NYSE on December 31, 2019.

2019 Options Exercised and Stock Vested Table

The following table sets forth the number and value of options exercised and stock awards that vested in 2019 for each of our NEOs.

Options Exercised and Stock Vested

	Option Awards		Stock Awards	
Name	Number of Shares Acquired on Exercise (#)	Value Realized on Exercise ($)[1]	Number of Shares Acquired on Vesting (#)	Value Realized on Vesting ($)[2]
Adam Elsesser	—	—	—	—
Sri Kosaraju	—	—	151,216	20,722,641
Maggie Yuen	—	—	—	—
James Pray	—	—	—	—
Lynn Rothman	320	51,238	—	—
Johanna Roberts	—	—	12,500	1,527,500

(1) The value realized on exercise of stock options is calculated as the excess of the closing price of our common stock as reported by the NYSE on the exercise date (or the most recent closing price in the event the exercise date falls on a non-trading day) over the exercise price of the stock options, multiplied by the number of shares acquired.

(2) The value realized on vesting of stock awards is calculated as the product of the closing price of a share of our common stock as reported by the NYSE on the vesting date (or the most recent closing price in the event the vesting date falls on a non-trading day), multiplied by the number of shares vested.

Executive Officer Employment Arrangements

We do not have formal employment agreements with any of our NEOs. In certain cases, the initial compensation of our NEOs was set forth in an employment offer or promotion letter that we executed with such NEO at the time his or her employment with us commenced (or at the time of his or her promotion, as the case may be). All of our NEOs are employed on an "at will" basis. We do not have agreements or policies that would require us to provide severance payments or benefits or change-in-control payments or benefits to our executive officers, other than the provisions under our equity plans and agreements described in the *2019 Outstanding Equity Awards at Fiscal Year-End Table* above and as described under "*Potential Payments upon Termination or Change in Control*" below.

Employee Benefit Plans

Our NEOs are entitled to participate in our equity incentive plans and are eligible to participate in our 401(k) plan on the same terms as all other employees. We do not maintain any supplemental health or welfare plans for our NEOs.

Pension Benefits

We do not maintain any defined benefit pension plans.

Nonqualified Deferred Compensation

We do not maintain any nonqualified deferred compensation plans.

Potential Payments Upon Termination or Change in Control

None of our employment arrangements with our NEOs provide for severance or change in control-related payments or benefits. None of our NEOs is subject to an employment arrangement that is not terminable at will by

the Company. Equity awards held by our NEOs, like equity awards held by all of our other employees, provide that all unvested awards will vest immediately upon a change in control of the Company (as defined in the relevant plan), subject to the grant recipient continuing to be a service provider (as defined in the relevant plan) through the date of such change in control.

The table below sets forth the intrinsic value, as of December 31, 2019, the final trading day of fiscal 2019, of the unvested equity awards held by our NEOs which would accelerate under the circumstances described in the preceding paragraph. The actual amounts of payments that would be provided can only be determined at the time of the change in control of the Company. Per SEC rules, the intrinsic value of accelerated stock options shown in the table below is the difference between $164.27, the closing price of our common stock as reported by the NYSE on December 31, 2019, and the exercise prices of the accelerated options, if less than $164.27, multiplied by the number of shares of common stock underlying the accelerated options. The intrinsic value of accelerated RSUs is calculated as the number of accelerated RSUs multiplied by $164.27.

Name	Intrinsic Value of Unvested Equity Awards ($)
Adam Elsesser	—
Sri Kosaraju	—
Maggie Yuen	1,188,840
James Pray	—
Lynn Rothman	—
Johanna Roberts	2,464,050

Transactions with Related Persons, Promoters and Certain Control Persons

Since January 1, 2019, there has not been nor is there currently proposed any transaction or series of similar transactions to which we were or are to be a party in which the amount involved exceeds $120,000 and in which any director, executive officer, holder of more than 5% of our common stock, or any member of the immediate family of any of the foregoing persons had or will have a direct or indirect material interest, other than as described below.

Compensation Arrangements

Aidan Elsesser, the son of Adam Elsesser, our Chairman and Chief Executive Officer, and James Koch, the son of Lynn Rothman, our Executive Vice President Chief Business Officer, are non-executive employees of Penumbra and received employment compensation in excess of $120,000 in 2019.

Review, Approval, and Ratification of Transactions with Related Parties

Our NCG Committee has primary responsibility for reviewing and approving in advance or ratifying all related party transactions. Additionally, the Board reviews all identified related party transactions on a quarterly basis. In conformance with SEC regulations, we define related persons to include our executive officers, our directors and nominees to become a director of our company, any person who is known to us to be the beneficial owner of more than 5% of any class of our voting securities, any immediate family member of any of the foregoing persons, and any firm, corporation or other entity for which any of the foregoing persons serves as an executive officer, is a general partner or in which such person has a 10% or greater beneficial ownership interest.

We have several processes that we use to ensure that we identify and review all related party transactions. First, each director, director nominee and executive officer is required to notify the Corporate Secretary of any transaction involving the Company and a related person, and the Corporate Secretary will present any new related party transactions to the NCG Committee at its next regularly scheduled meeting. Second, each year, we require our directors and executive officers to complete director and officer questionnaires identifying any transactions with us in which the executive officer or director or their family members have an interest.

The NCG Committee reviews related party transactions due to the potential for such transactions to create a conflict of interest. A conflict of interest occurs when an individual’s private interest interferes, or appears to interfere, with our interests. The NCG Committee will not approve or ratify a related person transaction unless it first determines that, upon consideration of all relevant information, the transaction is in, or not inconsistent with, the best interests of the Company and its stockholders. In reviewing the transaction or proposed transaction, the

NCG Committee considers all relevant facts and circumstances, including without limitation the commercial reasonableness of the terms, the benefit and perceived benefit, or lack thereof, to the Company, opportunity costs of alternate transactions, the materiality and character of the related person's direct or indirect interest, and the actual or apparent conflict of interest of the related person.

Our Related Party Transaction Policy can be found in the Investors section of our website at www.penumbrainc.com under "Governance—Corporate Governance." Information on or accessible through our website is not incorporated by reference into this Proxy Statement.

CEO Pay Ratio Disclosure

As required by Section 953(b) of the Dodd-Frank Wall Street Reform and Consumer Protection Act, and Item 402(u) of Regulation S-K, the following presents information regarding the relationship of the median of the annual total compensation of our employees, other than our Chief Executive Officer, to the annual total compensation of our Chief Executive Officer, Mr. Elsesser.

We identified the median employee for our 2017 pay ratio analysis using the following methodology:

- We selected December 24, 2017, as the date on which to determine our median employee (the Determination Date). As of the Determination Date, we employed approximately 1,700 individuals. This population consisted of full-time, part-time, and temporary employees. In addition to the United States, the Company has employees in Canada, Australia, Brazil, Malaysia, Singapore, and throughout Europe.

- To identify the median employee from our employee population, we compared the amount of salary, wages and fringe benefits of all of our employees who were employed as of the Determination Date (excluding Mr. Elsesser), as reflected in (i) Box 1 of Form W-2 for 2017 (for our U.S.-based employees) and (ii) information gathered from our 2017 payroll reports from our payroll providers (for our international employees).

- Wages and salaries were annualized for those employees that were not employed for the full year of 2017. We did not make any cost-of-living adjustments in identifying the median employee. Employee pay rates in foreign currencies were converted to U.S. Dollars using relevant exchange rates on December 31, 2017. Using this methodology, we determined that our median employee was a full-time hourly employee working in our manufacturing facilities at our campus in Alameda, California.

SEC rules permit us to identify the median employee only once every three years, unless there have been changes in our employee population or employee compensation arrangements that we believe would result in a significant change in our pay ratio disclosure. There has been no change in our employee population or employee compensation arrangements that we reasonably believe would result in a significant change to our pay ratio disclosure. As a result, we decided to use the same median employee that we identified for our 2017 pay ratio disclosure.

In determining our 2019 pay ratio, we combined all elements of our median employee's compensation for 2019 using the same methodology that we used for calculating Mr. Elsesser's total compensation shown in the 2019 Summary Compensation Table, resulting in annual total compensation of $71,088. Mr. Elsesser's annual total compensation, as reported in the 2019 Summary Compensation Table, was $726,690. Based on this information, the ratio of the annual total compensation of Mr. Elsesser to the annual total compensation of our median employee was approximately 10 to 1 for 2019.

We believe that the above pay ratio is a reasonable estimate calculated in a manner consistent with Item 402(u) of Regulation S-K. In addition, because the SEC rules for identifying the median employee allow companies to adopt a variety of methodologies, to apply certain exclusions, and to make reasonable estimates and assumptions that reflect their compensation practices, the pay ratio reported by other companies may not be comparable to the pay ratio reported above, as other companies may have different employment and compensation practices and may utilize different methodologies, exclusions, estimates and assumptions in calculating their own pay ratios.

HOUSEHOLDING OF PROXY MATERIALS

The SEC has adopted rules that permit companies and intermediaries (*e.g.*, brokers) to satisfy the delivery requirements for Proxy Availability Notice or other Annual Meeting materials with respect to two or more stockholders sharing the same address by delivering a single Proxy Availability Notice or other Annual Meeting Materials addressed to those stockholders. This process, which is commonly referred to as householding, potentially provides extra convenience for stockholders and cost savings for companies. Stockholders who participate in householding will continue to be able to access and receive separate proxy cards.

This year, a number of brokers with account holders who are our stockholders will be "householding" our proxy materials. A Proxy Availability Notice or proxy materials will be delivered in one single envelope to multiple stockholders sharing an address unless contrary instructions have been received from one or more of the affected stockholders. Once you have received notice from your broker that they will be householding communications to your address, householding will continue until you are notified otherwise or until you revoke your consent. If, at any time, you no longer wish to participate in householding and would prefer to receive a separate Proxy Availability Notice or proxy materials, please notify your broker or contact Broadridge Financial Solutions, Inc. in writing: Attn: Householding Department, 51 Mercedes Way, Edgewood, NY 11717; or by telephone: 1-866-540-7095. Stockholders who currently receive multiple copies of the Proxy Availability Notice or proxy materials at their address and would like to request householding of their communications should contact their broker. In addition, we will promptly deliver, upon written or oral request to the address or telephone number above, a separate copy of the Proxy Availability Notice or proxy materials to a stockholder at a shared address to which a single copy of the documents was delivered.

OTHER MATTERS

The Board knows of no other matters that will be presented for consideration at the Annual Meeting. If any other matters are properly brought before the Annual Meeting, it is the intention of the persons named in the accompanying proxy to vote on such matters in accordance with their best judgment.

APPROVAL

The contents of this Proxy Statement and the sending thereof to the stockholders have been authorized by the Board.

By Order of the Board of Directors

Johanna Roberts
Executive Vice President, General Counsel and Secretary

April 23, 2020

A copy of our Annual Report on Form 10-K for the year ended December 31, 2019, as filed with the SEC on February 26, 2020, is available without charge upon written request to Investor Relations, Penumbra, Inc., One Penumbra Place, Alameda, CA 94502 or by accessing a copy on Penumbra's website at www.penumbrainc.com in the Investors section under "SEC Filings."

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, 2019

or

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

For the transition period from _____ to _____

Commission file number: 001-37557

Penumbra, Inc.

(Exact Name of Registrant as Specified in Its Charter)

Delaware	**05-0605598**
(State or Other Jurisdiction of Incorporation or Organization)	(I.R.S. Employer Identification No.)

One Penumbra Place
Alameda, CA 94502
(Address of principal executive offices, including zip code)

(510) 748-3200
(Registrant's telephone number, including area code)

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

Title of each class	**Trading Symbol**	**Name of each exchange on which registered**
Common Stock, Par value $0.001 per share	PEN	The New York Stock Exchange

Securities registered pursuant of 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 and posted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes: ☒ No: ☐

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

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

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

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

As of June 28, 2019, the aggregate market value of the registrant's common stock held by non-affiliates was approximately $5.1 billion, based on the closing price as reported on the New York Stock Exchange as of such date.

As of February 11, 2020, the registrant had 35,052,239 shares of common stock, par value $0.001 per share, outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive proxy statement for its 2020 annual meeting of stockholders, which is to be filed not more than 120 days after the registrant's fiscal year ended December 31, 2019, are incorporated by reference into Part III of this Annual Report on Form 10-K.

Penumbra, Inc.
FORM 10-K
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FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K (this "Form 10-K") includes forward-looking statements in addition to historical information. These forward-looking statements are included throughout this Form 10-K, including in the sections entitled "Business," "Risk Factors," "Management's Discussion and Analysis of Financial Condition and Results of Operations," and in other sections of this Form 10-K. In some cases, you can identify these statements by forward-looking words such as "may," "might," "will," "should," "expects," "plans," "anticipates," "believes," "estimates," "predicts," "potential," "opportunity" or "continue," the negative of these terms and other comparable terminology. These forward-looking statements, which are subject to risks, uncertainties and assumptions about us, may include projections of our future financial performance, our anticipated growth strategies and anticipated trends in our business.

These statements are only predictions based on our current expectations and projections about future events. There are important factors that could cause our actual results, level of activity, performance or achievements to differ materially from the results, level of activity, performance or achievements expressed or implied by the forward-looking statements, including those factors discussed in the section entitled "Risk Factors" in this Form 10-K. You should specifically consider the numerous risks outlined in the section of this Form 10-K entitled "Risk Factors." Although we believe the expectations reflected in the forward-looking statements are reasonable, we cannot guarantee future results, level of activity, performance or achievements. We undertake no obligation to update any forward-looking statements made in this Form 10-K to reflect events or circumstances after the date of this Form 10-K or to reflect new information or the occurrence of unanticipated events, except as required by law.

PART I

ITEM 1. BUSINESS.

Overview

References herein to "we," "us," "our," the "Company," and "Penumbra," refer to Penumbra, Inc. and its consolidated subsidiaries unless expressly indicated or the context requires otherwise.

Penumbra is a global healthcare company focused on innovative therapies. We design, develop, manufacture and market medical devices and have a broad portfolio of products that addresses challenging medical conditions in markets with significant unmet need. Our team focuses on developing, manufacturing and marketing novel products for use by specialist physicians and healthcare providers to drive improved clinical outcomes. We believe that the cost-effectiveness of our products is attractive to our customers.

Since our founding in 2004, we have had a strong track record of organic product development and commercial expansion that has established the foundation of our global organization. We have successfully developed, obtained regulatory clearance or approval for, and introduced products into the neurovascular market since 2007, vascular market since 2013 and neurosurgical market since 2014, respectively. We continue to expand our portfolio of product offerings, while developing and iterating on our currently available products.

We attribute our success to our culture built on cooperation, our highly efficient product innovation process, our disciplined approach to product and commercial development, our deep understanding of our target end markets and our relationships with specialist physicians and healthcare providers. We believe these factors have enabled us to rapidly innovate in a highly efficient manner.

We sell our products to healthcare providers primarily through our direct sales organization in the United States, most of Europe, Canada and Australia, as well as through distributors in select international markets. We generated revenue of $547.4 million, $444.9 million and $333.8 million for the years ended December 31, 2019, 2018 and 2017, respectively. This represents an annual increase of 23.0% and 33.3%, respectively. We generated operating income of $47.5 million and $1.2 million for the years ended December 31, 2019 and 2017, respectively, and an operating loss of $0.9 million for the year ended December 31, 2018.

Our Markets

We concentrate on improving treatment outcomes for patients with certain forms of vascular disease and strive to improve the long-term quality of life for patients recovering from other diseases or injuries requiring rehabilitation. Vascular disease refers to any condition that affects the circulatory system and typically manifests as a blockage or rupture of an artery or a vein. When the treatment for vascular disease is performed from within a vessel, it is referred to as an endovascular procedure. Rehabilitation includes exercises which aim to restore a patient to health or normal function through training and therapy after illness or disability. Endovascular device markets are conventionally classified according to the anatomic location of the disorder, and are generally divided into neuro, which includes neurovascular and neurosurgical, and vascular, which includes peripheral vascular and cardiovascular. In both of these markets, our main product technologies include thrombectomy devices to remove clots and embolization devices to treat aneurysms and to occlude vessels.

We generated revenue of $331.7 million, $294.3 million and $232.4 million from our neuro product category for the years ended December 31, 2019, 2018 and 2017, respectively. We generated revenue of $215.7 million, $150.6 million, and $101.3 million from our vascular product category for the years ended December 31, 2019, 2018 and 2017, respectively. The Company designs, develops, manufactures and markets novel medical devices, and operates as one operating segment.

While reliable third party data is not available for many markets outside the United States, we believe that there is a substantial additional market for our neuro and vascular products throughout the world.

The Neuro Market

The neuro market is comprised of vascular diseases and disorders in the brain, including ischemic stroke, brain aneurysms, hemorrhagic stroke and other conditions. Our solutions address the intervention of these diseases and the rehabilitation of these conditions.

Globally, stroke is the second-leading cause of death, and the third-leading cause of serious long-term disability. It is estimated that nearly 14 million strokes occur annually and that there are more than 80 million survivors of stroke globally. In the United States, the American Heart Association ("AHA") and American Stroke Association ("ASA") estimate that nearly 800,000 strokes occur annually, and lead to approximately 140,000 deaths per year. It is estimated that there are more than 7 million survivors of stroke in the United States. The majority of stroke survivors require rehabilitation in order to relearn motor skills lost through the brain damage caused by stroke. Within the United States, nearly 66% of stroke survivors receive some form of rehabilitation.

A stroke occurs when a blood vessel that carries oxygen and nutrients to the brain is either blocked by a clot or bursts (ruptures) and may take one of the following forms

- ***Ischemic Stroke*:** Ischemic strokes, caused by the blockage of an artery in the brain, represent approximately 87% of strokes, or approximately 700,000 patients annually, in the United States. Of these cases, we estimate that approximately 200,000 are treatable with mechanical thrombectomy, which involves removal of the clot causing the blockage by mechanical means and restoring blood flow to the blocked vessels. Outside of the United States, we estimate that there are approximately 9.7 million ischemic strokes annually and that 1.9 million of these patients are treatable with mechanical thrombectomy. Studies have shown that patients treated with mechanical thrombectomy had improved functional outcomes compared with treatment with clot-busting drugs such as tPA alone.
- ***Brain Aneurysm*:** An aneurysm is a weak area in a blood vessel that usually enlarges and is often described as a "ballooning" of the blood vessel. Approximately 1.5% to 5.0% of the general population has or will develop a brain aneurysm and about 6 million people in the United States may currently have a brain aneurysm. If a patient has had an aneurysm, there is a 15% to 20% likelihood that the patient will have one or more additional aneurysms. The primary endovascular procedure for treating unruptured aneurysms uses a repair technique called embolization, in which the aneurysm is packed with coils in a minimally invasive procedure.
- ***Hemorrhagic Stroke*:** Hemorrhagic strokes, caused by the sudden rupture of a brain artery that leads to bleeding into or around the brain, represent approximately 13% of strokes in the United States. Brain aneurysms and arteriovenous malformations ("AVM") can both cause hemorrhagic stroke. According to independent sources, every year 0.5% to 3.0% of people with a brain aneurysm and 1.0% to 3.0% of people with an AVM may suffer from bleeding. According to the AHA and ASA, once a brain aneurysm or an AVM bleeds, the chance of death is 30% to 40% and 10% to 15%, respectively. Intracerebral hemorrhage ("ICH"), a type of hemorrhagic stroke, occurs when a vessel within the brain bursts, allowing blood to leak inside the brain.

In addition to products addressing these specific diseases, our neuro access and rehabilitation products address other diseases and potentially broader neuro conditions as well.

The Vascular Market

Vascular diseases are diseases occurring in vessels in the body outside of the brain. Such diseases are very similar to those experienced in the neurovasculature. Just as the disruption of blood flow to the brain has high mortality and morbidity, disruptions in the peripheral vasculature can also have serious adverse consequences. There are approximately 1.4 million incidences of clot in the peripheral vasculature each year in the United States.We estimate that of that patient incidence, approximately 425,000 patients are currently treated either surgically, interventionally, or with lytics for treatment of the following vascular diseases.

- ***Venous Thromboembolism ("VTE")*:** Deep Vein Thrombosis, ("DVT") and Pulmonary Embolism ("PE") are collectively referred to as VTE. DVT occurs when a blood clot develops in veins deep in the body and PE occurs when a blood clot becomes lodged in the lung. DVT can result in PE if a blood clot in the leg breaks loose and travels to the lungs.
- ***Peripheral Arterial Occlusion ("PAO")*:** Acute PAO occurs when a blood clot develops in major peripheral arteries.
- ***Arteriovenous Graft or Fistula Declot ("AV Graft or Fistula")*:** Arteriovenous grafts or fistulas are created for access to dialyze the blood of patients with end-stage renal disease. It is common for clots to form within these access vessels when patients undergo dialysis long-term.
- ***Peripheral Embolization*:** Coil embolization is used to treat numerous conditions in the peripheral vasculature including aneurysms, vessel malformations, bleeding, endoleaks, ovarian veins and varicoceles.

Our Product Portfolio

Since our founding in 2004 we have developed a product portfolio that includes 7 product families within our major markets. The following table summarizes our product offerings.

Product Families		Key Product Brands	Descriptions
NEURO	**Thrombectomy**	Penumbra System, including Penumbra JET, ACE and the 3D Revascularization Device, Penumbra ENGINE and other components and accessories	Aspiration based thrombectomy systems and accessory devices, including revascularization device designed for mechanical thrombectomy
	Embolization	Penumbra Coil 400 POD400 PAC400	Neurovascular embolization coiling system designed to treat patients with large aneurysms and other large neurovascular lesions
		Penumbra SMART COIL	Neurovascular embolization coiling system designed to treat patients with all sizes of aneurysms and other neurovascular lesions
	Access	Neuron Neuron MAX Select BENCHMARK DDC PX SLIM	Neurovascular access systems designed to provide intracranial access for use in a wide range of neurovascular therapies
	Neurosurgical Tools	Artemis Neuro Evacuation Device	Neurosurgical aspiration tools for the removal of tissue and fluids
	Rehabilitation Tools	REAL Immersive System	Immersive virtual reality and display system that interactively displays and tracks upper-extremity rehabilitation exercises
VASCULAR	**Thrombectomy**	Indigo System	Aspiration-based thrombectomy system for vascular applications, currently for use in the peripheral and coronary vasculature
	Embolization	Ruby Coil Ruby LP	Large-volume, detachable embolic coil system for peripheral embolization
		LANTERN	Microcatheter for delivery of detachable coils and occlusion devices
		POD (Penumbra Occlusion Device)	Detachable, microcatheter-deliverable occlusion device designed specifically to occlude peripheral vessels
		Packing Coil Packing Coil LP	Complementary device for use with Ruby Coil and POD for vessel occlusion

Neuro Products

Our neuro products fall into the following broad product families:

Thrombectomy Products

Our Penumbra System brand of products offers a form of mechanical thrombectomy used by specialist physicians to revascularize blood vessels that are blocked by clots in the intracranial vasculature. These products are aspiration-based. The Penumbra System is a fully integrated mechanical thrombectomy system consisting of reperfusion catheters and separators, the 3D Revascularization Device, aspiration tubing, and aspiration pump.

Penumbra System Reperfusion Catheters are the cornerstone of the Penumbra System and are manufactured using a variety of proprietary processes and materials science innovations. Our reperfusion catheters are cleared by the FDA for use in revascularization of patients with acute ischemic stroke.

The Penumbra System Reperfusion Catheters, powered by Penumbra ENGINE or Penumbra Pump MAX, are designed for trackability and to maximize thrombus removal force. We believe these design features contribute to improved clinical outcomes and reduced procedure times. Penumbra System Reperfusion Catheters include the latest Penumbra JET family, ACE family and MAX families of catheters, designed to address a broad range of occlusions.

The Penumbra JET 7 with XTRA FLEX Technology has the largest lumen of the catheter families and offers the greatest aspiration power with the Penumbra ENGINE. The Penumbra JET D is designed to maximize aspiration power for distal occlusions.

The 3D Revascularization Device is a component of the Penumbra System that offers a technologically-advanced structure designed to treat large vessel occlusion in combination with Penumbra JET 7 and ACE Reperfusion Catheters.

Penumbra ENGINE or *Penumbra Pump MAX* is connected to our reperfusion catheters and provides the aspiration suction force. We developed our proprietary aspiration source as a fully-integrated system specifically for mechanical thrombectomy by aspiration.

Embolization Products

Penumbra SMART COIL is a family of detachable coils, designed to treat patients with a wide range of neurovascular lesions, including the small and medium sized aneurysms that comprise the majority of the neurovascular coiling market. The design of Penumbra SMART COIL allows the level of softness to be determined not only by the diameter of the platinum filament, but also by a structural component inside the coil itself. This development enables Penumbra SMART COIL to become progressively softer within the span of an individual coil.

Penumbra Coil 400 is a family of detachable coils developed to offer an improved alternative for the treatment of larger aneurysms and other larger, more complex lesions. We implemented several proprietary design innovations to enable the coil to maintain shape while achieving biomechanically stable occlusion. Given the size and handling of Penumbra Coil 400, it is able to achieve higher packing density with fewer coils compared to competitive coiling systems.

Access Products

Most endovascular procedures require access to the diseased area using guidewires and catheters. Accessing the brain through the tortuous neurovasculature has been a substantial challenge for physicians treating vascular disorders in the brain. Companies that developed catheters and other products for neurovascular applications historically leveraged technologies developed for use in coronary or peripheral vascular interventions. This approach created challenges given the vastly different anatomy, structure and sizing of the neurovascular vessels.

The Neuron family of guide catheters and the Penumbra distal delivery catheters ("DDC") enable many endovascular procedures in the tortuous anatomy of the neurovasculature. The Neuron delivery catheter is a variable stiffness guide catheter with increased support in the aortic arch, easier access, and trackability into the intracranial vasculature. The design of Neuron enables physicians to position the catheter much higher in the anatomy than conventional guide catheters.

The BENCHMARK catheter features additional improvements in aortic arch support, ease-of-use, and trackability. In addition to improved proximal support in the arch through multi-geometry metal reinforcement, the distal tip is softer and more trackable, while maintaining distal shaft radiopacity for improved visualization. The BENCHMARK also is available pre-packaged with a Select catheter to obviate the need for a neurovascular guide catheter exchange, which may reduce the number of devices needed per procedure and shorten procedure times.

Neurosurgical Tools

Artemis Neuro Evacuation Device leverages our expertise in thrombectomy and access to offer a minimally invasive approach to surgical removal of fluid and tissue from the ventricles and cerebrum. The Artemis Neuro Evacuation Device works with a neuroendoscope through a sheath to access hematomas. Together with the Penumbra Pump MAX aspiration source, Artemis offers powerful and controlled hematoma evacuation.

Rehabilitation

The REAL Immersive System is a proprietary, 3D immersive virtual reality tool designed for neurological and other rehabilitation, that interactively displays and tracks upper-extremity rehabilitation exercises. This technology builds on our experience with the disease of stroke and is designed for conducting upper body rehabilitation in a clinical setting. Studies have shown that adding virtual reality therapy to conventional therapy is effective in improving rehabilitation outcomes, particularly with systems that are fully immersive, customized for the healthcare setting, and fun and engaging for patients.

Vascular Products

The peripheral vasculature presents unique challenges that differ from the neurovasculature. Many peripheral arteries and veins are significantly larger than those found in the brain and therefore have higher blood flow rates. More importantly, they must be able to accommodate larger pressure gradients and sustain structural integrity despite substantial movement and flexing of the organs and musculature that surround them. Imaging can also be more challenging as physicians have to view their equipment through many more layers of organs and tissue than in the brain. The coronary vasculature also presents unique challenges.

Our vascular products fall into the following broad product families:

Thrombectomy

Indigo System

The Indigo System was designed for continuous aspiration mechanical thrombectomy, leveraging the success of the Penumbra System in ischemic stroke. It is an easy to use thrombectomy system that is powerful, highly trackable, and suited to a wide range of clot morphology in both the peripheral arterial, peripheral venous, pulmonary arteries and coronary vasculature. The Indigo System is comprised of three principal components:

- *Continuous Aspiration Mechanical Thrombectomy Catheters* are robust, durable, trackable and suited for the peripheral and coronary anatomy. We have introduced multiple sizes of catheters for use in both the peripheral and coronary vasculature. CAT Catheters are available in a wide range of sizes and lengths to address a wide range of vessel sizes and clot locations.
- *Indigo Separators* are advanced and retracted through the aspiration catheter at the proximal margin of the primary occlusion to facilitate clearing of the thrombus from the catheter tip. In the peripheral vasculature, clots often form in long segments and are more resistant to traditional aspiration techniques. The Indigo System with the Separator enables a practitioner to remove a wide range of clot morphology from both peripheral and coronary vasculature.
- *Penumbra ENGINE* or *Penumbra Pump MAX* is connected to our CAT catheters and provides the aspiration suction force. We developed our proprietary aspiration source as a fully-integrated system specifically for mechanical thrombectomy by aspiration.

Embolization

Ruby Coil System

The Ruby Coil System consists of detachable coils that are specifically designed for peripheral applications. Ruby Coils have a controlled mechanical detachment mechanism that permits the physician to deliver and reposition the coil until the final satisfactory position is reached before detachment.

The Ruby Coil System is used in a variety of clinical applications, including, but not limited to:

- active extravasations, or the escape of blood into surrounding tissue;
- selective embolization in patients with visceral aneurysms;
- exclusion of branches prior to chemoembolization and radioembolization;
- embolization in patients with gastrointestinal bleeding;
- embolization of branches prior to stent graft procedures;
- procedures after stent grafting in patients with persistent type II endoleaks and sac enlargement;
- treatment of patients with varicocele and pelvic congestion syndrome;
- high flow arterial venous malformations;
- post trans intrahepatic shunt placement;
- balloon retrograde transvenous obliteration; and
- exclusion of hepatic branches prior to liver resection.

LANTERN

The Penumbra LANTERN Delivery Microcatheter is a low-profile microcatheter with a high-flow lumen that enables large-volume coil delivery. LANTERN features a radiopaque distal shaft for enhanced visibility and dual distal marker bands for precise coil deployment in tortuous anatomy.

POD (Penumbra Occlusion Device) System

POD addresses a specific need in the peripheral embolization market to rapidly and precisely occlude a target vessel. Our POD device utilizes technology that delivers both variable sizing and variable softness to provide a single device solution for rapid and precise embolization of the target vessel. The technology achieves this range of features through the design of a distal anchoring segment, thereby immediately anchoring the device in a range of vessel diameters. The proximal segment of the POD achieves dense occlusion by packing a softer, smaller diameter segment tightly behind the anchored portion.

The Packing Coil is a complementary device for use with our other peripheral embolization products. It is uniquely designed to pack densely behind Ruby Coils and POD to occlude arteries and veins throughout the peripheral vasculature including aneurysms. Both POD and Packing Coil are detached instantly with a sterile detachment handle.

Research and Development

Our research and development team has a track record of product innovation and significant product improvements. Since inception, we have introduced multiple brands in either the United States, international markets, or both.

We believe our ability to rapidly develop innovative products is in large part attributable to the fully integrated product innovation process that we have implemented, and the management philosophy behind that process. In addition, we have recruited and retained engineers with a variety of backgrounds and experience to support the development of innovative therapies. Substantially all of our research and development efforts are based at our campus in Alameda, California.

Manufacturing

We currently maintain our manufacturing facilities in Alameda and Roseville, California and currently produce substantially all of our products in-house. Our manufacturing facilities are International Organization for Standardization ("ISO") 13485 compliant. We achieved ISO 13485:2016 certification achieved at our Alameda facility in 2018 and re-certification in 2019. We are currently pursuing ISO 13485:2016 certification at our Roseville facility and anticipate certification in Q2 2020. In 2007, we achieved compliance with the European Union's Medical Device Directive ("MDD"), allowing our products to be CE marked. We received our most recent re-certification to the MDD in September 2019. We have elected to participate in the Medical Device Single Audit Program ("MDSAP") which allows for certification and review of compliance to standards and regulations required in the United States, Canada, Brazil, Australia, and Japan by a single auditing organization. We received our first MDSAP certification in August 2018 and re-certification in 2019.

We use annual internal audits to ensure strong quality control practices. An internal, on-going staff training and education program contributes to our quality assurance program; training is documented and considered part of the employee evaluation process.

We believe we have adequate supplies or sources of availability of raw materials necessary to meet our needs. However, there are risks and uncertainties with respect to the supply of raw materials, particularly where provided by a single supplier, which could impact availability in sufficient quantities to meet our needs. In an effort to manage risk associated with raw materials supply, we work closely with suppliers to help ensure availability and continuity of supply while maintaining high quality and reliability. We also utilize long-term supply contracts with some suppliers to help maintain continuity of supply and manage the risk of price increases. Where possible, we seek second source suppliers or suppliers that have alternate manufacturing sites at which they could manufacture our parts.

Sales and Marketing

We sell our products directly in the United States, most of Europe, Canada and Australia, subject to required regulatory clearances and approvals. We have complemented our direct sales organization with distributors in Japan and most other international markets.

We currently sell our products in the United States through our dedicated salesforce in our major markets, neuro and vascular. In addition, we have employed an additional team of Care Specialists, who will serve as the primary resource for sales and clinical support of the REAL Immersive System in the United States. Our sales representatives and sales managers generally have substantial medical device experience and market our products directly to a variety of specialist physicians engaged in the treatment of vascular disorders, who are the end users of our products and significantly influence hospital buying decisions relating to medical devices. We are focused on developing strong relationships with specialist physicians and devote significant resources to training and educating physicians in the use and benefits of our products. The principal specialist physicians and healthcare providers in our two target end markets include:

- ***Neuro*:** Interventional neuroradiologists, neurosurgeons,interventional neurologists, occupational therapists, physical therapists, physiatrists.
- ***Vascular*:** Interventional radiologists, vascular surgeons and interventional cardiologists.

In addition to our direct sales organizations, we work with distributors in certain geographic areas where we have determined that selling through distributors is likely to be more effective. The largest market where we sell our products through a distributor is Japan, with Medico's Hirata Inc. as our distributor.

Our direct sales have been, and we anticipate will continue to represent, a majority of our revenues. In 2019, direct sales accounted for approximately 80% of our revenue, with the balance generated by independent distributors that sell our products outside of the United States.

Backlog

We typically accept and ship orders on the day purchase orders are received or the next business day. Furthermore, if requested, we generally permit customers to cancel or reschedule without penalty. As a result, we do not believe that our backlog at any particular time is material, nor is it a reliable indication of future revenue.

Reimbursement

In the United States, hospitals are the primary purchasers of our products. Hospitals in turn bill various third-party payors, such as Medicare, Medicaid and private health insurance plans, for the total healthcare services required to treat the patient. Government agencies and some other payors determine whether to provide coverage for a particular procedure and to reimburse hospitals for inpatient treatment at a fixed rate based on the Medicare severity diagnosis-related group ("MS-DRG") as determined by the U.S. Centers for Medicare and Medicaid Services ("CMS"). The fixed rate of reimbursement is generally based on the patients' diagnosis and the procedure performed, and is unrelated to the specific medical device used in that procedure. Medicare rates for the same or similar procedures vary due to geographic location, nature of facility in which the procedure is performed (i.e., teaching or community hospital) and other factors. Private payors vary in their coverage and payment policies. While some may look to coverage and payment by Medicare as a guide, most formulate their own coverage and payment policies.

Some payors may deny reimbursement if they determine that the device used in a treatment was unnecessary, not cost-effective, or used for a non-approved indication. We cannot assure you that government or private third-party payors will cover and reimburse the procedures performed using our products in whole or in part in the future or that payment rates will be adequate.

Outside the United States, market acceptance of medical devices depends partly upon the availability of reimbursement within the prevailing healthcare payment system. Reimbursement levels vary significantly by country, and by region within some countries. Reimbursement is obtained from a variety of sources, including government-sponsored and private health insurance plans, and combinations of both. A small number of countries may require us to gather additional clinical data before recognizing coverage and reimbursement for our products. It is our intent to complete the requisite clinical studies and obtain coverage and reimbursement approval in countries where it makes economic sense to do so.

The increased emphasis on managed healthcare in the United States and on country and regional pricing and reimbursement controls in international markets will put additional pressure on product pricing, reimbursement and usage, which may adversely affect our product sales and results of operations. These pressures can arise from rules and practices of insurers and managed care organizations, judicial decisions and governmental laws and regulations related to Medicare, Medicaid and healthcare reform, medical device reimbursement policies and pricing in general. Our ability to achieve market acceptance or significant sales volume will depend in large part on the availability of coverage and the level of reimbursement for procedures performed using our products under healthcare payment systems in such markets.

All third-party reimbursement programs, whether government funded or insured commercially, whether in the United States or internationally, are developing increasingly sophisticated methods of controlling health care costs through prospective reimbursement and capitation programs, group purchasing, redesign of benefits, second opinions required prior to major surgery, review and analysis of claims, encouragement of and incentives for maintaining healthier lifestyles, and exploration of more cost-effective methods of delivering health care. These types of programs and legislative or regulatory changes to reimbursement policies could potentially limit the amount which healthcare providers may be willing to pay for medical devices.

Competition

The medical device industry is intensely competitive, subject to rapid change and significantly affected by new product introductions and other market activities of industry participants. We compete with a number of manufacturers and distributors of neuro and vascular medical devices. Our most notable competitors are Boston Scientific, Johnson & Johnson, Medtronic, Stryker and Terumo. All of these competitors are large, well-capitalized companies with longer operating histories and greater resources than we have. As a consequence, they are able to spend more on product development, marketing, sales and other product initiatives than we can. We also compete with a number of smaller medical device companies that have single products or a limited range of products. Some of our competitors have:

- significantly greater name recognition;
- broader or deeper relations with healthcare professionals, customers, group purchasing organizations, and third-party payors;
- more established distribution networks;

- additional lines of products and the ability to offer rebates or bundle products to offer greater discounts or other incentives to gain a competitive advantage;
- greater experience in conducting research and development, manufacturing, clinical trials, marketing and obtaining regulatory clearance or approval for products; and
- greater financial and human resources for product development, sales and marketing and patent litigation.

We compete primarily on the basis that our products are able to treat patients with neuro and vascular diseases and disorders safely and effectively. Our continued success depends on our ability to:

- develop innovative, proprietary products that can cost-effectively address significant clinical needs;
- continue to innovate and develop scientifically advanced technology;
- obtain and maintain regulatory clearances or approvals;
- demonstrate efficacy in Penumbra-sponsored and third-party clinical trials and studies;
- apply technology across product lines and markets;
- attract and retain skilled research and development and sales personnel; and
- cost-effectively manufacture and successfully market and sell products.

Intellectual Property

Our success depends in part on our ability to protect our proprietary technology and intellectual property and operate without infringing the patents and other proprietary rights of third parties. We rely on a combination of patent, trademark, trade secret, copyright and other intellectual property rights and measures to protect our intellectual property rights that we consider important to our business. We also rely on know-how and continuing technological innovation to develop and maintain our competitive position. We do not have any material licenses to any technology or intellectual property rights. Our subsidiary, MVI Health Inc. ("MVI"), currently has an exclusive license granted by Sixense Enterprises Inc. ("Sixense") for Sixense's intellectual property in the fields of healthcare and wellness.

As of December 31, 2019, we owned and/or had rights to 85 issued patents globally, of which 32 were U.S. patents. As of December 31, 2019, we owned and/or had rights to 66 pending patent applications, of which 15 were patent applications pending in the United States. Subject to payment of required maintenance fees, annuities and other charges, ten of our issued patents are currently expected to expire between 2025 and 2026; five of these patents relate to components of the Penumbra System and the Indigo System, one of these patents relates to methods performed by the former Apollo System, and four of these patents relate to components of devices that have not been commercialized. An additional four of our issued patents, which relate to components of devices that have not been commercialized, are expected to expire between 2026 and 2027. Twenty-four of our issued patents, which relate to components of the Penumbra Coil 400, Ruby Coil System and Smart Coil System, are currently expected to expire between 2029 and 2037. Twelve patents pertaining to the 3D Revascularization Device are projected to expire between 2032 and 2034. Nineteen patents that pertain to products that have not yet been commercialized are projected to expire between 2028 and 2036. Some of our pending patent applications pertain to components and methods of use associated with currently commercialized products. Our pending patent applications may not result in issued patents and we can give no assurance that any patents that have issued or might issue in the future will protect our current or future products or provide us with any competitive advantage. See the section titled "Risk Factors-Risks Related to Our Intellectual Property" for additional information.

Additionally, we own or have rights to trademarks or trade names that are used in our business and in conjunction with the sale of our products, including 17 U.S. trademark registrations and 94 foreign trademark registrations as of December 31, 2019. Included in the registered trademarks is a mark with our company name and logo.

We also seek to protect our proprietary rights through a variety of methods, including confidentiality agreements and proprietary information agreements with suppliers, employees, consultants and others who may have access to our proprietary information.

Government Regulation

Our products are medical devices subject to extensive and ongoing regulation by the FDA under the FD&C Act and its implementing regulations, as well as other federal and state regulatory bodies in the United States and comparable authorities in other countries under other statutes and regulations. The laws and regulations govern, among other things, product design and development, pre-clinical and clinical testing, manufacturing, packaging, labeling, storage, record keeping and reporting, handling of patient data and information clearance or approval, marketing, distribution, promotion, import and export, pricing

and discounts, post-marketing surveillance and interactions with healthcare professionals. Failure to comply with applicable requirements may subject a device and/or its manufacturer to a variety of administrative sanctions, such as issuance of warning letters, import detentions, civil monetary penalties, and/or judicial sanctions, such as product seizures, injunctions and criminal prosecution.

United States

FDA's Premarket Clearance and Approval Requirements

Each medical device we seek to commercially distribute in the United States will require either a prior 510(k) clearance, unless it is exempt, or a premarket approval ("PMA") from the FDA. Medical devices are classified into one of three classes-Class I, Class II or Class III-depending on the degree of risk associated with each medical device and the extent of control needed to provide reasonable assurance of safety and effectiveness. Class I devices are deemed to be low risk and are subject to the general controls of the FD&C Act, such as provisions that relate to adulteration; misbranding; registration and listing; notification, including repair, replacement, or refund; records and reports; and good manufacturing practices. Most Class I devices are classified as exempt from premarket notification under Section 510(k) of the FD&C Act, and therefore may be commercially distributed without obtaining 510(k) clearance from the FDA. Class II devices are subject to both general controls and special controls to provide reasonable assurance of safety and effectiveness. Special controls include performance standards, postmarket surveillance, patient registries, and guidance documents. A manufacturer may be required to submit to the FDA a premarket notification requesting permission to commercially distribute some Class II devices. Devices deemed by the FDA to pose the greatest risk, such as life-sustaining, life-supporting or implantable devices, or devices deemed not substantially equivalent to a previously cleared 510(k) device, are placed in Class III. A Class III device cannot be marketed in the United States unless the FDA approves the device after submission of a PMA application. However, there are some Class III devices for which the FDA has not yet called for a PMA. For these devices, the manufacturer must submit a premarket notification and obtain 510(k) clearance in order to commercially distribute these devices. The FDA can also impose sales, marketing or other restrictions on devices in order to assure that they are used in a safe and effective manner.

510(k) Clearance Pathway

When a 510(k) clearance is required, we must submit a premarket notification to the FDA demonstrating that our proposed device is substantially equivalent to a predicate device, which is a previously cleared and legally marketed 510(k) device or a device that was in commercial distribution before May 28, 1976. By regulation, a premarket notification must be submitted to the FDA at least 90 days before we intend to market a device, and we must receive 510(k) clearance from the FDA before we can market the device. The Medical Device User Fee Amendments ("MDUFA") performance goals for a traditional 510(k) clearance is 90 working days. As a practical matter, however, clearance often takes longer, because the review clock is paused by the FDA to allow time to resolve any questions the FDA may have on the 510(k). To demonstrate substantial equivalence, the manufacturer must show that the proposed device has the same intended use as the predicate device, and it either has the same technological characteristics, or different technological characteristics and the information in the premarket notification demonstrates that the device does not raise new questions of safety and effectiveness. The FDA may require further information, including clinical data, to make a determination regarding substantial equivalence. If the FDA determines that the device, or its intended use, is not substantially equivalent ("NSE") to a previously cleared device or use, the FDA will place the device into Class III.

There are three types of 510(k)s: traditional, special and abbreviated. Special 510(k)s are appropriate for certain technological, design, and labeling changes to a device which necessitates a new 510(k) but where the method(s) to evaluate the change(s) are well-established, and whether the results can be sufficiently reviewed in a summary or risk analysis format. Abbreviated 510(k)s are for devices that conform to a recognized standard. The special and abbreviated 510(k)s are intended to streamline review, and the FDA intends to process special 510(k)s within 30 days of receipt.

Premarket Approval Pathway

A PMA application under section 515 of the FD&C Act must be submitted to the FDA for Class III devices that support or sustain human life, are of substantial importance in preventing impairment of human health, or which present a potential, unreasonable risk of illness or injury. The PMA application process is much more demanding than the 510(k) premarket notification process. A PMA is based on a determination by FDA that the PMA application contains sufficient valid scientific evidence to assure that the device is safe and effective for its intended use(s).

After a PMA application is submitted, the FDA has 45 days to determine whether the application is sufficiently complete to permit a substantive review and thus whether the FDA will file the application for review. The FDA has 180 days to review a filed PMA application, although the review of an application generally occurs over a significantly longer period of time and can take up to several years. During this review period, the FDA may request additional information or clarification of the information already provided. Also, an advisory panel of experts from outside the FDA may be convened to review and

evaluate the application and provide recommendations to the FDA as to the approvability of the device. Although the FDA is not bound by the advisory panel decision, the panel's recommendations are important to the FDA's overall decision making process. In addition, the FDA may conduct a preapproval inspection of the manufacturing facility to ensure compliance with the Quality System Regulation ("QSR"). The FDA also may inspect one or more clinical sites to assure compliance with the FDA's regulations.

Upon completion of the PMA application review, the FDA may: (i) approve the PMA which authorizes commercial marketing with specific prescribing information for one or more indications, which can be more limited than those originally sought; (ii) issue an approvable letter which indicates the FDA's belief that the PMA application is approvable and states what additional information the FDA requires, or the post-approval commitments that must be agreed to prior to approval; (iii) issue a not approvable letter which outlines steps required for approval, but which are typically more onerous than those in an approvable letter, and may require additional clinical trials that are often expensive and time consuming and can delay approval for months or even years; or (iv) deny the application. If the FDA issues an approvable or not approvable letter, the applicant has 180 days to respond, after which the FDA's review clock is reset.

Clinical Trials

Clinical trials are almost always required to support a PMA and are sometimes required for 510(k) clearance. In the United States, for significant risk devices, these trials require submission of an application for an Investigational Device Exemption ("IDE") to the FDA. The IDE application must be supported by appropriate data, such as animal and laboratory testing results, showing it is safe to test the device in humans and that the testing protocol is scientifically sound. The IDE must be approved in advance by the FDA for a specific number of patients at specified study sites. During the trial, the sponsor must comply with the FDA's IDE requirements for investigator selection, trial monitoring, reporting, and recordkeeping. The investigators must obtain patient informed consent, rigorously follow the investigational plan and study protocol, control the disposition of investigational devices, and comply with all reporting and recordkeeping requirements. Clinical trials for significant risk devices may not begin until the IDE application is approved by the FDA and the appropriate institutional review boards, or IRBs, at the clinical trial sites. An IRB is an appropriately constituted group that has been formally designated to review and monitor medical research involving subjects and which has the authority to approve, require modifications in, or disapprove research to protect the rights, safety and welfare of human research subjects. A nonsignificant risk device does not require FDA approval of an IDE; however, the clinical trial must still be conducted in compliance with various requirements of FDA's IDE regulations and be approved by an IRB at the clinical trials sites. We, the FDA or the IRB at each site at which a clinical trial is being performed may withdraw approval of a clinical trial at any time for various reasons, including a belief that the risks to study subjects outweigh the benefits or a failure to comply with FDA or IRB requirements. Even if a trial is completed, the results of clinical testing may not demonstrate the safety and effectiveness of the device, may be equivocal or may otherwise not be sufficient to obtain approval or clearance of the product.

Sponsors of clinical trials of devices are required to register with clinicaltrials.gov, a public database of clinical trial information. Information related to the device, patient population, phase of investigation, study sites and investigators, and other aspects of the clinical trial is made public as part of the registration.

Ongoing Regulation by the FDA

Even after a device receives clearance or approval and is placed on the market, numerous regulatory requirements apply. These include:

- establishment registration and device listing;
- the 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 the FDA prohibitions against the promotion of products for un-cleared, unapproved or "off-label" uses, and other requirements related to promotional activities;
- medical device reporting regulations, which require that manufactures report to the FDA if their device may have caused or contributed to a death or serious injury or if their device malfunctioned and the device or a similar device marketed by the manufacturer would be likely to cause or contribute to a death or serious injury if the malfunction were to recur;
- corrections and removal reporting regulations, which require that manufactures report to the FDA field corrections or removals if undertaken to reduce a risk to health posed by a device or to remedy a violation of the FD&C Act that may present a risk to health; and

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

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

Some changes to an approved PMA device, including changes in indications, labeling, or manufacturing processes or facilities, require submission and FDA approval of a new PMA application or PMA supplement, as appropriate, before the change can be implemented. Supplements to a PMA often require the submission of the same type of information required for an original PMA application, except that the supplement is generally limited to that information needed to support the proposed change from the device covered by the original PMA. The FDA uses the same procedures and actions in reviewing PMA supplements as it does in reviewing original PMA applications.

FDA regulations require us to register as a medical device manufacturer with the FDA. Additionally, the California Department of Health Services ("CDHS") requires us to register as a medical device manufacturer within the state. Because of this, the FDA and the CDHS inspect us on a routine basis for compliance with the QSR. These regulations require that we manufacture our products and maintain related documentation in a prescribed manner with respect to manufacturing, testing and control activities. We have undergone and expect to continue to undergo regular QSR inspections in connection with the manufacture of our products at our facilities. Further, the FDA requires us to comply with various FDA regulations regarding labeling. Failure by us or by our suppliers to comply with applicable regulatory requirements can result in enforcement action by the FDA or state authorities, which may include any of the following sanctions:

- warning or untitled letters, fines, injunctions, consent decrees and civil penalties;
- customer notifications, voluntary or mandatory recall or seizure of our products;
- operating restrictions, partial suspension or total shutdown of production;
- delay in processing submissions or applications for new products or modifications to existing products;
- withdrawing approvals that have already been granted; and
- criminal prosecution.

The Medical Device Reporting laws and regulations require us to provide information to the FDA when we receive or otherwise become aware of information that reasonably suggests our device may have caused or contributed to a death or serious injury as well as a device malfunction that likely would cause or contribute to death or serious injury if the malfunction were to recur. In addition, the FDA prohibits an approved device from being marketed for off-label use. The FDA and other agencies actively enforce the laws and regulations prohibiting the promotion of off-label uses, and a company that is found to have improperly promoted off-label uses may be subject to significant liability, including substantial monetary penalties and criminal prosecution.

Newly discovered or developed safety or effectiveness data may require changes to a product's labeling, including the addition of new warnings and contraindications, and also may require the implementation of other risk management measures. Also, new government requirements, including those resulting from new legislation, may be established, or the FDA's policies may change, which could delay or prevent regulatory clearance or approval of our products under development.

We are also subject to other federal, state and local laws, and regulations relating to safe working conditions, laboratory, and manufacturing practices.

Regulatory Inspections

We are subject to periodic inspections by the FDA and other regulatory entities, such as a European Notified Body, related to the regulatory requirements that apply to medical devices designed and manufactured, and clinical trials sponsored, by us. When the FDA conducts an inspection, the inspectors will identify any deficiencies they believe exist in the form of a notice of inspectional observations, or Form FDA 483. If we receive a notice of inspectional observations or deficiencies from the FDA following an inspection, we would be required to respond in writing, and would be required to undertake corrective and/or

preventive or other actions in order to address the FDA's or other regulators' concerns. Failure to address the FDA's concerns may result in the issuance of a warning letter or other enforcement or administrative actions.

European Union

Our products are regulated in the European Union as medical devices per the European Union Directive (93/42/EEC), also known as the Medical Device Directive (the "MDD"). An authorized third party, also called a Notified Body, must approve products for CE marking, other than those of risk class I. The CE mark is contingent upon continued compliance to the applicable regulations, harmonized standards and the quality system requirements of the ISO 13485 standard.

The new European Medical Devices Regulation (the "EU MDR"), which was published in May 2017 with a transition period of three years, replaces the MDD. On May 26, 2020, the new EU MDR will apply and no further applications under the previous directives will be permitted. During the said three-year transition period, we will need to update our quality management system processes to meet the new EU MDR requirements. We are currently updating our quality management system processes to meet the new EU MDR requirements. We are also updating our technical documentation to meet the EU MDR requirements and will submit as soon as our notified body can support transitioning our devices to MDR. Under the new EU MDR requirements, CE certificates issued under the previous directives prior to May 2020 will remain valid in accordance with their term beyond the expiration of the transition period, but will become void at the latest on May 27, 2024, however certain limitations set forth in the EU MDR, such as the inability to substantially change medical devices without notified body approval will apply. We do not expect such limitations to have any material impact on our ability to supply our products to the market in the region covered by the EU MDR.

Other Regions

Most major markets have different levels of regulatory requirements for medical devices. Modifications to the cleared or approved products may require a new regulatory submission in all major markets. The regulatory requirements, and the review time, vary significantly from country to country. Products can also be marketed in other countries that have minimal requirements for medical devices.

Fraud and Abuse and Other Healthcare Regulation

Anti-Kickback Statute

We are subject to various federal and state healthcare laws, including, but not limited to, anti-kickback laws. In particular, the federal Anti-Kickback Statute prohibits persons or entities from knowingly and willfully soliciting, offering, receiving or paying any remuneration, directly or indirectly, overtly or covertly, in cash or in kind, in exchange for or to induce either the referral of an individual for the furnishing or arranging for a good or service, or for the purchasing, leasing, ordering, or arranging for or recommending any good, facility, service or item for which payment may be made in whole or in part under federal healthcare programs, such as the Medicare and Medicaid programs. The federal Anti-Kickback Statute is broad and prohibits many arrangements and practices that are lawful in businesses outside of the healthcare industry. The term "remuneration" expressly includes kickbacks, bribes, or rebates and also has been broadly interpreted to include anything of value, including, for example, gifts, discounts, the furnishing of supplies or equipment, credit arrangements, payments of cash, waivers of payments, ownership interests and providing anything at less than its fair market value.

There are a number of statutory exceptions and regulatory safe harbors protecting certain business arrangements from prosecution under the federal Anti-Kickback Statute. These statutory exceptions and safe harbors set forth provisions that, if all their applicable requirements are met, will assure healthcare providers and other parties that they may not be prosecuted under the federal Anti-Kickback Statute. The failure of a transaction or arrangement to fit precisely within one or more applicable statutory exceptions or 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 all requirements of an applicable safe harbor may result in increased scrutiny by government enforcement authorities and will be evaluated on a case-by-case basis based on a cumulative review of all of its facts and circumstances. Additionally, the intent standard under the federal Anti-Kickback Statute was amended under the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act of 2010 ("Affordable Care Act"), to a stricter standard such that a person or entity no longer needs to have actual knowledge of the statute or specific intent to violate it in order to have committed a violation. 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 federal civil False Claims Act which is discussed below. Penalties for violations of the anti-kickback statute include, but are not limited to, criminal, civil and/or administrative penalties, damages, fines, disgorgement, individual imprisonment, possible exclusion from Medicare, Medicaid and other federal healthcare programs, and the curtailment or restructuring of operations. Various states have adopted laws similar to the federal Anti-Kickback Statute, and some of these state laws may be broader in scope in that some of these state laws extend to all payors and may not contain safe harbors. In addition, many foreign jurisdictions in which we operate have similar laws and regulations.

Federal Civil False Claims Act. The federal civil False Claims Act prohibits, among other things, persons or entities from knowingly presenting or causing to be presented a false or fraudulent claim to, or the knowing use of false statements to obtain payment from or approval by, the federal government. Suits filed under the federal civil False Claims Act, known as "qui tam" actions, can be brought by any individual on behalf of the government. These individuals, sometimes known as "relators" or, more commonly, as "whistleblowers," may share in any amounts paid by the entity to the government in fines or settlement. The number of filings of qui tam actions has increased significantly in recent years, causing more healthcare companies to have to defend a case brought under the federal civil False Claim Act. If an entity is determined to have violated the federal civil False Claims Act, it may be required to pay up to three times the actual damages sustained by the government, plus civil penalties for each separate false claim. Various states have adopted laws similar to the federal civil False Claims Act, and many of these state laws are broader in scope and apply to all payors, and therefore, are not limited to only those claims submitted to the federal government.

Federal Civil Monetary Penalties Statute. The federal Civil Monetary Penalties Statute, among other things, imposes fines against any person who is determined to have presented, or caused to be presented, claims to a federal healthcare program that the person knows, or should know, is for an item or service that was not provided as claimed or is false or fraudulent.

Sunshine Act. The Affordable Care Act also included a provision, commonly referred to as the Sunshine Act. This provision requires that any manufacturer of a covered device that provides payment or other transfer of value to a physician or teaching hospital, or to a third party at the request of a physician or teaching hospital, must submit to CMS information about the payment or other transfer of value annually, with the reported information to be made public on a searchable website. Similar laws have been enacted in foreign jurisdictions, including France.

Foreign Corrupt Practices Act and Anti-Bribery Laws. The Foreign Corrupt Practices Act ("FCPA") prohibits U.S. companies and their representatives from offering or making payments to foreign officials for the purpose of securing a business advantage. In many countries, the healthcare professionals we regularly interact with may meet the definition of a foreign government official for purposes of the FCPA. Similar anti-bribery laws are in effect in many of the countries in which we operate.

Health Insurance Portability and Accountability Act of 1996. The federal Health Insurance Portability and Accountability Act of 1996, as amended ("HIPAA") created several new federal crimes, including healthcare fraud and false statements relating to healthcare matters. The healthcare fraud statute prohibits knowingly and willfully executing a scheme to defraud any healthcare benefit program, including private third-party payors. The false statements statute prohibits knowingly and willfully falsifying, concealing or covering up a material fact or making any materially false, fictitious or fraudulent statement in connection with the delivery of or payment for healthcare benefits, items or services. In addition, HIPAA and its implementing regulations established uniform standards for certain covered entities, which are healthcare providers, health plans and healthcare clearinghouses, as well as their business associates, governing the conduct of specified electronic healthcare transactions and protecting the security and privacy of protected health information.

The American Recovery and Reinvestment Act of 2009, commonly referred to as the economic stimulus package, included an expansion of HIPAA's privacy and security standards called the Health Information Technology for Economic and Clinical Health Act ("HITECH"). Among other things, HITECH created four new tiers of civil monetary penalties and gave state attorneys general new authority to file civil actions for damages or injunctions in federal courts to enforce the federal HIPAA laws and seek attorneys' fees and costs associated with pursuing federal civil actions.

Employees

As of December 31, 2019, we had approximately 2,700 employees worldwide. None of our U.S. employees are represented by a collective bargaining agreement. Some of our employees outside of the United States are subject to mandatory, industry-specific collective bargaining agreements or the protections of statutory works councils as required by local law. We have never experienced a work stoppage. We believe our employee relations are good.

Facilities

We maintain approximately 305,000 square feet of research and development, manufacturing and administrative facilities in seven buildings at our campus in Alameda, California. The leases for these seven buildings expire in 2029 to 2035, subject to our option to renew certain leases for an additional five to fifteen years. From time to time through February 1, 2035, if any space in any of the buildings located in the same business park as our campus becomes vacant, that space will be added to the lease. The maximum additional space that could be added under this provision of the lease as of December 31, 2019 is approximately 175,000 square feet. The Company has a right of first offer to lease any space that becomes available after such date. We also lease approximately 20,000 square feet of warehouse space in Livermore, California, and approximately 45,000 square feet of warehouse space in Salt Lake City, Utah. The leases for the Livermore warehouse spaces expire in 2020 to 2022.

The lease for the Salt Lake City warehouse expires in 2024, subject to our option to renew the lease for an additional three to nine years.

On September 17, 2018, we entered into a lease for approximately 160,000 square feet to serve as a manufacturing facility in Roseville, California. The lease is for a fifteen year term, which commenced in November 2019. We have the option to renew the lease for an additional five to ten years.

On September 3, 2019, we entered into a lease for an additional space of approximately 127,000 square feet at our headquarters in the Harbor Bay Business Park in Alameda, California which has not yet commenced as of December 31, 2019. This additional space is in a to-be-constructed building located at 1310 Harbor Bay Business Parkway and we anticipate substantial completion will occur within the next two years.

We also lease office and warehouse space in Germany, Italy, Australia, and Brazil. The offices in Germany and Australia support our direct sales operations in Europe and Australasia, respectively, the office in Brazil supports our Latin America marketing efforts through our distribution partners, and the offices in Italy support the operations of Crossmed S.p.A., our wholly-owned subsidiary in Italy, including supporting our direct sales operations in Italy, San Marino, Vatican City, and Switzerland. We also warehouse and distribute finished products to our international customers utilizing a third-party logistics provider in the Netherlands.

Legal Proceedings

From time to time, we are subject to other claims and assessments in the ordinary course of business. We are not currently a party to any such litigation matter that, individually or in the aggregate, is expected to have a material adverse effect on our business, financial condition, results of operations or cash flows.

Available Information

We make our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, and amendments to those reports, available free of charge at our website as soon as reasonably practicable after they have been filed with the SEC. Our website address is www.penumbrainc.com. Information contained in or accessible through our website is not part of this report. The SEC maintains a website that contains the materials we file with the SEC at www.sec.gov.

ITEM 1A. RISK FACTORS.

This Annual Report on Form 10-K contains forward-looking information based on our current expectations. Because our business is subject to many risks and our actual results may differ materially from any forward-looking statements made by or on behalf of us, this section includes a discussion of important factors that could affect our business, operating results, financial condition and the trading price of our common stock. You should carefully consider these risk factors, together with all of the other information included in this Annual Report on Form 10-K as well as our other publicly available filings with the SEC. If any of the following risks actually occurs, our business, financial condition, results of operations and future prospects could be materially and adversely harmed.

Business Risks

We have a limited operating history and may not be able to sustain or grow our profitability or continue to generate positive cash flows from operations.

We were founded in 2004 and did not generate any revenue until 2007. Moreover, while we have successfully developed, obtained regulatory clearance or approval for, and introduced a number of products in the neuro market since 2007, we first introduced products in the peripheral vascular and neurosurgical markets in 2013 and 2014, respectively. Accordingly, we only have a limited operating history upon which investors can evaluate our business and prospects, and this limited operating history may not be indicative of our future results. We incurred operating losses in 2018. We can give no assurance that we will be profitable or cash flow positive in the future.

Our sales, general and administrative expenses have increased, and we expect that they will continue to increase, to support our past and anticipated future growth. We have also expended significant amounts on research and development to develop our products, and we expect to continue to do so. We also expend significant amounts on maintaining inventory levels of raw materials, components and finished products to meet anticipated customer demand. In addition, our coil products are sold on a consignment basis, which requires us to expend significant amounts on inventory that is placed at many customer locations. Our ability to sustain our growth and profitability and continue to generate positive operating cash flow may be influenced by many factors, including:

- our ability to achieve and maintain market acceptance of our products;
- unanticipated problems and additional costs relating to the development and testing of new products;
- our ability to introduce, manufacture at scale, build new inventory and commercialize new products;
- our ability to produce sufficient quantities of our products to meet demand;
- the impact of competition;
- the timing and impact of market and regulatory developments;
- our ability to expand into new markets;
- pricing pressure from competitors;
- the availability and adequacy of third-party reimbursement for procedures in which our products are used; and
- our ability to obtain and maintain adequate intellectual property protection for our products and technologies.

If we encounter difficulties with any of the foregoing or unexpected expenses, it could materially adversely affect our business, results of operations, financial condition or cash flows.

Our existing products may be rendered obsolete and we may be unable to effectively introduce and market new products or may fail to keep pace with advances in technology.

The medical device market is characterized by rapidly advancing technology. Our success and growth depends, in part, on our ability to anticipate technological advancements and competitive innovations and introduce new products to adapt to these advancements and innovations. To compete in the marketplace, we have made, and we must continue to make, substantial investments in new product development, whether internally through research and development or externally through licensing or acquisitions. We can give no assurance that we will be successful in identifying, developing or acquiring, and marketing new products or enhancing our existing products. In addition, we can give no assurance that new products or alternative treatment techniques developed by competitors will not render our current or future products obsolete or inferior, technologically or economically.

The success of any new products that we develop or acquire depends on achieving and maintaining market acceptance. Market acceptance for our current and new products could be affected by a number of factors, including:

- our ability to market and distribute our products effectively;
- the availability, perceived efficacy and pricing of alternative products from our competitors;

- the development of new products or alternative treatments by others that render our products and technologies obsolete;
- the price, quality, effectiveness and reliability of our products;
- our customer service and reputation;
- our ability to convince specialist physicians and other healthcare providers to use our products on their patients; and
- the timing of market entry of new products or alternative treatments.

Our competition may respond more quickly to new or emerging technologies or a changing clinical landscape, undertake more extensive marketing campaigns, have greater financial, marketing and other resources than us or be more successful in attracting potential customers and strategic partners. Given these factors, we cannot assure you that we will be able to continue or increase our level of success. Our failure to introduce new and innovative products in a timely manner, and our inability to maintain or grow the market acceptance of our existing products, could result in write-offs of our inventory and otherwise have a material and adverse effect on our business, results of operations, financial condition or cash flows.

Delays in product introductions could adversely affect our business, results of operations, financial condition or cash flows.

The medical device market is highly competitive and designs change often to adjust to shifting market preferences and other factors. Therefore, product life cycles are relatively short. As a result, any delays in our product launches may significantly impede our ability to enter or compete in a given market and may reduce the sales that we are able to generate from these products. We may experience delays in any phase of a product launch, including during research and development, clinical trials, regulatory review, manufacturing and marketing. Delays in product introductions could materially adversely affect our business, results of operations, financial condition or cash flows.

We face significant competition, and if we are unable to compete effectively, we may not be able to achieve or maintain significant market penetration or improve our results of operations.

The medical device industry is intensely competitive, subject to rapid change and significantly affected by new product introductions and other market activities of industry participants. We compete with a number of manufacturers and distributors of neuro and vascular devices. Our most notable competitors are Boston Scientific, Johnson & Johnson, Medtronic, Stryker and Terumo. All of these competitors are large, well-capitalized companies with longer operating histories and greater resources than us. We also compete with a number of smaller medical device companies that have a single product or a limited range of products. Our competitors may be able to spend more on product development, marketing, sales and other product initiatives, or be more focused in their spending and activities, than we can. Some of our competitors have:

- significantly greater name recognition;
- broader or deeper relations with healthcare professionals, customers, group purchasing organizations and third-party payors;
- more established distribution networks;
- additional lines of products and the ability to offer rebates or bundle products to offer greater discounts or other incentives to gain a competitive advantage;
- greater experience in conducting research and development, manufacturing, clinical trials, marketing and obtaining regulatory clearance or approval for products; and
- greater financial and human resources for product development, sales and marketing and patent litigation.

We compete primarily on the basis that our products are able to treat patients with neurovascular and vascular diseases and disorders safely and effectively, with improved outcomes and procedural cost savings. Our continued success depends on our ability to:

- develop innovative, proprietary products that can cost-effectively address significant clinical needs;
- continue to innovate and develop scientifically advanced technology;
- obtain and maintain regulatory clearances or approvals;
- demonstrate efficacy in Penumbra-sponsored and third-party clinical trials and studies;
- apply technology across product lines and markets;
- attract and retain skilled research and development and sales personnel; and

- cost-effectively manufacture and successfully market and sell products.

We cannot assure you that we will be able to compete effectively on the basis of these factors. Additionally, our competitors with greater financial resources could acquire or develop new technologies or products that effectively compete with our existing or future products. If we are unable to effectively compete, it would materially adversely affect our business, results of operations, financial condition and cash flows.

Risks Related to our Controlling Interest in MVI Health Inc.

In 2017, we formed MVI as a joint venture with Sixense to explore healthcare applications using virtual reality technology, with each party holding 50% of the issued and outstanding equity of MVI. On August 31, 2018, we purchased an additional 40% of the equity interest in MVI from Sixense for an initial cash purchase price of $20.0 million, excluding additional contingent consideration relating to anti-dilution protection provided to Sixense. We now own a 90% controlling interest in MVI and Sixense retains the remaining 10% minority interest.

Our company is experienced in and has a strong history of bringing technology to healthcare markets. While we are familiar with the healthcare markets that we plan to target initially, we do not have extensive experience with virtual reality technology and are relying on new hires and consultants with expertise in the field. Apart from funds we have invested to date to purchase our interest in MVI, we continue to invest additional funds for research and development at MVI, to establish manufacturing operations, to hire dedicated sales and marketing personnel and to commercialize products. We consolidate MVI's financial results into our consolidated financial statements, so losses at MVI could have a materially adverse effect on our business, results of operations, financial condition or cash flows

We can give no assurance that we will be successful in developing and commercializing products using virtual reality technology. To date, our efforts have been focused on developing the REAL Immersive System and our commercial launch of this product is in its early stages. We have not yet determined that the business model we are pursuing to bring virtual reality technology to the healthcare field will be successful. Our ability to successfully commercialize healthcare applications using virtual reality technology may be influenced by many factors, including:

- our inability to develop new products and content;
- unanticipated problems and additional costs relating to the development and testing of new products;
- our ability to install, set up and service new customers;
- our ability to achieve and maintain market acceptance;
- our reliance on technology licensed from Sixense;
- our possible reliance on a limited number of suppliers for key components of the products it develops we develop;
- maintaining an appropriate program for compliance with regulations related to the privacy and security of individually-identifiable patient information, including but not limited to HIPAA;
- our ability to introduce, manufacture at scale, build new inventory and commercialize new products;
- our ability to produce sufficient quantities of products to meet demand;
- the impact of competition;
- the timing and impact of market and regulatory developments, including our ability to obtain any required regulatory approvals or clearances outside the United States;
- our ability to expand into new markets; and
- our ability to obtain and maintain adequate intellectual property protection for our products and technologies.

Our future growth depends, in part, on our ability to further penetrate our current customer base and increase the frequency of use of our products by our customers.

We will need to continue to make specialist physicians and other healthcare providers aware of the benefits of our products to generate increased demand and frequency of use, and thus increase sales to our hospital customers. Although we are attempting to increase the number of patients treated with our products through our established relationships and focused sales efforts, we cannot provide assurance that our efforts will increase the use of our products. If we are unable to increase the frequency of use of our products by specialist physicians and other healthcare providers, our business, results of operations, financial condition and cash flows could be materially adversely affected.

Our future growth depends, in part, on significantly expanding our user base to include additional specialist physicians and other healthcare professionals in both our existing and future target end markets.

Currently, the primary users of our neurovascular and vascular products are specialist physicians, including interventional neuroradiologists, neurosurgeons, interventional neurologists, interventional radiologists, interventional cardiologists and vascular surgeons. We may enter new target end markets with different users in the future. Our revenue growth will depend in part on our ability to convince specialist physicians and other healthcare professionals in our existing and future target end markets of our products' efficacy, to educate them in the proper use of our products and to sell our products to their affiliated hospitals or other organizations. Convincing specialist physicians and other healthcare professionals to use new products and to dedicate the time and energy necessary for adequate education in the use of our products is challenging, especially in new markets where treatments or therapies using our products are not established. Expanding our customer base in existing and new target end markets may require, among other things, additional clinical evidence supporting patient benefits, training in a manner to which we are not accustomed, or other resources that we do not readily have available or are not cost effective for us to provide. If we are unable to convert specialist physicians or other healthcare professionals in existing or new target end markets to the use of our products, our sales growth will be limited, which could materially adversely affect our business, results of operations, financial condition or cash flows.

We may not have the resources to successfully market and sell our products, which would adversely affect our business and results of operations.

The marketing and sales of our products requires us to invest in training and education and employ a salesforce that is large enough to interact with the specialist physicians and others who use our products. Entering new markets also requires a significant amount of time and expense in order to identify and establish relationships with key opinion leaders among the specialist physicians and others who may use our products in those markets. We may not have adequate resources to market and sell our products successfully against larger competitors. If we cannot market and sell our products successfully, our business, results of operations, financial condition and cash flows could be materially adversely affected.

Third-party reimbursement may not be available or adequate for the procedures or therapies for which our products are used.

Our ability to commercialize new products successfully in both the United States and international markets, such as Japan, depends in part on the availability of, and hospitals' and other customers' ability to obtain, adequate levels of third-party reimbursement for the procedures in which our products are used. In the United States, the cost of medical care is funded, in substantial part, by government insurance programs, such as Medicare and Medicaid, and private and corporate health insurance plans. Third-party payors may deny reimbursement if they determine that a device used in a procedure has not received appropriate FDA or other governmental regulatory clearances or approvals, is not used in accordance with cost-effective treatment methods as determined by the payor, or is experimental, unnecessary or inappropriate. Our ability to commercialize our products successfully will depend, in large part, on the extent to which adequate reimbursement levels for the cost of their use are obtained from government authorities, private health insurers and other organizations, such as health maintenance organizations. Further, healthcare in the United States and international markets is also being affected by economic pressure to contain reimbursement levels and costs. Changing reimbursement models either domestically or internationally could materially adversely affect our business, results of operations, financial condition or cash flows.

We have generated a significant portion of our revenue and revenue growth from a limited number of product families, and our revenue and business prospects would be adversely affected if sales of any of these product families were to decline.

We have generated most of our revenue and revenue growth from a limited number of product families. If any one or more of these product families were adversely affected because of regulatory, third-party reimbursement or intellectual property issues or any other reason, or if one of our competitors introduced one or more products that specialist physicians believe are superior to our products, our revenue from one of these product families could decline. A significant decline in our sales of any of these product families could also negatively impact our financial condition and our ability to conduct product development activities, and therefore negatively impact our business prospects.

We must maintain and further develop relationships with specialist physicians and other healthcare providers. If specialist physicians and other healthcare providers do not recommend and endorse, or use, our products or if our relationships with specialist physicians and other healthcare providers deteriorate, our products may not be accepted or maintain acceptance in the marketplace, which would adversely affect our business and results of operations.

Our products are sold primarily to hospitals for use by specialist physicians and other healthcare providers practicing at their facilities. In order for us to sell our products, specialist physicians and other healthcare providers must recommend and endorse them for the hospital to purchase them, and must use them in treating their patients to generate follow-on sales. We may not obtain the necessary recommendations or endorsements for new products from specialist physicians and other healthcare providers, nor may we be able to maintain the current or future level of acceptance and usage of our products. Acceptance of our products depends on educating the medical community as to the distinctive characteristics, perceived benefits, safety, clinical efficacy and cost-effectiveness of our products compared to products of our competitors or treatments that do not use our products, and on training specialist physicians and other healthcare providers in the proper application and use of our products. We invest in significant training and education of our sales representatives, specialist physicians and other healthcare providers to achieve market acceptance of our products, with no assurance of success. If we are not successful in

obtaining and maintaining the recommendations or endorsements of specialist physicians and other healthcare providers for our products, if specialist physicians and other healthcare providers prefer our competitors' products or other alternative treatments that do not use our products, or if our products otherwise do not gain or maintain market acceptance, our business could be adversely affected.

In addition, the research, development, marketing and sales of our products are dependent, in part, upon our working relationships with specialist physicians and other healthcare providers. We rely on them to provide us with knowledge and feedback regarding our products and the marketing of our products. If we are unable to develop or maintain strong relationships with specialist physicians and other healthcare providers and receive their advice and input, the development and marketing of our products could suffer, which could materially adversely affect our business, results of operations, financial condition or cash flows.

We may not be able to achieve or maintain satisfactory pricing and margins for our products.

Manufacturers of medical devices have a history of price competition, and we can give no assurance that we will be able to achieve satisfactory prices for our products or maintain prices at the levels we have historically achieved. If we are unable to achieve or maintain our prices, or if our costs increase and we are unable to offset such increase with an increase in our prices, our margins could erode and we may be unable to maintain profitable operations.

We cannot be certain that we will be able to manufacture our products in high volumes at commercially reasonable costs.

We currently maintain our primary manufacturing operations at our campus in Alameda, California. We currently produce substantially all of our products at this facility, and we do not currently have redundant facilities. We recently took occupancy of an additional space in Roseville, California, which we plan to use primarily for manufacturing, but we can give no assurance that this space will be adequate for our future needs. We may need to expend significant capital resources and further increase the size of our manufacturing capabilities as we grow our business. We could, however, encounter problems related to:

- capacity constraints;
- production yields;
- quality control;
- equipment availability; and
- shortages of qualified personnel.

Our continuous product innovation limits our ability to identify and implement manufacturing efficiencies. Failure to do so may reduce our ability to manufacture our products at commercially reasonable costs. If we are unable to manufacture our products in high volumes at commercially reasonable costs, it could materially affect our ability to adequately increase production of our products and fulfill customer orders on a timely basis, which could have a material adverse effect on our business, results of operations, financial condition or cash flows.

We are required to maintain high levels of inventory, which consume a significant amount of our working capital and could lead to permanent write-downs or write-offs of our inventory.

We maintain a significant inventory of raw materials, components and finished goods, which subjects us to a number of risks and challenges. Our hospital customers typically maintain only small quantities of our products at their facilities, so as products are used, they order replacements that typically require prompt delivery. As a result, we must maintain sufficient levels of finished goods to permit rapid shipment of products following receipt of a customer order. In turn, we must also maintain a sufficient supply of raw materials and components inventory to permit rapid manufacturing and re-stocking of finished goods. Furthermore, our coil inventory is supplied to hospital customers on a consignment basis, which means that it is classified as part of our inventory for financial reporting purposes but is maintained at the hospital location until it is used. We have built, and will continue to build, a significant inventory of coils in order to support the introduction of and to provide adequate consignment stock for our new and existing coil products.

Maintaining a significant inventory of raw materials, components and finished goods, including coils, consumes a significant amount of our working capital. This working capital could be used for other purposes, such as research and development or sales and marketing activities. As we grow our business, we may need substantial additional capital to fund higher levels of inventory, which may materially adversely affect our liquidity or result in dilution to our stockholders if we sell additional equity securities or leverage if we raise debt capital to finance our working capital requirements.

Maintaining a significant inventory of raw materials, components and finished goods, including coils, also subjects us to the risk of inventory excess and obsolescence, which may lead to a permanent write-down or write-off of our inventory. While in inventory, our components and finished goods may become obsolete, and we may over-estimate the amount of inventory needed, which may lead to excessive inventory. In these circumstances we would write-down or write-off our inventory and

may be required to expend additional resources or be constrained in the amount of end product that we can produce. Furthermore, our products have a limited shelf life due to sterilization requirements, and part or all of a given product or component may expire, resulting in a decrease in value and potentially a permanent write-down of our inventory. In the event that a substantial portion of our inventory becomes excess or obsolete, it could materially adversely affect our results of operations.

Defects or failures or alleged defects or failures associated with our products could lead to recalls, safety alerts or litigation, as well as significant costs and negative publicity.

Manufacturing flaws, component failures, design defects, off-label uses or inadequate disclosure of product-related information could result in an unsafe condition or the injury or death of a patient. These problems could lead to a recall of, or issuance of a safety alert relating to, our products and result in significant costs, negative publicity and adverse competitive pressure. While we have had product recalls, they have all been voluntary, based on our own internal safety and quality monitoring and testing data, and none of our past product recalls has been material. The circumstances giving rise to recalls are, however, unpredictable, and any future recalls of existing or future products could materially adversely affect our business, results of operations, financial condition or cash flows.

The medical device industry has historically been subject to extensive litigation over product liability claims. There are high rates of mortality and other complications associated with some of the medical conditions suffered by the patients whom specialist physicians use our devices to treat, and we may be subject to product liability claims if our products cause, or merely appear to have caused, an injury or death. In addition, an injury or death that is caused by the activities of our suppliers, such as those that provide us with components and raw materials, or by an aspect of a treatment used in combination with our products, such as a complementary drug or anesthesia, may be the basis for a claim against us by patients, hospitals, health-care providers or others purchasing or using our products, even if our products were not the actual cause of such injury or death. An adverse outcome involving one of our products could result in reduced market acceptance and demand for all of our products, and could harm our reputation and our ability to market our products in the future. In some circumstances, adverse events arising from or associated with the design, manufacture or marketing of our products could result in the suspension or delay of regulatory reviews of our premarket notifications or applications for marketing. Any of the foregoing problems could disrupt our business and have a material adverse effect on our business, results of operation, financial condition or cash flows.

Although we carry product liability insurance in the United States and in other countries in which we conduct business, including for clinical trials and product marketing, we can give no assurance that such coverage will be available or adequate to satisfy any claims. Product liability insurance is expensive, subject to significant deductibles and exclusions, and may not be available on acceptable terms, if at all. If we are unable to obtain or maintain insurance at an acceptable cost or on acceptable terms with adequate coverage or otherwise protect against potential product liability claims, we could be exposed to significant liabilities. A product liability claim, recall or other claim with respect to uninsured liabilities or for amounts in excess of insured liabilities could materially adversely affect our business, financial condition and results of operations. Defending a suit, regardless of its merit or eventual outcome, could be costly, could divert management's attention from our business and might result in adverse publicity, which could result in reduced acceptance of our products in the market, product recalls or market withdrawals.

Our products are continually the subject of clinical trials conducted by us, our competitors, or other third parties, the results of which may be unfavorable, or perceived as unfavorable, and which could materially adversely affect our business, financial condition and results of operations.

As a part of the regulatory process of obtaining marketing clearance or approval for new products and new indications for existing products, as well as to provide specialist physicians with ongoing information regarding the efficacy of our products, we conduct and participate in numerous clinical trials with a variety of study designs, patient populations and trial endpoints. Our competitors and third parties also conduct clinical trials of our products without our participation. Unfavorable or inconsistent clinical data from existing or future clinical trials conducted by us, our competitors or third parties, or the market's or regulators' perception of clinical data, could materially adversely affect our business, results of operations, financial condition or cash flows.

Our future success depends in part upon establishing an interventional stroke care pathway in the United States that integrates the use of mechanical thrombectomy into the treatment of ischemic stroke.

The stroke care pathway in the United States generally begins with emergency responders who are responsible for transporting the patient to a hospital facility. With a small number of exceptions (such as for trauma), emergency responders in the United States generally operate under a protocol that transports patients to the nearest hospital, which decreases the likelihood that the patient will be transported to a stroke center that has a developed stroke team and an interventional approach to the treatment of stroke. Further, there is no agreed upon standard of care among physicians or hospitals regarding the treatment of ischemic stroke patients, and treatment protocols vary according to the particular hospital, often resulting in

significant delays and gaps in patients being assessed for and receiving interventional treatment. The absence of a uniform protocol among hospitals and among physicians within the same hospital means that we have to educate each hospital and stroke center about protocols that integrate our products for the treatment of stroke.

We believe that the stroke care system in the United States has not been historically geared towards interventional treatment of stroke due to the absence of clinical evidence that interventional techniques were effective. Specialist physician societies and we and our competitors are making efforts to alter the existing stroke care pathway, but we anticipate that these efforts will take years to be fully successful. The success of these efforts may depend on whether we and our competitors can effectively use recent positive clinical studies to convince specialist physicians that intervention yields superior clinical results relative to cases where intervention is not used.

Establishing an interventional stroke pathway that integrates the use of interventional treatments, including our products, will depend upon many factors, including:

- effectively educating hospitals and specialist physicians about the clinical evidence supporting intervention, as well as the use, benefits and cost-effectiveness of our products;
- improving the speed with which patients are assessed for and receive interventional treatments; and
- the success of legislative efforts aimed at increasing the likelihood that patients are transported to a hospital or stroke center where interventional treatments are available.

Even if these efforts are successful, it may be years before existing systems and care pathways are changed. These factors may make it difficult to grow our business.

Any data that is gathered in the course of clinical trials may be significantly more favorable than the typical results achieved by practicing specialist physicians, which could negatively impact rates of adoption of our products.

Even if the data collected from clinical trials indicates positive results, each specialist physician's actual experience with our products will vary. Clinical trials often involve procedures performed by specialist physicians who are technically proficient and high volume users. Consequently, the results reported in clinical trials may be significantly more favorable than typical results of other users. If specialist physicians' experiences indicate, or they otherwise believe, that our products are not as safe or effective as other treatment options with which they are more familiar, or clinical trial data indicates the same, adoption of our products may suffer, which could materially adversely affect our business, results of operations, financial condition or cash flows.

Negative publicity regarding our products or marketing tactics by competitors could reduce demand for our products, which would adversely affect sales and our financial performance.

We may experience, from time to time, negative exposure in clinical publications or in marketing campaigns of our competitors. Such publications or campaigns may present negative individual physician experience regarding the safety or effectiveness of our products or may suggest our competitors' products are superior to ours, based on studies or clinical trials conducted or funded by competitors or that involved competitive products.

Our reputation and competitive position may also be harmed by other publicly available information suggesting that our products are not safe. For example, we file adverse event reports under Medical Device Reporting ("MDR") obligations with the FDA that are publicly available on the FDA's website. We are required to file MDRs if our products may have caused or contributed to a serious injury or death or malfunctioned in a way that could likely cause or contribute to a serious injury or death if it were to recur. Any such MDR that reports a significant adverse event could result in negative publicity and could harm our reputation and future sales.

Our dependence on key suppliers puts us at risk of interruptions in the availability of our products, which could reduce our revenue and adversely affect our results of operations. In addition, increases in prices for raw materials and components used in our products could adversely affect our results of operations.

We require the timely delivery of sufficient amounts of components and materials to manufacture our products. For reasons of quality assurance, cost effectiveness or availability, we procure certain raw materials and components from a single or limited number of suppliers. We generally acquire such raw materials and components through purchase orders placed in the ordinary course of business, and as a result we may not have a significant inventory of these materials and components and generally do not have any guaranteed or contractual supply arrangements with many of these suppliers. Our reliance on these suppliers subjects us to risks that could harm our business, including, but not limited to, difficulty locating and qualifying alternative suppliers.

Our dependence on third-party suppliers involves several other risks, including limited control over pricing, availability, quality and delivery schedules. Suppliers of raw materials and components may decide, or be required, for reasons beyond our

control, to cease supplying raw materials and components to us or to raise their prices. Shortages of raw materials, quality control problems, production capacity constraints or delays by our suppliers could negatively affect our ability to meet our production requirements and result in increased prices for affected materials or components. We may also face delays, yield issues and quality control problems if we are required to locate and secure new sources of supply. While we have not experienced any to date, any material shortage, constraint or delay may result in delays in shipments of our products, which could materially adversely affect our results of operations. Increases in prices for raw materials and components used in our products could also materially adversely affect our results of operations.

In addition, the FDA and regulators outside of the United States may require additional testing of any raw materials or components from new suppliers prior to our use of these materials or components. In the case of a device with clearance under Section 510(k) of the FD&C Act, referred to as a 510(k), we may be required to submit a new 510(k) if a change in a raw material or component supplier results in a change in a material or component supplied that is not within the 510(k) cleared device specifications. If we need to establish additional or replacement suppliers for some of these materials or components, our access to the materials or components might be delayed while we qualify such suppliers and obtain any necessary FDA approvals or clearances. Our suppliers may also be subject to regulatory inspection and scrutiny. Any adverse regulatory finding or action against those suppliers could impact their ability to supply us with raw materials and components for our products.

Finally, some of our products are sterilized prior to use at a third-party sterilizer in the United States. Recently, certain other sterilization facilities in the United States have undergone temporary closures, and such closures or any future closures could lead to increased demand for sterilization services at the facility we currently use to sterilize our products, which could prevent us from being able to sterilize our products at a pace to meet product demand and/or result in an increase in the cost of sterilization services. In addition, if the sterilization facility we currently use were to close, even on a temporary basis, due to the limited number of sterilization facilities and the time required to approve and license, and gain regulatory approval for us to use, a sterilization facility, we may not be able to replace lost sterilization capacity on a timely basis which could materially adversely affect our results of operations.

Our corporate culture has contributed to our success, and if we cannot maintain this culture as we grow, we could lose the innovative approach, creativity, and teamwork fostered by our culture, and our business may be harmed.

We believe that a critical contributor to our success has been our corporate culture, which we believe fosters innovation, teamwork, and a focus on execution, as well as facilitates critical knowledge transfer and knowledge sharing. As we grow, we may find it difficult to maintain these important aspects of our corporate culture, which could limit our ability to innovate and operate effectively. Any failure to preserve our culture could also negatively affect our ability to retain and recruit personnel or execute on our business strategy.

If our facilities were to become inoperable, we would be unable to continue to develop and manufacture our products until we were able to restore full research, manufacturing and administrative capabilities at our facilities or secure a new facility, and as a result, our business would be harmed.

We currently maintain our research and development, administrative and primary manufacturing operations in buildings located at our campus in Alameda, California, and we do not currently have redundant facilities. We recently took occupancy of an additional facility in Roseville, California, which we plan to use primarily for manufacturing, but it will take some time for that site to become fully operational and we can give no assurance that this space will be adequate for our future needs. Alameda is situated on or near earthquake fault lines, and our facilities are built on filled land, which could be prone to liquefaction in a major earthquake. Should one or more of our buildings be significantly damaged or destroyed by natural or man-made disasters, such as earthquakes, fires or other events, it could take months to relocate or rebuild, during which time our employees may seek other positions, our research, development and manufacturing would cease or be delayed and our products may be unavailable. Moreover, because of the time required to approve and license a manufacturing facility under FDA and non-U.S. regulatory requirements, we may not be able to resume production on a timely basis even if we are able to obtain replacement production capacity. While we maintain property and business interruption insurance, such insurance has limits and would only cover the cost of rebuilding and relocating and lost profits, but not losses we may suffer due to our products being replaced by competitors' products. The inability to perform our research, development and manufacturing activities, combined with our limited inventory of raw materials and components and manufactured products, may cause specialist physicians to discontinue using our products or harm our reputation, and we may be unable to reestablish relationships with those specialist physicians in the future. Consequently, a catastrophic event at our facility could materially adversely affect our business, results of operations, financial condition or cash flows.

Natural disasters and other events beyond our control could harm our business.

Natural disasters or other catastrophic events, such as earthquakes, flooding, wildfires, power shortages, pandemics such as the recent spread of COVID-19 (coronavirus), terrorism, political unrest, telecommunications failure, vandalism, cyberattacks,

geopolitical instability, war, drought, sea level rise and other events beyond our control may cause damage or disruption to our operations, the operations of our suppliers and service providers, international commerce and the global economy, and could seriously harm our revenue and financial condition and increase our costs and expenses. The geographic location of our Alameda, California headquarters and production facilities, as well as the facilities of certain of our key suppliers and service providers, subject them to earthquake and wildfire risks. If a major earthquake, wildfire or other natural disaster were to damage our facilities or the facilities of suppliers and service providers, or impact the ability of our employees or the employees of our suppliers and service providers to travel to their workplace, we may experience potential impacts ranging from production and shipping delays to lost revenues and increased costs, which could significantly harm our business. Moreover, in October 2019, Pacific Gas and Electric ("PG&E"), the public electric utility in the Northern California region, commenced planned widespread blackouts during the peak wildfire season to avoid and contain wildfires sparked during strong wind events by downed power lines or equipment failure. While we have not experienced damage to our facilities or disruption to operations as a result of these power outages, ongoing blackouts, particularly if prolonged or frequent, could impact our operations and the operations of our suppliers and service providers located in the Northern California region going forward. In addition, many of our employees and the employees of such suppliers and service providers reside in Alameda County or surrounding counties and may be unable to travel to work for the duration of any power shut off. We do not have multiple-site capacity for all of our operations in the event of a business disruption, and our insurance may not be sufficient to cover losses or additional expense that we may sustain. Furthermore, other parties in our supply chain are similarly vulnerable to natural disasters or other sudden, unforeseen, and severe adverse events. A natural disaster or other catastrophic event in any of our major markets could have a material adverse impact on our business, financial condition, results of operations, or cash flows.

To successfully market and sell our products internationally, we must address a number of unique challenges applicable to international markets.

For the years ended December 31, 2019, 2018 and 2017, we derived 35.1%, 34.7% and 34.3%, respectively, of our revenue from international sales. To accommodate our international sales, we have invested significant financial and management resources to develop an international infrastructure that will meet the needs of our customers. We anticipate that a significant portion of our revenue will continue to be derived from sales of our products in foreign markets and that the percentage of our overall revenue that is derived from these markets may continue to increase. This revenue and related operations will continue to be subject to the risks and challenges associated with international operations, including:

- reliance on distributors;
- varying coverage and reimbursement policies, processes and procedures;
- difficulties in staffing and managing international operations from which sales are conducted;
- difficulties in penetrating markets in which our competitors' products or alternative procedures that do not use our products are more established;
- reduced protection for intellectual property rights in some countries;
- export licensing requirements or restrictions, trade regulations and foreign tax laws;
- fluctuating foreign currency exchange rates;
- foreign certification, regulatory requirements and legal requirements;
- lengthy payment cycles and difficulty in collecting accounts receivable;
- customs clearance and shipping delays;
- reliance on third-party logistics providers who warehouse and distribute finished products to our international customers;
- pricing pressure in international markets;
- political and economic instability;
- preference for locally produced products;
- higher incidence of corruption or unethical business practices; and

- uncertainty around a potential reversal or renegotiation of international trade agreements and partnerships and the imposition of tariffs under the administration of U.S. President Donald J. Trump.

If we are unable to successfully address these challenges, we may not be able to grow our international sales and our results of operations may suffer as a result.

Over the long term, we intend to grow our business internationally and to do so, we will need to either spend substantial sums to expand or develop direct sales capabilities in existing and new geographic areas or generate additional sales through existing distributors or attract additional distributors.

As a result of our international operations, we are required to comply with tax requirements in multiple jurisdictions, the scope and impact of which may be unclear. Moreover, tax authorities in jurisdictions in which we do business could disagree with tax positions that we take, including, for example, our inter-company pricing policies, or could assert that we owe more taxes than we currently pay due to the level and nature of our activities in such jurisdictions.

The June 2016 referendum by British voters to exit the European Union and the commencement of the official withdrawal process by the United Kingdom government in March 2017 has created uncertainties affecting business operations in the United Kingdom and the European Union. Until the terms of the United Kingdom's exit from the European Union are determined, it is difficult to predict its impact, but it is possible that the withdrawal could, among other things, affect the legal and regulatory environments to which our businesses are subject, impact trade between the United Kingdom and the European Union and other parties and create economic uncertainty in the region.

In 2018, the United States imposed tariffs on goods imported from China and certain other countries, which has resulted in retaliatory tariffs by China and other countries. Additional tariffs imposed by the United States on a broader range of imports, or further retaliatory trade measures taken by China or other countries in response, could result in an increase in supply chain costs or other pricing pressures that we may not be able to offset or may otherwise adversely impact our results of operations.

We rely on our distributors to market and sell our products in certain international markets.

We have established a direct sales capability in the United States, most of Europe, Canada and Australia, which we have complemented with distributors in Japan and certain other international markets. Sales to distributors represented 20.5%, 18.1% and 18.2% of our revenue in 2019, 2018 and 2017 respectively. Our success outside of the United States, most of Europe, Canada and Australia depends largely upon marketing arrangements with distributors, in particular their sales expertise and their relationships with specialist physicians and affiliated hospitals in their geographic areas. Distributors may terminate their relationship with us, sell competitive products or devote insufficient sales efforts or other resources to our products. We do not control our distributors, and they may not be successful in implementing our marketing plans. In addition, many of our distributors initially obtain and maintain foreign regulatory approval for the sale of our products in their respective countries, and their efforts in obtaining and maintaining regulatory approval may not be as robust as we desire or expect. As our business grows, we may seek to expand or otherwise modify our arrangements with our existing distributors and/or retain the services of additional distributors. Our failure to maintain our relationships with our existing distributors, or our failure to recruit and retain additional skilled distributors in existing or new international markets, could have an adverse effect on our operations. If current or future distributors do not perform adequately, or if we lose a significant distributor, such as our Japanese distributor, we may not be able to maintain existing levels of international revenue or realize expected long term international revenue growth. We have in the past experienced turnover with some of our distributors that has adversely affected sales in the countries in which those distributors operate. Similar occurrences could happen in the future.

Most of our customer relationships outside of the United States are with governmental entities, and we could be materially adversely affected by violations of the U.S. Foreign Corrupt Practices Act and similar anti-bribery laws in non-U.S. jurisdictions.

The U.S. Foreign Corrupt Practices Act (the "FCPA"), the United Kingdom Bribery Act, the Chinese Anti-Unfair Competition Law, and similar anti-bribery laws in other non-U.S. jurisdictions generally prohibit companies and their intermediaries from making improper payments to foreign officials for the purpose of obtaining or retaining business. Because of the predominance of government-sponsored healthcare systems around the world, most of our customer relationships outside of the United States are with governmental entities, and physicians practicing in those systems are considered "government officials." Therefore, our sales to these entities are subject to such anti-bribery laws. Our policies mandate compliance with these anti-bribery laws. We operate in many parts of the world that have experienced governmental corruption, and we have operations in certain countries, including working with a distributor in Russia and a local partner in China, where strict compliance with anti-bribery laws may be at variance with local customs and practices. Despite our training and compliance programs, our internal control policies and procedures may not always protect us from reckless or criminal acts committed by our employees, distributors or agents. Violations of the FCPA or other anti-bribery laws, or allegations of such violations, could disrupt our business and materially adversely affect our business, results of operations, financial condition or cash flows.

Foreign currency exchange rates may adversely affect our results.

We are exposed to the effects of changes in foreign currency exchange rates, and we have not historically hedged our foreign currency exposure. Approximately 35.1%, 34.7%, and 34.3% of our revenue for the years ended December 31, 2019, 2018 and 2017, respectively, were derived from sales in non-U.S. markets, and we expect sales from non-U.S. markets to continue to represent a significant portion of our revenue. For direct sales in our international markets, we are paid by our customers in their local currency, which is primarily euros. For sales to distributors in our international markets, we are paid in either U.S. dollars, euros or Japanese yen, with some sales being denominated in other currencies. Therefore, when the U.S. dollar strengthens relative to the euro, yen or other local currency, our U.S. dollar reported revenue from non-U.S. dollar denominated sales will decrease, or we will need to increase our non-U.S. dollar denominated prices, which may not be commercially practical. Conversely, when the U.S. dollar weakens relative to the euro, yen or other local currency, our U.S. dollar reported expenses from non-U.S. dollar denominated operating costs will increase. Global markets and foreign currencies, including the Euro and the British Pound, were adversely impacted, as a result of the June 23, 2016 referendum by British voters to exit the European Union and volatility in foreign currencies is expected to continue as the United Kingdom negotiates and executes its exit from the European Union. Changes in the relative values of currencies occur regularly and, in some instances, could materially adversely affect our business, results of operations, financial condition or cash flows.

We have experienced rapid growth in recent periods, and if we fail to manage our growth effectively, our business and results of operations may suffer.

We have significantly expanded our overall business, research and development, customer base, product portfolio, employee headcount and operations in recent periods. We have also established new operations in other countries. We have increased our total number of full-time employees from 1,100 as of December 31, 2015, to approximately 2,700 as of December 31, 2019. Our expansion has placed, and our expected future growth will continue to place, a significant strain on our managerial, operational, product development, sales and marketing, administrative, financial and other resources.

We plan to continue to increase our salesforce. Our experience has been that it takes at least six months, and often longer, before new sales personnel generate enough sales to cover their costs, resulting in increased costs without offsetting revenue during periods in which we are increasing the size of our salesforce.

More systems, facilities, processes and management employees are needed to allow us to continue to grow successfully. We are expanding and renovating our existing facilities around the world but particularly in Alameda, California, driven by our need to expand the space available for our product development and test capacities, as well as our need for additional information technology and office space. The expansion and renovation of our facilities entail risks that could cause disruption in the operations of our business. Such risks include potential interruption in data flow; unforeseen construction, scheduling, engineering, environmental, or geological problems; and unanticipated cost increases. To meet anticipated demand for our products, we will also have to continue to buy additional equipment and hire additional research and development and manufacturing employees, including quality control personnel and other personnel involved in the production process. This expansion could result in operating difficulties including, but not limited to, difficulties in hiring the appropriate number of research and development and manufacturing employees, training and managing an increasing number of employees, delays in production and shipments, manufacturing inefficiencies and employees not working at capacity. If we do not adapt to meet these evolving challenges and if we are unable to manage our growth successfully, it could have a material and adverse effect on our business, results of operations, financial condition or cash flows.

We have experienced rapid growth in the market for our products and we believe the demand for our products may not continue at these rates.

Annual revenue from our neurovascular products and vascular products increased by $213.6 million, or 64.0%, over a two-year period from 2017 to 2019. This growth was the result of many factors, including but not limited to continued investment in our sales force and a shift to endovascular treatment as the standard of care in treatment of stroke. As we continue to grow and scale our business, it is likely that our growth rates will be more gradual.

We depend on key personnel to operate our business and develop our products, and if we are unable to retain, attract and integrate qualified personnel, our ability to develop and successfully grow our business could be harmed.

We believe that our future success is highly dependent on the contributions of our executive officers, particularly our chief executive officer, as well as our ability to attract and retain highly skilled and experienced sales and marketing, technical and other personnel in the United States and in international markets. Each of these persons' efforts will be critical to us as we continue to develop our products and business. If we were to lose one or more of our key employees, including to competitors, we may experience difficulties in competing effectively, developing our products and implementing our business strategies.

Our research and development and sales and marketing programs depend on our ability to attract and retain highly skilled technicians, engineers and salespeople. In general, we may not be able to attract or retain qualified employees in the future due to the intense competition for qualified personnel among life science businesses, particularly in the San Francisco Bay Area,

where our corporate headquarters, research and development and primary manufacturing facility is located. In addition to the competition for personnel, the San Francisco Bay Area in particular is characterized by a high cost of living. Although we historically have not had any material difficulty attracting qualified experienced personnel to our company, we could in the future have such difficulties and may be required to expend significant financial resources in our employee recruitment and retention efforts. If we are not able to identify, recruit and retain highly qualified personnel, we may experience constraints that will adversely affect our ability to support our research, development, manufacturing and sales programs, and ultimately our ability to compete. If we are unable to identify, recruit and retain qualified salespeople, there could be a delay or decline in the adoption of our products. If key personnel were to leave Penumbra, either to join our competitors or otherwise, we may not be able to attract and retain equally qualified personnel to replace them, which could harm our ability to develop and successfully grow our business.

We depend on information technology systems to operate our business, and issues with maintaining, upgrading or implementing these systems, could have a material adverse effect on our business.

We rely on the efficient and uninterrupted operation of information technology systems to process, transmit and store electronic information in our day-to-day operations. All information technology systems are vulnerable to damage or interruption from a variety of sources. Our business has grown in size and complexity; this has placed, and will continue to place, significant demands on our information technology systems. To effectively manage this growth, our information systems and applications require an ongoing commitment of significant resources to maintain, protect, enhance and upgrade existing systems and develop and implement new systems to keep pace with changing technology and our business needs. In the fourth quarter of 2019, we began evaluating the implementation of a new enterprise resource planning ("ERP") software system which will replace certain existing business, operational, and financial processes and systems. This ERP implementation project has required and may continue to require investment of capital and human resources, the re-engineering of business processes, and the attention of many employees who would otherwise be focused on other areas of our business. This system change entails certain risks, including difficulties with changes in business processes that could disrupt our operations - such as our ability to track orders and timely ship products, manage our supply chain and aggregate financial and operational data. During the transition, we may continue to rely on legacy information systems, which may be costly or inefficient, while the implementation of new initiatives may not achieve the anticipated benefits and may divert management's attention from other operational activities, negatively affect employee morale, or have other unintended consequences. Delays in integration or disruptions to our business from implementation of new or upgraded systems could have a material adverse impact on our financial condition and operating results. Additionally, if we are not able to accurately forecast expenses and capitalized costs related to system upgrades and changes, this may have an adverse impact on our financial condition and operating results.

If we fail to maintain or are unable to assert that our internal control over financial reporting is effective under the new ERP system, we could adversely affect our ability to accurately report our financial condition, operating results or cash flows. If our independent registered public accounting firm determines we have a material weakness in our internal control over financial reporting, investors may lose confidence in the accuracy and completeness of our financial reports and the market price of our common stock could be adversely affected, and we could become subject to investigations by the stock exchange on which our securities are listed, the SEC, or other regulatory authorities, which could require additional financial and management resources.

If the information we rely upon to run our businesses were to be found to be inaccurate or unreliable, if we fail to maintain or protect our information technology systems and data integrity effectively, if we fail to develop and implement new or upgraded systems to meet our business needs in a timely manner, or if we fail to anticipate, plan for or manage significant disruptions to these systems, our competitive position could be harmed, we could have operational disruptions, we could lose existing customers, have difficulty preventing, detecting, and controlling fraud, have disputes with customers, specialist physicians and other health care professionals, have regulatory sanctions or penalties imposed or other legal problems, incur increased operating and administrative expenses, lose revenues as a result of a data privacy breach or theft of intellectual property or suffer other adverse consequences, any of which could have a material adverse effect on our business, results of operations, financial condition or cash flows.

Failure to protect our information technology infrastructure against cyber-based attacks, network security breaches, service interruptions, or data corruption could significantly disrupt our operations and adversely affect our business and operating results.

We rely on information technology, telephone networks and systems, including the internet, to process and transmit sensitive electronic information and to manage or support a variety of business processes and activities, including sales, billing, marketing, procurement and supply chain, manufacturing, and distribution. We use enterprise information technology systems to record, process, and summarize financial information and results of operations for internal reporting purposes and to comply with regulatory, financial reporting, legal, and tax requirements. Our information technology systems are vulnerable to a cyber-attack, malicious intrusion, breakdown, destruction, loss of data privacy or other significant disruption. Any such successful attacks could result in the theft of intellectual property or other misappropriation of assets, or otherwise compromise our

confidential or proprietary information and disrupt our operations. Cyber-attacks are becoming more sophisticated and frequent, and our systems could be the target of malware and other cyber-attacks. We have invested in our systems and the protection of our data to reduce the risk of an intrusion or interruption, and we monitor our systems on an ongoing basis for any current or potential threats. We can give no assurances that these measures and efforts will prevent interruptions or breakdowns. If we are unable to detect or prevent a security breach or cyber-attack or other disruption from occurring, then we could incur losses or damage to our data, or inappropriate disclosure of our confidential information or that of others; and we could sustain damage to our reputation and customer and employee relationships, suffer disruptions to our business and incur increased operating costs including costs to mitigate any damage caused and protect against future damage, and be exposed to additional regulatory scrutiny or penalties and to civil litigation and possible financial liability, any of which could have a material adverse effect on our business, financial condition, results of operations or cash flows. In addition, our information technology may be susceptible to damage, disruptions or shutdowns due to power outages, user errors, implementation of new operational systems or software or upgrades to existing systems and software, or catastrophes or other unforeseen events. Such events could result in the disruption of business processes, network degradation and system downtime, along with the potential that a third party will exploit our critical assets such as intellectual property, proprietary business information and data related to our customers, suppliers and business partners. To the extent that such disruptions occur, our customers and partners may lose confidence in our solutions and we may lose business or brand reputation, resulting in a material and adverse effect on our business, financial condition, results of operations or cash flows.

Cost-containment efforts of our customers, purchasing groups and governmental organizations could have a material adverse effect on our sales and profitability.

In an effort to reduce costs, many hospitals within the United States have become members of Group Purchasing Organizations ("GPOs") and Integrated Delivery Networks ("IDNs"). GPOs and IDNs negotiate pricing arrangements with medical device companies and distributors and offer the negotiated prices to affiliated hospitals and other members. GPOs and IDNs typically award contracts on a category-by-category basis through a competitive bidding process. Bids are generally solicited from multiple providers with the intention of driving down pricing or reducing the number of vendors. Due to the highly competitive nature of the GPO and IDN contracting processes, we may not be able to obtain or maintain contract positions with major GPOs and IDNs. Furthermore, the increasing leverage of organized buying groups may reduce market prices for our products, thereby reducing our profitability.

While having a contract with a GPO or IDN for a given product category can facilitate sales to members of that GPO or IDN, such contract positions can offer no assurance that any level of sales will be achieved, as sales are typically made pursuant to purchase orders. Even when a provider is the sole contracted supplier of a GPO or IDN for a certain product category, members of the GPO or IDN generally are free to purchase from other suppliers. Furthermore, GPO and IDN contracts typically are terminable without cause by the GPO or IDN upon 60 to 90 days' notice. Accordingly, although we have multiple contracts with many major GPOs and IDNs, the members of such groups may choose to purchase from our competitors due to the price or quality offered by such competitors, which could result in a decline in our sales and profitability.

The successful use of our products depends, in part, on our ability to educate specialist physicians in the proper use of our products, which may be more complex than competitive products or alternative treatments that do not use our products. If we are unable to educate specialist physicians in the proper use of our products, we may experience a high risk of product liability.

The successful use of our products depends, in part, on our ability to educate specialist physicians in the proper use of our products, which may be more complex than competitive products or alternative treatments that do not use our products. We educate specialist physicians on the proper techniques in using our products to achieve the intended outcome. However, our products may be more complicated to operate than competitive products or alternative treatments that do not use our products. In the event that specialist physicians perceive that our products are complex relative to alternative products or established treatments that do not use our products, we may have difficulty gaining or increasing adoption of our products. Further, we may be unable to provide adequate education on the use of our products to specialist physicians, and some specialist physicians may not be willing to invest the time required to become properly educated on the use of our products. If we are unable to educate specialist physicians to properly use our products, this may lead to inadequate demand for our products and materially adversely affect our business, results of operations, financial condition or cash flows.

In addition, if we do not adequately educate specialist physicians on the use of our products, and our products are used incorrectly during procedures, we may be subject to claims against us by such specialist physicians, their hospitals or their patients. Our business, including our reputation, may consequently be adversely affected by any litigation that may occur based on error in the use of our products, and such litigation could also materially adversely affect our results of operations, financial condition or cash flows.

Regulatory Risks

We are subject to stringent domestic and foreign medical device regulation, which may impede the approval or clearance process for our products, hinder our development activities and manufacturing processes and, in some cases, result in the recall or seizure of previously approved or cleared products.

Our products, development activities and manufacturing processes are subject to extensive and rigorous regulation by the FDA and by comparable agencies in foreign countries and by other regulatory agencies and governing bodies. Manufacturers of medical devices such as us must comply with certain regulations that cover the composition, labeling, testing, clinical study, manufacturing, packaging and distribution of medical devices. In addition, most medical devices (Class II & III) must receive FDA clearance or approval before they can be commercially marketed in the United States. The FDA may require testing and surveillance programs to monitor the effects of cleared or approved products that have been commercialized and can prevent or limit further marketing of a product based on the results of these post-marketing programs. Furthermore, most major markets for medical devices outside the United States require clearance, approval or compliance with certain standards and requirements before a product can be commercially marketed. The process of obtaining marketing approval or clearance from the FDA and foreign regulatory agencies for new products could take a significant period of time, require the expenditure of substantial resources, involve rigorous pre-clinical and clinical testing, require changes to our products and result in limitations on the indicated uses of our products. We cannot provide assurance that we will receive the required approval or clearance from the FDA and foreign regulatory agencies for future products on a timely basis. Results from pre-clinical studies and early clinical trials may not allow us to predict results in later-stage testing. We cannot be certain that our future clinical trials will demonstrate the safety and effectiveness of any of our future products or will result in clearance or approval to market any of these products. In addition, our development activities could be harmed or delayed by a shutdown of the U.S. government, including the FDA. The failure to receive approval or clearance for significant new products on a timely basis could have a material adverse effect on our business, results of operation, financial condition or cash flows.

The FDA and other foreign regulatory entities also conduct periodic inspections of our facilities to determine compliance with the FDA's QSR requirements, MDR regulations and all comparable foreign regulations. Product approvals or clearances by the FDA can be withdrawn, and new product approvals or clearances by the FDA and foreign regulatory bodies can be delayed, due to failure to comply with regulatory requirements or the occurrence of unforeseen problems following initial approval or clearance of a product. In addition, state or federal legislation or regulations may impact key manufacturing processes, such as sterilization, which could require expensive and time-consuming changes to our manufacturing processes as well as the need for additional regulatory clearances or approvals. The failure to comply with regulatory requirements or the discovery of previously unknown problems with a product or manufacturer could result in fines, delays or suspensions of regulatory approvals or clearances, seizures or recalls of products (with the attendant expenses and adverse competitive impact), the banning of a particular device, an order to replace or refund the cost of any device previously manufactured or distributed, operating restrictions and criminal prosecution, as well as decreased sales as a result of negative publicity and product liability claims, all of which could have a material adverse effect on our business, results of operation, financial condition or cash flows.

The implementation of healthcare reform in the United States could have a material adverse effect on our business.

In March 2010, the Patient Protection and Affordable Care Act was enacted into law in the United States (as amended by the Health Care and Education Reconciliation Act, the Affordable Care Act).The Affordable Care Act reduces Medicare and Medicaid payments to hospitals and clinical laboratories, which could reduce medical procedure volumes and impact the demand for our products or the prices at which we sell them. While this legislation is intended to expand health insurance coverage to uninsured persons in the United States, the impact of any overall increase in access to healthcare on sales of our products remains uncertain. Various healthcare reform proposals have also emerged at the state level. In addition, there have been judicial, Congressional and executive branch challenges to certain aspects of the Affordable Care Act, and we expect that the Trump Administration may seek to modify, repeal or otherwise invalidate or vitiate all, or certain provisions of, the Affordable Care Act in the future. The impact of the Affordable Care Act and these proposals could have a material adverse effect on our business, results of operation, financial condition or cash flows.

If we modify our FDA cleared products, we may need to seek and obtain new clearances, which, if not granted, would prevent us from selling our modified products or require us to redesign our products.

A component of our strategy is to continue to modify and upgrade our products that have been cleared by the FDA. The FDA requires device manufacturers to make a determination of whether or not a modification requires a clearance; however, the FDA can review a manufacturer's decision not to submit for additional clearances. Any modifications to an FDA cleared device that would significantly affect its safety or effectiveness or that would constitute a major change in its intended use would require a new 510(k) clearance or possibly a premarket approval. We may not be able to obtain additional 510(k) clearances or premarket approvals for new products or for modifications to, or additional indications for, our existing products in a timely fashion, or at all. We also cannot provide any assurance that the FDA will agree with our decisions not to seek clearances for particular device modifications. Delays in obtaining future clearances would adversely affect our ability to introduce new or enhanced products in a timely manner, which in turn would harm our revenue and future profitability. We have made modifications to our products in the past and may make additional modifications in the future that we believe do not or will not require additional clearances. If the FDA disagrees, and requires new clearances or approvals for any modifications, and we fail

to obtain such approvals or clearances or fail to secure approvals or clearances in a timely manner, we may be required to recall and to stop the manufacturing and marketing of the modified device until we obtain FDA approval or clearance, and we may be subject to significant regulatory fines or penalties, all of which could harm our results of operations and require us to redesign our products.

We may not receive necessary foreign regulatory approvals or clearances or otherwise comply with foreign regulations.

For the years ended December 31, 2019, 2018 and 2017, sales outside the United States accounted for approximately 35.1%, 34.7%, and 34.3%, respectively, of our total sales, and we expect this percentage to increase in future years. Foreign regulatory bodies have established varying regulations. Specifically, the European Union has promulgated rules that require that medical device products receive the right to affix the CE mark, an international symbol of adherence to quality assurance standards and compliance with applicable European medical device directives. Although we have received CE markings for all of the products we currently sell in the European Union, we can give no assurance that we will be able to obtain European Union approval for any of our future products. Our inability or failure, or the inability or failure of our international distributors, to comply with varying foreign regulations or the imposition of new regulations could restrict or, in certain countries, result in the prohibition of the sale of our products, and thereby adversely affect our business, financial condition and results of operations.

Our global regulatory environment is becoming increasingly stringent and unpredictable, which could increase the time, cost and complexity of obtaining regulatory approvals for our products, as well as the clinical and regulatory costs of supporting those approvals. Many countries that did not have regulatory requirements for medical devices have established such requirements in recent years and other countries have expanded existing regulations. Certain regulators are exhibiting less flexibility by requiring, for example, the collection of local preclinical and/or clinical data prior to approval. While harmonization of global regulations has been pursued, requirements continue to differ significantly among countries. We expect the global regulatory environment to continue to evolve, which could impact our ability to obtain future approvals for our products and increase the cost and time to obtain such approvals. By way of example, the European Union regulatory bodies is instituting the EU MDR, which changes many aspects of the existing regulatory framework, such as clinical data requirements, and introduces new ones, such as Unique Device Identification ("UDI"). MDR's date of application (full implementation) is May 26, 2020. Once applicable, the MDR will impose increased compliance obligations for many parts of our business in order to access the EU market. The notified bodies that will oversee compliance with the new EU MDR, face uncertainties in the upcoming years as the EU MDR is rolled out and enforced, creating risks in several areas, including the CE Marking process, data transparency and application review timetables.

We may not be able to meet regulatory quality requirements applicable to our manufacturing process.

We are required to register with the FDA as a device manufacturer and as a result, we are subject to periodic inspection by the FDA for compliance with the FDA's QSR requirements, which requires manufacturers of medical devices to adhere to certain requirements, including testing, quality control and documentation procedures. In addition, the federal MDR regulations require us to provide information to the FDA whenever there is evidence that reasonably suggests that a device may have caused or contributed to a death or serious injury, or has malfunctioned, and if the malfunction were to recur, it would be likely to cause or contribute to a death or serious injury. Compliance with applicable regulatory requirements is subject to continual review and is rigorously monitored through periodic inspections by the FDA. In the European Community, we are required to maintain certain ISO certifications in order to sell products and we undergo periodic inspections by notified bodies to obtain and maintain these certifications. On March 1, 2016, the ISO issued a new Quality Management System ("QMS") standard for medical device manufacturers, ISO 13485:2016. We received certification to ISO 13485:2016 in June 2018 and re-certification in 2019. Compliance with this standard is subject to continual review and is monitored through periodic inspections by our notified body. Some foreign countries, most notably Japan and Brazil, have similar requirements or may require inspections of our manufacturing facilities before approving a product for sale in their country. We have decided to participate in the Medical Device Single Audit Program ("MDSAP") which allows for certification and review of compliance to standards and regulations required in the United States, Canada, Brazil, Australia, and Japan. We received our first MDSAP certification in August 2018 and re-certification in 2019. Some of our suppliers are subject to the same or similar scrutiny. If we or our suppliers fail to adhere to QSR, ISO or other regulatory requirements, this could delay production of our products and lead to fines, difficulties in obtaining regulatory clearances or approvals, recalls or other consequences, which could in turn have a material adverse effect on our business, results of operation, financial condition or cash flows.

We are subject to periodic inspections by the FDA and other regulatory bodies related to regulatory requirements that apply to medical devices designed and manufactured, and clinical trials sponsored, by us. We have previously received and could in the future receive notices of inspectional observations or deficiencies from the FDA. Any such notices would require us to undertake corrective and preventive actions or other actions in order to address the FDA's concerns, which could be expensive and time-consuming to complete and could impose additional burdens and expenses.

We are subject to periodic inspections by the FDA and other regulatory bodies. If we receive a notice of inspectional observations or deficiencies from the FDA following an inspection, we may be required to undertake corrective and preventive

actions or other actions in order to address the FDA's concerns, which could be expensive and time-consuming to complete and could impose additional burdens and expenses. Failure to adequately address the FDA's concerns could expose us to enforcement and administrative actions.

We are subject to federal, state and foreign healthcare laws and regulations that could result in significant liability, require us to change our business practices and restrict our operations in the future.

We are subject to various healthcare fraud and abuse regulation and enforcement by federal, state and foreign governments, which could significantly impact our business. The laws that may affect our ability to operate include, but are not limited to:

- the federal Anti-Kickback Statute, which prohibits, among other things, persons and entities from knowingly and willfully soliciting, receiving, offering, or paying remuneration, directly or indirectly, in cash or in kind, in exchange for or to induce either the referral of an individual for, or the purchase, lease, order or recommendation of, any good, facility, item or service for which payment may be made, in whole or in part, under federal healthcare programs such as Medicare and Medicaid. A person or entity does not need to have actual knowledge of this statute or specific intent to violate it;

- federal civil and criminal false claims laws and civil monetary penalty laws, including civil whistleblower or qui tam actions, that prohibit, among other things, knowingly presenting, or causing to be presented, claims for payment or approval to the federal government that are false or fraudulent, knowingly making a false statement material to an obligation to pay or transmit money or property to the federal government or knowingly concealing or knowingly and improperly avoiding or decreasing an obligation to pay or transmit money or property to the federal government;

- HIPAA, which created federal criminal laws that prohibit executing a scheme to defraud any healthcare benefit program or making false statements relating to healthcare matters. A person or entity does not need to have actual knowledge of these statutes or specific intent to violate them;

- HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009, and their respective implementing regulations, which impose requirements on certain covered healthcare providers, health plans and healthcare clearinghouses as well as their business associates that perform services for them that involve individually identifiable health information, relating to the privacy, security and transmission of individually identifiable health information without appropriate authorization, including mandatory contractual terms as well as directly applicable privacy and security standards and requirements;

- the federal physician sunshine requirements under the Affordable Care Act, which require certain manufacturers of drugs, devices, biologics, and medical supplies to report annually to the U.S. Department of Health and Human Services information related to payments and other transfers of value to physicians (defined to include doctors, dentists, optometrists, podiatrists and chiropractors) and teaching hospitals, and ownership and investment interests held by physicians and their immediate family members;

- state and foreign law equivalents of each of the above federal laws, such as foreign and state anti-kickback, anti-benefit and false claims laws, as well as state and foreign laws and regulations governing interactions with healthcare professionals and requiring disclosure of payments and interactions with healthcare professionals and state and foreign laws governing the privacy and security of health information in certain circumstances.

The scope and enforcement of each of these laws is uncertain and subject to rapid change in the current environment of healthcare reform, especially in light of the lack of applicable precedent and regulations. Federal and state enforcement bodies have recently increased their scrutiny of interactions between healthcare companies and healthcare providers, which has led to a number of investigations, prosecutions, convictions and settlements in the healthcare industry. Responding to investigations can be time-and resource-consuming and can divert management's attention from the business. Additionally, as a result of these investigations, healthcare providers and entities may have to agree to additional onerous compliance and reporting requirements as part of a consent decree or corporate integrity agreement. Any such investigation or settlement could increase our costs or otherwise have an adverse effect on our business.

If our operations are found to be in violation of any of the laws described above or any other governmental regulations that apply to us now or in the future, we may be subject to penalties, including civil and criminal penalties, damages, fines, disgorgement, exclusion from governmental health care programs, and the curtailment or restructuring of our operations, any of which could have a material adverse effect on our business, results of operation, financial condition or cash flows.

The FDA and other regulatory agencies strictly regulate the promotional claims that may be made about medical devices. If we are found to have improperly promoted our products for off-label uses, we may become subject to significant fines and other liability.

The FDA and other regulatory agencies strictly regulate the promotional claims that may be made about medical devices. For example, devices cleared under section 510(k) cannot be marketed for any intended use that is outside of the FDA's substantial equivalence determination for such devices. Physicians nevertheless may use our products on their patients in a manner that is inconsistent with the intended use cleared by the FDA. If we are found to have promoted such "off-label" uses, we may become subject to significant government fines and other related liability. The federal government has levied large civil and criminal fines against companies for alleged improper promotion and has enjoined several companies from engaging in off-label promotion. The FDA has also requested that companies enter into consent decrees or permanent injunctions under which specified promotional conduct is changed or curtailed.

Our operations are subject to environmental, health and safety, and data privacy laws and regulations, compliance with which may be costly.

Our business is subject to federal, state, and local laws and regulations relating to the protection of the environment, worker health and safety and the use, management, storage, and disposal of hazardous substances and wastes. Failure to comply with these laws and regulations may result in substantial fines, penalties or other sanctions. In addition, environmental laws and regulations could require us to pay for environmental remediation and response costs, or subject us to third party claims for personal injury, natural resource or property damage, relating to environmental contamination. Liability may be imposed whether or not we knew of, or were responsible for, such environmental contamination.The cost of defending against environmental claims, of compliance with environmental, health and safety regulatory requirements or of remediating contamination could materially adversely affect our business, results of operations, financial condition or cash flows.

Additionally, we are subject to laws and regulations with respect to the collection, use, disclosure, transfer and storage of personal data that we may collect from our employees, consultants or in conjunction with clinical trials. The legislative and regulatory landscape for privacy and data protection continues to evolve, and there has been an increasing amount of focus on privacy and data protection issues that may affect our business. For example, the European Union's General Data Protection Regulation ("GDPR"), which became effective in May 2018, established new, and in some cases more stringent, requirements for data protection in Europe. Under the GDPR, enhanced data protection requirements as well as substantial fines for breaches of personal data will apply and increase our obligations and potential liabilities for the personal data that we process or control. We have modified and will continue to modify our practices in order to comply with these and other requirements, which requires us to incur costs and expenses, and we may face difficulties in complying with all privacy and data protection legal requirements that apply to us now or in the future, as well as financial penalties and liabilities if we are unable to do so. Similar issues could arise as a result of the passage of the California Consumer Privacy Act which became effective January 1, 2020.

Regulations and customer demands related to conflict minerals may force us to incur additional expenses and may make our supply chain more complex.

The Dodd-Frank Wall Street Reform and Consumer Protection Act ("Dodd-Frank Act") imposes disclosure requirements regarding the use in components of our products of "conflict minerals" mined from the Democratic Republic of Congo and adjoining countries, whether the components of our products are manufactured by us or third parties. This requirement could affect the pricing, sourcing and availability of minerals used in the manufacture of components we use in our products. In addition, there are additional costs associated with complying with the disclosure requirements and customer requests related to the use of conflict minerals in components of our products, such as costs related to our due diligence to determine the source of any conflict minerals used in our products. Compliance with these requirements could adversely affect the sourcing, supply and pricing of materials used in those products and we may face reputational challenges if we are unable to verify the origins for all "conflict minerals" used in our products through the procedures we have implemented.

Risks Related to Our Intellectual Property

We rely on a variety of intellectual property rights, and if we are unable to maintain or protect our intellectual property, our business and results of operations will be harmed.

Our commercial success will depend, in part, on our ability to obtain and maintain intellectual property protection for our products and related technologies both in the United States and elsewhere, successfully defend our intellectual property rights against third-party challenges and successfully enforce our intellectual property rights to prevent third-party infringement. While we rely primarily upon a combination of patents, trademarks and trade secret protection, as well as nondisclosure, confidentiality and other contractual agreements to protect the intellectual property related to our brands, products and other proprietary technologies, protection derived from patents is relatively limited.

The process of obtaining patent protection is expensive and time-consuming, and we may not be able to prosecute all necessary or desirable patent applications at a reasonable cost or in a timely manner. We may choose not to seek patent protection for certain innovations or products and may choose not to pursue patent protection in certain jurisdictions, and under the laws of certain jurisdictions, patents or other intellectual property rights may be unavailable or limited in scope and, in any event, any patent protection we obtain may be limited. As a result, some of our products are not, and in the future may not be, protected by patents. We generally apply for patents in those countries where we intend to make, have made, use or sell products and where we assess the risk of infringement to justify the cost of seeking patent protection. However, we do not seek protection in all countries where we sell products and we may not accurately predict all the countries where patent protection would ultimately be desirable. If we fail to timely file a patent application in any such country or major market, we may be precluded from doing so at a later date. Competitors may use our technologies in jurisdictions where we have not obtained patent protection to develop their own products and, further, may export otherwise infringing products to territories in which we have patent protection that may not be sufficient to terminate infringing activities.

Furthermore, we cannot guarantee that any patents will be issued from any pending or future owned or licensed patent applications, or if any current or future patents will provide us with any meaningful protection or competitive advantage. Even if issued, existing or future patents may be challenged, including with respect to ownership, narrowed, invalidated, held unenforceable or circumvented, any of which could limit our ability to prevent competitors and other third parties from developing and marketing similar products or limit the length of terms of patent protection we may have for our products and technologies. Other companies may also design around technologies we have patented, licensed or developed. In addition, the issuance of a patent does not give us the right to practice the patented invention. Third parties may have blocking patents that could prevent us from marketing our products or practicing our own patented technology.

The patent positions of medical device companies can be highly uncertain and involve complex legal, scientific and factual questions for which important legal principles remain unresolved. The standards that the U.S. Patent and Trademark Office ("USPTO") and its foreign counterparts use to grant patents are not always applied predictably or uniformly. Changes in either the patent laws, implementing regulations or the interpretation of patent laws may diminish the value of our rights. The legal systems of certain countries do not protect intellectual property rights to the same extent as the laws of the United States, and many companies have encountered significant problems in protecting and defending such rights in foreign jurisdictions.

Because patent applications in the United States, Europe and many other jurisdictions are typically not published until 18 months after filing, or in some cases not at all, and because publications of discoveries in scientific literature lag behind actual discoveries, we cannot be certain that we were the first to make the inventions claimed in our issued patents or pending patent applications, or that we were the first to file for protection of the inventions set forth in our patents or applications. We can give no assurance that all of the potentially relevant art relating to our patents and patent applications has been found; overlooked prior art could be used by a third party to challenge the validity, enforceability and scope of our patents or prevent a patent from issuing from a pending patent application. As a result, we may not be able to obtain or maintain protection for certain inventions. Therefore, the validity, enforceability and scope of our patents in the United States, Europe and in other countries cannot be predicted with certainty and, as a result, any patents that we own or license may not provide sufficient protection against our competitors.

Third parties may challenge any existing patent or future patent we own or license through adversarial proceedings in the issuing offices or in court proceedings, including as a response to any assertion of our patents against them. In any of these proceedings, a court or agency with jurisdiction may find our patents invalid and/or unenforceable, or even if valid and enforceable, insufficient to provide protection against competing products and services sufficient to achieve our business objectives. We may be subject to a third party pre-issuance submission of prior art to the USPTO, or reexamination by the USPTO if a third party asserts a substantial question of patentability against any claim of a U.S. patent we own or license. The adoption of the Leahy-Smith America Invents Act ("Leahy-Smith Act") in September 2011 established additional opportunities for third parties to invalidate U.S. patent claims, including inter parties review and post-grant review proceedings. Outside of the United States, patents we own or license may become subject to patent opposition or similar proceedings, which may result in loss of scope of some claims or the entire patent. In addition, such proceedings are very complex and expensive, and may divert our management's attention from our core business. If any of our patents are challenged, invalidated, circumvented by third parties or otherwise limited or expire prior to the commercialization of our product candidates, and if we do not own or have exclusive rights to other enforceable patents protecting our products or other technologies, competitors and other third parties could market products and use processes that are substantially similar to, or superior to, ours and our business would suffer.

The degree of future protection for our proprietary rights is uncertain because legal means afford only limited protection and may not adequately protect our rights or permit us to gain or keep a competitive advantage. For example:

- others may be able to develop products that are similar to, or better than, ours in a way that is not covered by the claims of our patents;

- we might not have been the first to make the inventions covered by our patents or pending patent applications;
- we might not have been the first to file patent applications for these inventions;
- any patents that we obtain may not provide us with any competitive advantages or may ultimately be found invalid or unenforceable; or
- we may not develop additional proprietary technologies that are patentable.

We may file lawsuits or initiate other proceedings to protect or enforce our patents or other intellectual property rights, which could be expensive, time consuming and unsuccessful.

Competitors may infringe our issued patents or other intellectual property. To counter infringement or unauthorized use, we may be required to file infringement claims, which can be expensive and time-consuming. Any claims we assert against perceived infringers could provoke these parties to assert counterclaims against us alleging that we infringe their intellectual property. In addition, in a patent infringement proceeding, a court may decide that a patent of ours is invalid or unenforceable, in whole or in part, construe the patent's claims narrowly or refuse to stop the other party from using the technology at issue on the grounds that our patents do not cover the technology in question. An adverse result in any litigation proceeding could put one or more of our patents at risk of being invalidated or interpreted narrowly, which could adversely affect our competitive business position, business prospects and financial condition.

Our commercial success depends significantly on our ability to operate without infringing upon the intellectual property rights of third parties.

The medical device industry is subject to rapid technological change and substantial litigation regarding patent and other intellectual property rights. Our competitors in both the United States and abroad, many of which have substantially greater resources and have made substantial investments in patent portfolios and competing technologies, may have applied for or obtained or may in the future apply for and obtain, patents that will prevent, limit or otherwise interfere with our ability to make, use and sell our products. Numerous third party patents exist in the fields relating to our products, and it is difficult for industry participants, including us, to identify all third-party patent rights relevant to our products and technologies. Moreover, because some patent applications are maintained as confidential for a certain period of time, we cannot be certain that third parties have not filed patent applications that cover our products and technologies.

Patents could be issued to third parties that we may ultimately be found to infringe. Third parties may also have or obtain valid and enforceable patents or proprietary rights that could block us from developing product candidates using our technology. Our failure to obtain or maintain a license to any technology that we require may materially harm our business, financial condition and results of operations. Furthermore, we would be exposed to a threat of litigation.

From time to time, we may be party to, or threatened with, litigation or other proceedings with third parties, including non-practicing entities, who allege that our products, components of our products and/or proprietary technologies infringe, misappropriate or otherwise violate their intellectual property rights. The types of situations in which we may become a party to such litigation or proceedings include:

- we or our collaborators may initiate litigation or other proceedings against third parties seeking to invalidate the patents held by those third parties or to obtain a judgment that our products or processes do not infringe those third parties' patents;
- we or our collaborators may participate at substantial cost in International Trade Commission proceedings to abate importation of products that would compete unfairly with our products;
- if our competitors file patent applications that claim technology also claimed by us or our licensors, we or our licensors may be required to participate in interference, derivation or opposition proceedings to determine the priority of invention, which could jeopardize our patent rights and potentially provide a third party with a dominant patent position;
- if third parties initiate litigation claiming that our processes or products infringe their patent or other intellectual property rights, we and our collaborators will need to defend against such proceedings;
- if third parties initiate litigation or other proceedings seeking to invalidate patents owned by or licensed to us or to obtain a declaratory judgment that their product or technology does not infringe our patents or patents licensed to us, we will need to defend against such proceedings;
- we may be subject to ownership disputes relating to intellectual property, including disputes arising from conflicting obligations of consultants or others who are involved in developing our products; and

- if a license to necessary technology is terminated, the licensor may initiate litigation claiming that our processes or products infringe or misappropriate their patent or other intellectual property rights and/or that we breached our obligations under the license agreement, and we and our collaborators would need to defend against such proceedings.

These lawsuits and proceedings, regardless of merit, are time-consuming and expensive to initiate, maintain, defend or settle, and could divert the time and attention of managerial and technical personnel, which could materially adversely affect our business. Any such claim could also force use to do one or more of the following:

- incur substantial monetary liability for infringement or other violations of intellectual property rights, which we may have to pay if a court decides that the product or technology at issue infringes or violates the third party's rights, and if the court finds that the infringement was willful, we could be ordered to pay treble damages and the third party's attorneys' fees;
- pay substantial damages to our customers or end users to discontinue use or replace infringing technology with non-infringing technology;
- stop manufacturing, selling, using, exporting or licensing the product or technology incorporating the allegedly infringing technology or stop incorporating the allegedly infringing technology into such product or technology;
- obtain from the owner of the infringed intellectual property right a license, which may require us to pay substantial upfront fees or royalties to sell or use the relevant technology and which may not be available on commercially reasonable terms, or at all;
- redesign our products and technology so they do not infringe or violate the third party's intellectual property rights, which may not be possible or may require substantial monetary expenditures and time;
- enter into cross-licenses with our competitors, which could weaken our overall intellectual property position;
- lose the opportunity to license our technology to others or to collect royalty payments based upon successful protection and assertion of our intellectual property against others;
- find alternative suppliers for non-infringing products and technologies, which could be costly and create significant delay; or
- relinquish rights associated with one or more of our patent claims, if our claims are held invalid or otherwise unenforceable.

Some of our competitors may be able to sustain the costs of complex intellectual property litigation more effectively than we can because they have substantially greater resources. In addition, intellectual property litigation, regardless of its outcome, may cause negative publicity, adversely impact prospective customers, cause product shipment delays, or prohibit us from manufacturing, marketing or otherwise commercializing our products and technology. Any uncertainties resulting from the initiation and continuation of any litigation could have a material adverse effect on our ability to raise additional funds or otherwise have a material adverse effect on our business, results of operation, financial condition or cash flows.

In addition, we may indemnify our customers and distributors against claims relating to the infringement of intellectual property rights of third parties related to our products. Third parties may assert infringement claims against our customers or distributors. These claims may require us to initiate or defend protracted and costly litigation on behalf of our customers or distributors, regardless of the merits of these claims. If any of these claims succeed, we may be forced to pay damages on behalf of our customers, suppliers or distributors, or may be required to obtain licenses for the products they use. If we cannot obtain all necessary licenses on commercially reasonable terms, our customers may be forced to stop using our products.

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

Changes in patent law could diminish the value of patents in general, thereby impairing our ability to protect our existing and future products.

Recent patent reform legislation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents. The Leahy-Smith Act includes a number of significant changes to U.S. patent law. These include provisions that affect the way patent applications are prosecuted, redefine prior art, and may also affect patent litigation. The USPTO developed new regulations and procedures to govern administration of the

Leahy-Smith Act, including switching the U.S. patent system from a "first-to-invent" system to a "first-to-file" system. Under a "first-to-file" system, assuming the other requirements for patentability are met, the first inventor to file a patent application generally will be entitled to the patent on an invention regardless of whether another inventor had made the invention earlier. Many of the substantive changes to patent law associated with the Leahy-Smith Act, in particular, the first-to-file provisions, only became effective recently. Accordingly, it is not clear what, if any, impact the Leahy-Smith Act will have on the operation of our business. The Leahy-Smith Act and its implementation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents, all of which could have a material adverse effect on our business, results of operation, financial condition or cash flows.

In addition, patent reform legislation may pass in the future that could lead to additional uncertainties and increased costs surrounding the prosecution, enforcement and defense of our patents and applications. Furthermore, the U.S. Supreme Court and the U.S. Court of Appeals for the Federal Circuit have made, and will likely continue to make, changes in how the patent laws of the United States are interpreted. Similarly, foreign courts have made, and will likely continue to make, changes in how the patent laws in their respective jurisdictions are interpreted. We cannot predict future changes in the interpretation of patent laws or changes to patent laws that might be enacted into law by U.S. and foreign legislative bodies. Those changes may materially affect our patents or patent applications and our ability to obtain additional patent protection in the future.

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

The USPTO and various foreign patent offices require compliance with a number of procedural, documentary, fee payment and other similar provisions. In addition, periodic maintenance fees on our owned and in-licensed patents are due to be paid to governmental patent agencies over the lifetime of the patents. Future maintenance fees will also need to be paid on other patents that may be issued to us. We have systems in place to remind us to pay these fees, and we employ outside firms to remind us or our licensor to pay annuity fees due to patent agencies on our patents and pending patent applications. In certain cases, an inadvertent lapse can be cured by payment of a late fee or by other means in accordance with the applicable rules. However, there are situations in which noncompliance can result in abandonment or lapse of the patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. In such an event, our competitors might be able to enter the market and this circumstance would have a material adverse effect on our business, results of operation, financial condition or cash flows.

If our trademarks and trade names are not adequately protected, then we may not be able to build name recognition in our markets of interest and our business may be adversely affected.

We currently own 17 trademarks, related to our company name, logo, products and technology, that are registered with the USPTO as well as 94 trademarks registered outside of the United States. Our registered or unregistered trademarks or trade names may be challenged, infringed, circumvented, declared generic or determined to be infringing on other marks or names. We may not be able to protect our rights in these trademarks and trade names, which we need in order to build name recognition with potential customers in our markets of interest. There is no guarantee we will be able to secure registration for any of our pending trademark applications with the USPTO or comparable foreign authorities. In addition, third parties have registered trademarks similar or identical to our trademarks, and may in the future file for registration of such trademarks. If they succeed in registering or developing common law rights in such trademarks, and if we are not successful in challenging such third-party rights, we may not be able to use these trademarks to market our products in those countries where such third parties have registered such trademarks or obtained such common law rights. In any case, if we are unable to establish name recognition based on our trademarks and trade names, then we may not be able to compete effectively and our business may be adversely affected.

In addition, we may be involved in litigation or other proceedings to protect our trademark rights associated with our company name or the names used with our products. For example, we are currently opposing the registration of a product name on the grounds that the name is confusingly similar to our ACE brand, and that use of the name by a competitor will cause confusion in the marketplace. An adverse decision in such proceeding could have a negative impact on the value of the ACE brand. Any objections we receive from the USPTO, foreign trademark authorities or third parties relating to our pending applications could require us to incur significant expense in defending the objections or establishing alternative names. Names used with our products may be claimed to infringe names held by others or to be ineligible for proprietary protection. If we have to change the name of our company or any product, we may experience a loss in goodwill associated with our brand name, customer confusion or a loss of sales.

If we are unable to protect the confidentiality of our trade secrets and other proprietary information, our business and competitive position may be harmed.

In addition to patent protection, we also rely on confidential proprietary information, including trade secrets and know-how, to develop and maintain our competitive position. We seek to protect our confidential proprietary information, in part, by

entering into confidentiality agreements with our employees, consultants, collaborators, strategic partners and others upon the commencement of their relationships with us. These agreements require that all confidential information developed by the individual or made known to the individual by us during the course of the individual's relationship with us be kept confidential. Our agreements with employees and our personnel policies also provide that any inventions conceived by the individual in the course of rendering services to us shall be our exclusive property. However, we may not obtain these agreements in all circumstances, and individuals with whom we have these agreements may not comply with their terms. Thus, despite such agreements, such inventions may become assigned to third parties. Monitoring unauthorized uses and disclosures of our intellectual property is difficult, and we do not know whether the steps we have taken to protect our intellectual property will be effective. In the event of unauthorized use or disclosure of our trade secrets or proprietary information, these agreements, even if obtained, may not provide meaningful protection, particularly for our trade secrets or other confidential information. To the extent that our employees, consultants or contractors use technology or know-how owned by third parties in their work for us, disputes may arise between us and those third parties as to the rights in related inventions. To the extent that an individual who is not obligated to assign rights in intellectual property to us is rightfully an inventor of intellectual property, we may need to obtain an assignment or a license to that intellectual property from that individual, or a third party or from that individual's assignee. Such assignment or license may not be available on commercially reasonable terms or at all.

Adequate remedies may not exist in the event of unauthorized use or disclosure of our proprietary information. The disclosure of our trade secrets would impair our competitive position and may materially harm our business, financial condition and results of operations. Costly and time consuming litigation could be necessary to enforce and determine the scope of our proprietary rights, and failure to maintain trade secret protection could adversely affect our competitive business position. In addition, others may independently discover or develop our trade secrets and proprietary information, and the existence of our own trade secrets affords no protection against such independent discovery.

We may also employ individuals who were previously or concurrently employed at research institutions and/or other medical device companies, including our competitors or potential competitors. We may be subject to claims that these employees, or we, have inadvertently or otherwise used or disclosed trade secrets or other proprietary information of their former employers, or that patents and applications we have filed to protect inventions of these employees, even those related to one or more of our products, are rightfully owned by their former or concurrent employer. Litigation may be necessary to defend against these claims. Even if we are successful in defending against these claims, litigation could result in substantial costs and be a distraction to management.

Risks Related to Our Finances and Capital Requirements

It is difficult to forecast future performance, which may cause our financial results to fluctuate unpredictably.

A number of factors over which we have limited or no control may contribute to fluctuations in our financial results, such as:

- variations in revenue due to the unavailability of specialist physicians who use our products during certain times of the year, such as those periods when there are major conferences on conditions they treat or those periods when high volume users of our products take time off of work;
- positive or negative media coverage of our products or the procedures or products of our competitors or our industry;
- publication of clinical trial results or studies by us or our competitors;
- changes in our sales process due to industry changes, such as changes in the stroke care pathway;
- delays in receipt of anticipated purchase orders;
- delays in customers receiving products;
- performance of our independent distributors;
- our ability to obtain further regulatory clearances or approvals;
- the timing of product development and clinical trial activities, including the pace of enrollment;
- delays in, or failure of, product and component deliveries by our suppliers;
- changes in reimbursement policies or levels;
- the number of procedures performed in any given period using our products, which can sometimes vary significantly between periods;

- customer response to the introduction of new products or alternative treatments, and the degree to we which we are effective in transitioning customers to our products; and
- fluctuations in foreign currency.

In the event our actual revenue and results of operations do not meet our or others' forecasts for a particular period, the market price of our common stock may decline substantially.

We may require additional financing in the future and may not be able to obtain such financing on favorable terms, if at all, which could force us to delay, reduce or eliminate our research and development activities or otherwise harm our business.

Since our initial public offering in September 2015, we have financed our operations primarily through our operations and sales of our equity securities. We are unable to predict the extent of any future operating cash flows or whether we will be able to maintain or grow our profitability. If we require additional financing to continue or expand our operations, for research and development, for acquisitions or for other purposes, we may determine to engage in equity or debt financings or incur other indebtedness. We may not be able to timely secure additional debt or equity financing on favorable terms, or at all. If we raise additional funds through the issuance of equity or convertible debt or other equity-linked securities, our existing stockholders could suffer significant dilution. Any debt financing obtained by us in the future could involve 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 to pursue business opportunities, including potential acquisitions. If needed funds are not available in adequate amounts or on acceptable terms from additional financing sources, our business will be materially adversely affected.

By engaging in acquisitions and other business development arrangements, we will incur a variety of costs and may potentially face numerous risks that could adversely affect our business and operations.

We have in the past, and expect in the future, to seek to acquire additional businesses, assets, technologies or products to enhance our business if appropriate opportunities become available. In connection with any acquisitions, we could issue additional equity securities or convertible debt or equity-linked securities, which would dilute our stockholders, cause us to incur substantial debt to fund the acquisitions, or assume significant liabilities.

Acquisitions involve numerous risks, including problems integrating the purchased operations, technologies or products, unanticipated costs and other liabilities, diversion of management's attention from our core businesses, adverse effects on existing business relationships with current and/or prospective customers and/or suppliers, risks associated with entering markets in which we have no or limited prior experience and potential loss of key employees. Acquisitions may also require us to record goodwill and non-amortizable intangible assets that will be subject to impairment testing on a regular basis and potential periodic impairment charges, incur amortization expenses related to certain intangible assets, and incur write-offs and restructuring and other related expenses, any of which could harm our results of operations and financial condition. If we fail in our integration efforts with respect to any of our acquisitions and are unable to efficiently operate as a combined organization, our business and financial condition may be adversely affected.

Fluctuations in our effective tax rate and changes to tax laws may adversely affect us.

As an international company, we are subject to taxation in numerous countries, states and other jurisdictions. Our effective tax rate is derived from a combination of statutory tax rates in the various jurisdictions in which we operate. In preparing our financial statements, our effective tax rate is based on estimates of the amount of tax that will become payable in each of these jurisdictions. Our effective tax rate may, however, differ from estimates due to numerous factors, including a change in the mix of our profitability from country to country and changes in tax laws. The fluctuations in our effective tax rate could have an adverse effect on our business, financial condition and results of operations and cash flows.

Our excess tax benefits and tax deficiencies are required to be recorded in the income statement when stock awards vest or are settled and as discrete items on the tax rate in the period in which they occur. The amount of excess tax benefits can fluctuate from period to period based on the price of our stock, the volume of share-based grants settled or vested, and the fair value assigned to equity awards under U.S. GAAP. For interim reporting purposes, we are required to exclude the excess tax benefits and tax deficiencies from the annual estimated tax rate and not to forecast the potential impact to our rate. As a result, we could experience an effective tax rate significantly different from previous periods or from our expectations.

The Tax Cuts and Jobs Act of 2017 (the "Tax Reform Act") was signed into law by President Donald J. Trump on December 22, 2017. In the year ended December 31, 2018, we completed our accounting for the income tax effects of the Tax Reform Act under FASB ASC 740 "Income Taxes" based on authoritative guidance available to date. Prospectively, as additional interpretive guidance, potential amendments, or technical corrections relating to the Tax reform Act are released, we are required to further evaluate the tax consequences of such guidance or amendments and determine the impact on our financial statements, if any. If the additional guidance or amendments result in changes to our current interpretation of the income tax effects of the Tax Reform Act, our effective tax rate could fluctuate or be different from our expectations.

In addition, changes in tax law or declines in our underlying profitability may negatively or positively impact our financial outlook of operations, which could lead to a corresponding charge or benefit to income taxes attributable to adjustments to the valuation allowance recorded against our deferred tax assets ("DTAs") on our consolidated balance sheets. The tax charge or benefit resulting from such change in valuation allowance could result in fluctuations in our effective tax rate and have a material negative impact on our financial condition and results of operations.

Risks Relating to Securities Markets and Investment in Our Common Stock

The price of our common stock may be volatile, and you could lose all or part of your investment.

The trading price of our common stock has been and is likely to continue to be volatile. From January 1, 2019 through December 31, 2019 our closing stock price as reported on The New York Stock Exchange ("NYSE") has ranged from $115.84 to $183.40. Stock markets have experienced extreme volatility that has often been unrelated to the operating performance of particular companies. These broad market fluctuations may adversely affect the trading price of our common stock. In addition, limited trading volume of our stock may contribute to its future volatility. Price declines in our common stock could result from general market and economic conditions, some of which are beyond our control, and a variety of other factors, including any of the risk factors described in this Annual Report on Form 10-K or those that we have not anticipated. These broad market and industry factors may harm the market price of our common stock, regardless of our operating performance, and could cause you to lose all or part of your investment in our common stock since you might be unable to sell your shares at or above the price you paid for such shares. Factors that could cause fluctuations in the market price of our common stock include the following:

- price and volume fluctuations in the overall stock market from time to time;
- volatility in the market prices and trading volumes of medical device company stocks;
- changes in operating performance and stock market valuations of other medical device companies generally, or those in our industry in particular;
- sales of shares of our common stock by us or our stockholders;
- failure of securities analysts to maintain coverage of us, changes in financial estimates by securities analysts who follow our company, or our failure to meet these estimates or the expectations of investors;
- the financial projections we may provide to the public, any changes in those projections or our failure to meet those projections;
- announcements by us or our competitors of new products or services;
- the public's reaction to our press releases, other public announcements and filings with the SEC;
- rumors and market speculation involving us or other companies in our industry;
- actual or anticipated changes in our results of operations or fluctuations in our results of operations;
- actual or anticipated developments in our business, our competitors' businesses or the competitive landscape generally;
- litigation involving us, our industry or both, or investigations by regulators into our operations or those of our competitors;
- developments or disputes concerning our intellectual property or other proprietary rights;
- announced or completed acquisitions of businesses or technologies by us or our competitors;
- new laws or regulations or new interpretations of existing laws or regulations applicable to our business;
- changes in accounting standards, policies, guidelines, interpretations or principles;
- any significant change in our management; and
- general economic conditions and slow or negative growth of our markets.

In addition, in the past, following periods of volatility in the overall market and the market price of a particular company's securities, securities class action litigation has often been instituted against these companies. This litigation, if instituted against us, could result in substantial costs and a diversion of our management's attention and resources.

If our executive officers, directors and largest stockholders choose to act together, they may be able to significantly influence our management and operations, acting in their own best interests and not necessarily those of other stockholders.

As of December 31, 2019, our executive officers, directors and holders of 5% or more of our outstanding stock and their affiliates beneficially owned approximately 40.6% of our voting stock in the aggregate. These stockholders, acting together, would be able to significantly influence all matters requiring approval by our stockholders, including the election of directors and the approval of mergers or other business combination transactions. The interests of this group of stockholders may not always coincide with the interests of other stockholders, and they may act in a manner that advances their best interests and not necessarily those of other stockholders. This concentration of ownership may have the effect of delaying, preventing or deterring a change in control of our company, could deprive our stockholders of an opportunity to receive a premium for their common stock as part of a sale of our company and might ultimately affect the market price of our common stock.

A sale of a substantial number of shares of our common stock in the public market could cause the market price of our common stock to drop significantly, even if our business is doing well.

Sales of a substantial number of shares of our common stock could occur at any time. These sales, or the perception in the market that the holders of a large number of shares of common stock intend to sell shares, could reduce the market price of our common stock. As of December 31, 2019, our directors, executive officers and holders of 5% or more of our outstanding stock beneficially owned approximately 40.6% of our outstanding stock in the aggregate. If one or more of them were to sell a substantial portion of the shares they hold, it could cause our stock price to decline.

We have also registered the offer and sale of all shares of common stock that we may issue under our equity compensation plans. As of December 31, 2019, approximately 9,800,000 shares of common stock that are either subject to outstanding options or other equity awards or reserved for future issuance under our equity incentive plans have been registered on Form S-8 registration statements and may be freely sold in the public market upon issuance, except for shares held by affiliates who have certain restrictions on their ability to sell. If these additional shares of common stock 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.

Our restated certificate of incorporation, our amended and restated bylaws and Delaware law contain provisions that could discourage another company from acquiring us and may prevent attempts by our stockholders to replace or remove our current management.

Provisions of Delaware law (where we are incorporated), our amended and restated certificate of incorporation and amended and restated bylaws may discourage, delay or prevent a merger or acquisition that stockholders may consider favorable, including transactions in which you might otherwise receive a premium for your shares. In addition, these provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace or remove our board of directors. These provisions include:

- authorizing the issuance of "blank check" preferred stock without any need for action by stockholders;
- requiring supermajority stockholder voting to effect certain amendments to our restated certificate of incorporation and amended and restated bylaws;
- eliminating the ability of stockholders to call and bring business before special meetings of stockholders;
- prohibiting stockholder action by written consent;
- establishing advance notice requirements for nominations for election to the board of directors or for proposing matters that can be acted on by stockholders at stockholder meetings;
- dividing our board of directors into three classes so that only one third of our directors will be up for election in any given year; and
- providing that our directors may be removed by our stockholders only for cause.

In addition, we are subject to Section 203 of the Delaware General Corporation Law, which may have an anti-takeover effect with respect to transactions not approved in advance by our board of directors, including discouraging takeover attempts that could have resulted in a premium over the market price for shares of our common stock.

These provisions apply even if a takeover offer may be considered beneficial by some stockholders and could delay or prevent an acquisition that our board of directors determines is not in our and our stockholders' best interests and could also affect the price that some investors are willing to pay for our common stock.

Our restated certificate of incorporation provides that the Court of Chancery of the State of Delaware is the 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 restated certificate of incorporation provides that the Court of Chancery of the State of Delaware is the exclusive forum for any derivative action or proceeding brought on our behalf; any action asserting a breach of fiduciary duty; any action asserting a claim against us arising pursuant to the General Corporation Law of the State of Delaware, our restated certificate of incorporation or our amended and restated bylaws; or any action asserting a claim against us that is 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. If a court were to find the choice of forum provision contained in our 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 and financial condition.

We incur significant costs and devote substantial management time as a result of operating as a public company.

As a public company, we incur significant legal, accounting and other expenses as we devote resources to comply with the Securities Exchange Act of 1934, as amended ("Exchange Act"), the Sarbanes-Oxley Act of 2002 ("Sarbanes-Oxley Act"), and the Dodd-Frank Act, as well as rules and regulations subsequently implemented by the SEC and the NYSE, including the establishment and maintenance of effective disclosure and financial controls and changes in corporate governance practices. We expect that compliance with these requirements will increase our legal and financial compliance costs and will make some activities more time consuming and costly.

We plan to continue to invest resources to comply with the evolving laws, regulations and standards applicable to public companies, 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. Operating as a public company and being subject to these rules and regulations makes 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. As a result, it may be difficult for us to attract and retain qualified members of our board of directors or executive officers.

The costs associated with operating as a public company may decrease our net income or increase any future net loss and may cause us to reduce costs in other areas of our business or increase the prices of our products to offset the effect of such costs. Additionally, if these requirements divert our management's attention from other business concerns, they could have a material adverse effect on our business, results of operation, financial condition or cash flows.

If we fail to maintain an effective system of disclosure controls and internal control over financial reporting, our ability to produce timely and accurate financial statements or comply with applicable regulations could be impaired.

As a public company, we are subject to the reporting requirements of the Exchange Act, Sarbanes-Oxley Act, and the listing standards of the NYSE. We expect that the requirements of these rules and regulations will continue to increase our legal, accounting and financial compliance costs, make some activities more difficult, time consuming and costly, and place significant strain on our personnel, systems and resources.

The Sarbanes-Oxley Act requires, among other things, that we maintain effective disclosure controls and procedures and internal control over financial reporting. We are continuing to develop and refine our disclosure controls and other procedures that are designed to ensure that information required to be disclosed by us in the reports that we will file with the SEC is recorded, processed, summarized and reported within the time periods specified in SEC rules and forms, and that information required to be disclosed in reports under the Exchange Act is accumulated and communicated to our principal executive and financial officers. We are also continuing to improve our internal control over financial reporting. In order to maintain and improve the effectiveness of our disclosure controls and procedures and internal control over financial reporting, we have expended, and anticipate that we will continue to expend, significant resources, including accounting-related costs and significant management oversight.

Our current controls and any new controls that we develop may become inadequate because of changes in our business. Further, weaknesses in our disclosure controls or our internal control over financial reporting may be discovered in the future. Any failure to develop or maintain effective controls, or any difficulties encountered in their implementation or improvement, could harm our operating results or cause us to fail to meet our reporting obligations and may result in errors in our financial statements or a restatement of our financial statements for prior periods. Any failure to implement and maintain effective internal control over financial reporting also could adversely affect the results of management evaluations and independent registered public accounting firm audits of our internal control over financial reporting that we include in our periodic reports that are filed with the SEC. Ineffective disclosure controls and procedures and internal control over financial reporting could also cause investors to lose confidence in our reported financial and other information, which would likely have a negative

effect on the trading price of our common stock. In addition, if we are unable to continue to meet these requirements, we may not be able to remain listed on the NYSE.

As a public company, we are required to provide an annual management report on the effectiveness of our internal control over financial reporting and our independent registered public accounting firm is required to audit the effectiveness of our internal control over financial reporting. If we identify material weaknesses in our internal controls over financial reporting, if we are unable to assert that our internal control over financial reporting is effective, or if our independent registered public accounting firm is unable to express an opinion as to the effectiveness of our internal controls over financial reporting, investors may lose confidence in the accuracy and completeness of our financial reports and the market price of our common stock could be adversely affected, and we could become subject to investigations by the stock exchange on which our securities are listed, the SEC, or other regulatory authorities, which could require additional financial and management resources.

Any failure to maintain effective disclosure controls and internal control over financial reporting could have a material and adverse effect on our business and results of operations, and cause a decline in the price of our common stock.

If securities or industry analysts publish inaccurate or unfavorable research about our business or cease publishing research, our stock price and trading volume could decline.

The trading market for our common stock depends in part on the research and reports that securities or industry analysts publish about us or our business. If one or more of the analysts who cover us downgrade our stock or publish inaccurate or unfavorable research about our business, our stock price would likely decline. If one or more of these analysts cease coverage of our company or fail to publish reports on us regularly, demand for our stock could decrease, which might cause our stock price and trading volume to decline.

We do not anticipate paying cash dividends, and accordingly, stockholders must rely on stock appreciation for any return on their investment.

We do not anticipate paying cash dividends in the future. As a result, only appreciation of the price of our common stock, which may never occur, would provide a return to stockholders. Investors seeking cash dividends should not invest in our common stock.

An additional valuation allowance against our deferred tax assets could require a charge to earnings, which could result in a negative impact on our results of operations.

Primarily as a result of net operating losses, stock-based compensation, various accruals and reserves, and tax credits, we maintain foreign and domestic DTAs. DTAs reflect an expected benefit to be realized in the future that may be used to reduce the amount of tax that we would otherwise be required to pay in future periods. DTAs are reduced by a valuation allowance when it is more likely than not that the future realization of all or some of the DTAs will not be achieved. Valuation allowances related to DTAs can be affected by changes to tax laws, statutory tax rates, future taxable income levels and input from our tax advisors or regulatory authorities. At this time, we consider it more likely than not that we will have sufficient taxable income in the future that will allow us to realize the benefits of the domestic DTAs we maintain as of December 31, 2019, exclusive of our federal research and development tax credit, California DTAs and DTAs acquired from MVI that are subject to limitation. However, it is possible that some of our foreign or domestic DTAs could ultimately expire unused, or future DTAs could be created, due to vesting or settlement of stock awards or other book to tax differences, in which we will not have sufficient taxable income in the future to fully utilize these and which will result in us recording a valuation allowance. Therefore, unless we are able to generate sufficient taxable income, a substantial valuation allowance to reduce our DTAs may be required, which would materially increase our tax expense in the period the valuation allowance is recorded and could have a material adverse impact on our financial condition and results of operations.

ITEM 1B. UNRESOLVED STAFF COMMENTS.

None.

ITEM 2. PROPERTIES.

We maintain approximately 305,000 square feet of research and development, manufacturing and administrative facilities in seven buildings at our campus in Alameda, California. The leases for these seven buildings expire in 2029 to 2035, subject to our option to renew certain leases for an additional five to fifteen years. From time to time through February 1, 2035, if any space in any of the buildings located in the same business park as our campus becomes vacant, that space will be added to the lease. The maximum additional space that could be added under this provision of the lease as of December 31, 2019 is approximately 175,000 square feet. The Company has a right of first offer to lease any space that becomes available after such date. We also lease approximately 20,000 square feet of warehouse space in Livermore, California, and approximately 45,000 square feet of warehouse space in Salt Lake City, Utah. The leases for the Livermore warehouse spaces expire in 2020 to 2022. The lease for the Salt Lake City warehouse expires in 2024, subject to our option to renew the lease for an additional three to nine years.

On September 17, 2018, we entered into a lease for approximately 160,000 square feet to serve as a manufacturing facility in Roseville, California. The lease is for a fifteen year term, which commenced in November 2019. We have the option to renew the lease for an additional five to ten years.

On September 3, 2019, we entered into a lease for an additional space of approximately 127,000 square feet at our headquarters in the Harbor Bay Business Park in Alameda, California, which has not yet commenced as of December 31, 2019. This additional space is in a to-be-constructed building and we anticipate substantial completion will occur within the next two years.

We also lease office and warehouse space in Germany, Italy, Australia, and Brazil. The offices in Germany and Australia support our direct sales operations in Europe and Australasia, respectively, the office in Brazil supports our Latin America marketing efforts through our distribution partners, and the offices in Italy support the operations of Crossmed S.p.A., our wholly-owned subsidiary in Italy, including supporting our direct sales operations in Italy, San Marino, Vatican City, and Switzerland. We also warehouse and distribute finished products to our international customers utilizing a third-party logistics provider in the Netherlands.

ITEM 3. LEGAL PROCEEDINGS.

For information with respect to Legal Proceedings, see Note “10. Commitments and Contingencies” to our consolidated financial statements in Part II, Item 8 of this Form 10-K.

ITEM 4. MINE SAFETY DISCLOSURES.

Not applicable.

PART II

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

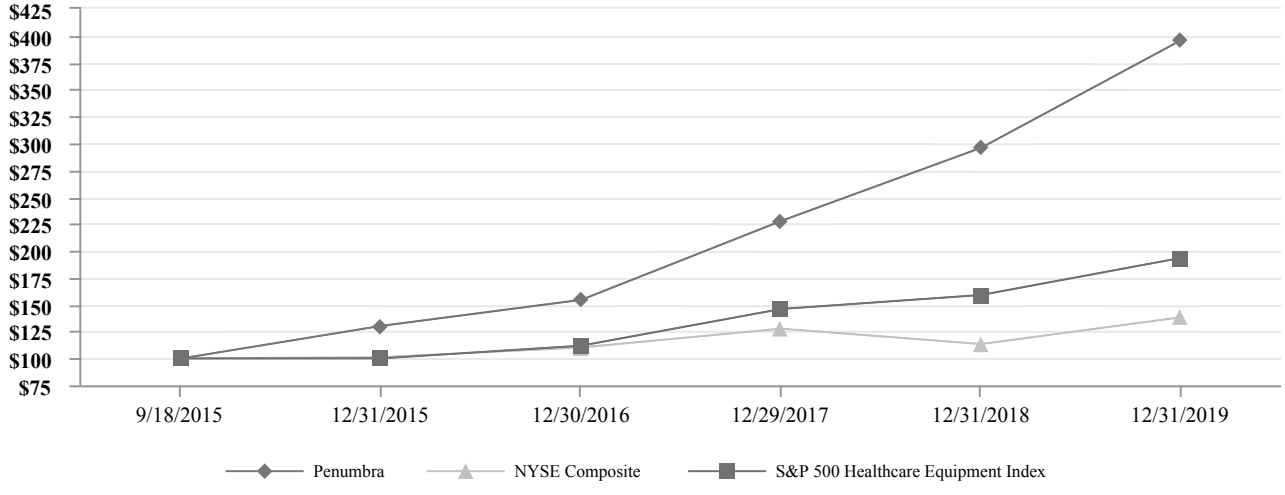
Market Information

Our common stock has been listed on the NYSE under the symbol "PEN" since September 18, 2015. Prior to that date, there was no established public trading market for our common stock. As of February 11, 2020, there were 40 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.

Performance Graph

The following graph illustrates a comparison of the total cumulative stockholder return on our common stock with the total return for (i) the S&P Healthcare Equipment and (ii) the NYSE Composite for the period from September 18, 2015 (the date our common stock commenced trading on the NYSE) through December 31, 2019. Although our common stock was initially listed at $30.00 per share on the date our common stock was first listed on the NYSE, September 18, 2015, the $30.00 price is not reflected in the graph. Instead, the figures represented below assume an investment of $100 in our common stock at the closing price of $41.30 on September 18, 2015 and in the S&P Healthcare Equipment and NYSE Composite on September 18, 2015 and the reinvestment of dividends into shares of common stock. The comparisons in the table are required by the SEC and are not intended to forecast or be indicative of possible future performance of our common stock. This graph shall not be deemed "soliciting material" or be deemed "filed" for purposes of Section 18 of the Exchange Act, or otherwise subject to the liabilities under that Section, and shall not be deemed to be incorporated by reference into any of our filings under the Securities Act, whether made before or after the date hereof and irrespective of any general incorporation language in any such filing.

Performance Graph



$100 investment in stock or index	Ticker	9/18/2015	12/31/2015	12/30/2016	12/29/2017	12/31/2018	12/31/2019
Penumbra	PEN	$ 100.00	$ 130.29	$ 154.48	$ 227.85	$ 295.88	$ 397.75
NYSE Composite	NYA	100.00	101.11	110.22	127.68	113.39	138.69
S&P 500 Healthcare Equipment Index	XHE	100.00	100.09	111.87	146.00	159.00	194.45

Dividend Policy

We have never declared or paid cash dividends on our capital stock. We currently intend to retain all available funds for use in the operation and expansion of our business, and do not anticipate paying any cash dividends in the foreseeable future.

Any future determination related to dividend policy will be made at the discretion of our board of directors, subject to applicable laws, and will depend on a number of factors, including our financial condition, results of operations, capital requirements, contractual restrictions, general business conditions and other factors that our board of directors may deem relevant.

Issuer Purchases of Equity Securities

None.

Recent Sales of Unregistered Securities

None.

ITEM 6. SELECTED CONSOLIDATED FINANCIAL DATA.

The following selected consolidated financial data of Penumbra, Inc. should be read in conjunction with, and are qualified by reference to, the section titled "Management's Discussion and Analysis of Financial Condition and Results of Operations" and the consolidated financial statements and notes thereto included in this report. The consolidated statement of operations data for the years ended December 31, 2019, 2018 and 2017, and the consolidated balance sheet data as of December 31, 2019 and 2018, are derived from, and qualified by reference to, our audited consolidated financial statements included elsewhere in this Annual Report on Form 10-K. The consolidated statement of operations data for the years ended December 31, 2016 and 2015 and selected consolidated balance sheet data as of December 31, 2017, 2016 and 2015 are derived from our audited consolidated financial statements not included in this Annual Report on Form 10-K. Our historical results are not necessarily indicative of the results that may be expected in the future.

	Year Ended December 31,				
	2019[1]	2018[2][3]	2017[4][5]	2016[6]	2015
	(In thousands, except share and per share amounts)				
Consolidated Statement of Operations Data:					
Revenue	$ 547,405	$ 444,938	$ 333,764	$ 263,317	$ 186,095
Gross profit	371,964	292,533	217,142	170,829	124,058
Operating expenses:					
Acquired in-process research and development	—	30,835	—	—	—
Total operating expenses	324,456	293,385	215,977	172,179	119,879
Income (loss) from operations	47,508	(852)	1,165	(1,350)	4,179
Income (loss) before income taxes and equity in losses of unconsolidated investee	50,135	1,608	2,476	(869)	4,024
Provision for (Benefit from) income taxes	3,131	(4,403)	(3,611)	(15,683)	1,659
Income before equity in losses of unconsolidated investee	47,004	6,011	6,087	14,814	2,365
Equity in losses of unconsolidated investee	—	(3,101)	(1,430)	—	—
Consolidated net income	$ 47,004	$ 2,910	$ 4,657	$ 14,814	$ 2,365
Net loss attributable to non-controlling interest	(1,454)	(3,691)	—	—	—
Net income attributable to Penumbra, Inc.	$ 48,458	$ 6,601	$ 4,657	$ 14,814	$ 1,084
Net income attributable to Penumbra, Inc. per share:					
Basic	$ 1.39	$ 0.19	$ 0.14	$ 0.49	$ 0.09
Diluted	$ 1.34	$ 0.18	$ 0.13	$ 0.44	$ 0.08
Weighted average shares used to compute net income per share attributable to common stockholders:					
Basic	34,750,706	34,138,176	32,978,065	30,464,583	11,993,429
Diluted	36,265,999	36,086,821	35,319,103	33,478,078	14,219,650

	Year Ended December 31,				
	2019[1]	2018[2][3]	2017[4][5]	2016[6]	2015
			(in thousands)		
Balance Sheet Data:					
Cash and cash equivalents	$ 72,779	$ 67,850	$ 50,637	$ 13,236	$ 19,547
Marketable investments	116,610	133,039	163,954	115,517	129,257
Total assets	665,901	515,006	476,667	308,254	263,848
Working capital	372,086	344,664	330,652	228,027	216,213
Total stockholders' equity	485,613	422,415	400,408	266,547	232,522

[1] In first quarter of 2019, the Company adopted Accounting Standard Update ("ASU") No. 2016-02, Leases (Topic 842), and its associated amendments. Under the standard, a lessee will be required to recognize a lease liability and right-of-use asset for all leases with terms in excess of twelve months. The Company elected to apply the modified retrospective transition approach to all leases existing at the date of initial application and not restate comparative periods. As a result of the adoption, there was no cumulative-effect adjustment recorded to retained earnings upon adoption. As of January 1, 2019, the Company's consolidated balance sheet included operating lease right-of-use assets of $43.3 million, current operating lease liabilities of $3.6 million and non-current operating lease liabilities of $47.0 million on the consolidated balance sheet. Refer to Note "2. Summary of Significant Accounting Policies" and Note "9. Leases" for more information.

[2] In the first quarter of 2018, the Company adopted Accounting Standard Update ("ASU") No. 2014-09, Revenue from Contracts with Customers ("Topic 606"), and its associated amendments. Under the standard, revenue is recognized when a customer obtains control of promised goods or services in an amount

that reflects the consideration the entity expects to receive in exchange for those goods or services. The Company applied the five step method outlined in the ASU to all revenue streams and elected to utilize the modified retrospective implementation method. As a result of adoption, the Company recorded a $0.3 million cumulative adjustment to its retained earnings at January 1, 2018.

(3) During the year ended December 31, 2017, the Company formed MVI as a privately-held joint venture, with Sixense Enterprises, Inc. ("Sixense") for the purpose of exploring healthcare applications of virtual reality technology. On August 31, 2018, the Company acquired a controlling interest in MVI Health Inc. ("MVI") which was accounted for as an asset acquisition. In connection with the asset acquisition, the Company recorded a $30.8 million IPR&D charge in the consolidated statements of operations related to the acquired technology under development from MVI. Of the total IPR&D charge, $27.4 million was attributable to the net loss of Penumbra, Inc. Refer to Note "3. Investments and Fair Value of Financial Instruments" and Note "6. Asset Acquisition" for more information.

(4) Income tax expense for the year ended December 31, 2017, includes $2.4 million of valuation allowance against the Company's federal research and development tax credits and $15.4 million of deferred income tax due to the remeasurement of the Company's DTAs at a 21% corporate income tax rate pursuant to the Tax Reform Act. Refer to our risk factor titled "Fluctuations in our effective tax rate and changes to tax laws may adversely affect us" in the section titled "Risk Factors-Risks Related to Our Finances and Capital Requirements."

(5) In the third quarter of 2017, the Company acquired Crossmed S.p.A. ("Crossmed"). Crossmed is engaged in the business of distributing medical supplies and equipment in Italy, San Marino, Vatican City, and Switzerland. Refer to Note "5. Business Combinations" for more information.

(6) In the fourth quarter of 2016, the Company elected to early adopt ASU 2016-09 which required excess tax benefit attributable to stock-based compensation to be recognized in the income statement. In connection with the adoption, the Company recorded a modified retrospective adjustment of $17.4 million in accumulated deficit.

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 the section of this report entitled "Selected Consolidated Financial Data" and our consolidated financial statements and related notes included elsewhere in this Annual Report on Form 10-K. This discussion and other parts of this report contain forward-looking statements that involve risk and uncertainties, such as statements of our plans, objectives, expectations, and intentions. As a result of many factors, including those factors set forth in the "Risk Factors" section of this Annual Report on Form 10-K, our actual results could differ materially from the results described in or implied by these forward-looking statements.

Overview

Penumbra is a global healthcare company focused on innovative therapies. We design, develop, manufacture and market medical devices and have a broad portfolio of products that addresses challenging medical conditions in markets with significant unmet need. Our team focuses on developing, manufacturing and marketing novel products for use by specialist physicians and healthcare providers to drive improved clinical outcomes. We believe that the cost-effectiveness of our products is attractive to our customers.

Since our founding in 2004, we have invested heavily in our product development capabilities in our major markets: neuro and vascular. We have successfully developed, obtained regulatory clearance or approval for, and introduced products into the neurovascular market since 2007, vascular market since 2013 and neurosurgical market since 2014, respectively. We continue to expand our portfolio of product offerings, while developing and iterating on our currently available products.

We expect to continue to develop and build our portfolio of products, including our thrombectomy, embolization and access technologies. Generally, when we introduce a next generation product or a new product designed to replace a current product, sales of the earlier generation product or the product replaced decline. Our research and development activities are centered around the development of new products and clinical activities designed to support our regulatory submissions and demonstrate the effectiveness of our products.

We sell our products to hospitals primarily through our direct sales organization in the United States, most of Europe, Canada and Australia, as well as through distributors in select international markets. In 2019, 35.1% of our revenue was generated from customers located outside of the United States. Our sales outside of the United States are denominated principally in the euro and Japanese yen, with some sales being denominated in other currencies. As a result, we have foreign exchange exposure, but do not currently engage in hedging.

We generated revenue of $547.4 million, $444.9 million and $333.8 million for the years ended December 31, 2019, 2018 and 2017, respectively. This represents annual increases of 23.0% and 33.3%, respectively. We generated operating income of $47.5 million and $1.2 million for the years ended December 31, 2019 and 2017. We generated an operating loss of $0.9 million for the year ended December 31, 2018 as a result of the $30.8 million acquired in-process research and development ("IPR&D") charge recorded in connection with the acquisition of a controlling interest in MVI which was accounted for as an asset acquisition in the third quarter of 2018.

Factors Affecting Our Performance

There are a number of factors that have impacted, and we believe will continue to impact, our results of operations and growth. These factors include:

- The rate at which we grow our salesforce and the speed at which newly hired salespeople become fully effective can impact our revenue growth or our costs incurred in anticipation of such growth.
- Our industry is intensely competitive and, in particular, we compete with a number of large, well-capitalized companies. We must continue to successfully compete in light of our competitors' existing and future products and their resources to successfully market to the specialist physicians who use our products.
- We must continue to successfully introduce new products that gain acceptance with specialist physicians and successfully transition from existing products to new products, ensuring adequate supply. In addition, as we introduce new products and expand our production capacity, we anticipate additional personnel will be hired and trained to build our inventory of components and finished goods in advance of sales, which may cause quarterly fluctuations in our operating results and financial condition.
- Publications of clinical results by us, our competitors and other third parties can have a significant influence on whether, and the degree to which, our products are used by specialist physicians and the procedures and treatments those physicians choose to administer for a given condition.

- The specialist physicians who use our products may not perform procedures during certain times of the year, such as those periods when they are at major medical conferences or are away from their practices for other reasons, the timing of which occurs irregularly during the year and from year to year.

- Most of our sales outside of the United States are denominated in the local currency of the country in which we sell our products. As a result, our revenue from international sales can be significantly impacted by fluctuations in foreign currency exchange rates.

In addition, we have experienced and expect to continue to experience meaningful variability in our quarterly revenue, gross profit and gross margin percentage as a result of a number of factors, including, but not limited to: the number of available selling days, which can be impacted by holidays; the mix of products sold; the geographic mix of where products are sold; the demand for our products and the products of our competitors; the timing of or failure to obtain regulatory approvals or clearances for products; increased competition; the timing of customer orders; inventory write-offs due to obsolescence; costs, benefits and timing of new product introductions; costs, benefits and timing of the acquisition and integration of businesses and product lines we may acquire; the availability and cost of components and raw materials; and fluctuations in foreign currency exchange rates. We may experience quarters in which we have significant revenue growth sequentially followed by quarters of moderate or no revenue growth. Additionally, we may experience quarters in which operating expenses, in particular research and development expenses, fluctuate depending on the stage and timing of product development.

Critical Accounting Policies and Use of Estimates

Our consolidated financial statements have been prepared in accordance with generally accepted accounting principles in the United States. The preparation of our consolidated financial statements requires management to make estimates, assumptions and judgments that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the consolidated financial statements and the reported amounts of revenues and expenses during the applicable periods. Management bases its estimates, assumptions and judgments on historical experience and on various other factors that it believes to be reasonable under the circumstances. Different assumptions and judgments would change the estimates used in the preparation of our consolidated financial statements, which, in turn, could materially change our results from those reported. Management evaluates its estimates, assumptions and judgments on an ongoing basis. Historically, our critical accounting estimates have not differed materially from actual results. However, if our assumptions change, we may need to revise our estimates, or take other corrective actions, either of which may also have a material adverse effect on our consolidated statements of operations, liquidity and financial condition.

We believe the following critical accounting policies involve significant areas where management applies judgments and estimates in the preparation of our consolidated financial statements.

Leases

The Company adopted the guidance under ASC 842 on January 1, 2019 using the modified retrospective transition approach. There was no cumulative-effect adjustment recorded to retained earnings upon adoption.

Under ASC 842, the Company determines if an arrangement is a lease at inception. In addition, the Company determines whether leases meet the classification criteria of a finance or operating lease at the lease commencement date considering: (1) whether the lease transfers ownership of the underlying asset to the lessee at the end of the lease term, (2) whether the lease contains a bargain purchase option, (3) whether the lease term is for a major part of the remaining economic life of the underlying asset, (4) whether the present value of the sum of the lease payments and residual value guaranteed by the lessee equals or exceeds substantially all of the fair value of the underlying asset, and (5) whether the underlying asset is of such a specialized nature that it is expected to have no alternative use to the lessor at the end of the lease term. As of December 31, 2019, the Company's lease population consisted of operating and finance real estate, equipment and vehicle leases. As of the date of adoption of ASC 842 the Company did not have material finance leases.

Operating leases are included in operating lease right-of-use assets, current operating lease liabilities, and non-current operating lease liabilities in our consolidated balance sheet. Finance leases are included in finance lease right-of-use assets, current finance lease liabilities, and non-current finance lease liabilities in our consolidated balance sheet. ROU assets represent the Company’s right to use an underlying asset for the lease term and lease liabilities represent the Company’s obligation to make lease payments arising from the lease. Lease ROU assets and liabilities are recognized at the lease commencement date based on the present value of lease payments over the lease term. In determining the present value of lease payments, the Company uses its incremental borrowing rate which requires management’s judgement as the rate implicit in the lease is generally not readily determinable. The determination of the Company’s incremental borrowing rate requires management judgment including the development of a synthetic credit rating and cost of debt as the Company currently does not carry any debt. The lease ROU assets also include adjustments for prepayments, accrued lease payments and exclude lease incentives.

The Company's lease terms may include options to extend or terminate the lease when it is reasonably certain that the Company will exercise such options. Operating lease cost is recognized on a straight-line basis over the expected lease term. Finance lease cost is recognized as depreciation expense on a straight-line basis over the expected lease term and interest expense using the accelerated interest method of recognition. Lease agreements entered into after the adoption of ASC 842 that include lease and non-lease components are accounted for as a single lease component. Lease agreements with a noncancelable term of less than 12 months are not recorded on the Company's consolidated balance sheet. For more information about the impact of adoption and disclosures on the Company's leases, refer to Note "9. Leases."

Revenue Recognition

Revenue is comprised of product revenue net of returns, discounts, administration fees and sales rebates. We adopted the guidance under Topic 606 of the Accounting Standards Codification ("ASC") on January 1, 2018, using the modified retrospective method for all contracts not completed as of the date of adoption. Therefore, the financial information for the year ended December 31, 2017 has not been adjusted and continues to be reported under ASC 605 with the impact of the adoption reflected in opening retained earnings for the subsequent year. As a result of adoption, the cumulative impact to our retained earnings at January 1, 2018 was $0.3 million.

Under ASC 606, we recognize revenue when control of the promised goods or services is transferred to our customers, in an amount that reflects the consideration we expect to be entitled to in exchange for those goods or services. Revenue from product sales is recognized either on the date of shipment or the date of receipt by the customer, but is deferred for certain transactions when control has not yet transferred. With respect to products that we consign to hospitals, which primarily consist of coils, we recognize revenue at the time hospitals utilize products in a procedure. The implementation of the new revenue standard did not have a material impact on the measurement or recognition of revenue from prior periods, however additional disclosures have been added in accordance with the guidance. Refer to Note "16. Revenues" to our consolidated financial statements in Part II, Item 8 of this Form 10-K for more information and disclosures on our revenue.

We defer revenue for amounts that we have already invoiced our customers for and are ultimately expected to be recognized as revenue, but for which not all revenue recognition criteria have been met.

Revenue is recorded at the net sales price, which includes estimates of variable consideration such as product returns utilizing historical return rates, rebates, discounts, and other adjustments to net revenue. To the extent the transaction price includes variable consideration, we estimate the amount of variable consideration that should be included in the transaction price. Variable consideration is included in revenue only to the extent that it is probable that a significant reversal of the revenue recognized will not occur when the uncertainty associated with the variable consideration is subsequently resolved. During the year ended December 31, 2019, we made no material changes in estimates for variable consideration.

Our terms and conditions permit product returns and exchanges. We base our estimates for sales returns on actual historical returns over the prior three years and they are recorded as reductions in revenue at the time of sale. Upon recognition, we reduce revenue and cost of revenue for the estimated return. Return rates can fluctuate over time, but are sufficiently predictable to allow us to estimate expected future product returns.

Income Taxes

We account for income taxes using the asset and liability method, whereby deferred tax asset and liability account balances are determined based on differences between the financial reporting and tax bases of assets and liabilities, and are measured using the enacted tax rates and laws that will be in effect when the differences are expected to reverse. We provide a valuation allowance to reduce the net deferred tax assets ("DTAs") to their estimated realizable value.

The calculation of our DTAs involves the use of estimates, assumptions and judgments while taking into account estimates of the amounts and type of future taxable income. DTAs are reduced to their estimated realizable value by a valuation allowance when it is more likely than not that the future realization of all or some of the DTAs will not be achieved. Valuation allowances related to DTAs can be affected by changes to tax laws, statutory tax rates, and projections of future taxable income.

The calculation of our current provision for income taxes involves the use of estimates, assumptions and judgments while taking into account current tax laws, interpretation of current tax laws and possible outcomes of future tax audits. We have established reserves to address potential exposures related to tax positions that could be challenged by tax authorities. Although we believe our estimates, assumptions and judgments to be reasonable, any changes in tax law or interpretation of tax law and the resolutions of potential tax audits could significantly impact the amounts provided for income taxes in our consolidated financial statements.

We follow FASB ASC 740-10 "Accounting for Uncertainty in Income Taxes" that prescribes a financial statement recognition threshold and measurement attribute for uncertain tax positions taken or expected to be taken on our income tax returns, and also provides guidance on derecognition, classification, interest and penalty accrual, accounting in interim periods, and disclosure requirements. We include interest and penalties related to unrecognized tax benefits within income tax expense in the accompanying consolidated statements of operations.

On December 22, 2017, the Tax Cuts and Jobs Act of 2017 ("the Tax Reform Act") was enacted. The Tax Reform Act significantly revised the U.S. corporate income tax regime. Also on December 22, 2017, the Securities and Exchange Commission issued Staff Accounting Bulletin 118 ("SAB 118"), which provided for a measurement period that should not extend beyond one year from the Tax Reform Act enactment date. As of December 31, 2018, we completed our accounting for the tax effects of the Tax Reform Act under FASB ASC 740 "Income Taxes" and therefore our financial statements reflect tax law interpretations based on authoritative guidance available to date. Legislative guidance continues to be issued which could have an impact on our current interpretations and accounting for the income tax effects. We will evaluate any additional legislative guidance associated with the Tax Reform Act, when released, and determine the tax impact on our financial statements, if any.

Significant domestic DTAs were generated in recent years, primarily due to excess tax benefits from stock option exercises and vesting of restricted stock. As of December 31, 2019, we had approximately $89.3 million, $78.6 million and $0.4 million of federal, state and foreign net operating loss carryforwards, respectively, available to offset future taxable income. The federal and state net operating loss carryforwards will begin to expire in 2036 and 2020, respectively. At December 31, 2019, we had research credits available to offset federal and state tax liabilities in the amount of $9.2 million and $10.5 million, respectively. The federal tax credits will begin to expire in 2024. California state tax credits have no expiration.

We assess the ability to realize the benefits of our DTAs in each reporting period by evaluating all available positive and negative evidence, objective and subjective in nature, including (1) cumulative results of operations in recent years, (2) sources of recent pre-tax income, (3) estimates of future taxable income, (4) respective carryback and/or carryforward periods of tax attributes available to date, and (5) limitation on net operating loss ("NOL") utilization against taxable income. We also measure our current DTA balances against estimates of future income based on objectively verifiable operating results from the Company's recent history.

As of December 31, 2019, our net DTA balance was $29.5 million, after reduction of a valuation allowance of $21.6 million. We do not maintain valuation allowances against any of our foreign DTAs as we believe, at the required more-likely-than-not level of certainty, that our foreign subsidiaries will generate sufficient future taxable income to realize the benefit of their DTAs in full. In the period ended December 31, 2019, we measured our domestic net operating loss ("NOL") DTA balances against projections of future taxable income with consideration of relevant provisions of the Tax Reform Act, including but not limited to, the indefinite carryforward period for NOLs generated in years beginning on or after January 1, 2018. We also considered our three year cumulative income position, exclusive of the impact of excess tax deductions from stock-based compensation. We concluded that sufficient taxable income will be generated to realize the benefit of our domestic NOLs in full.

The Tax Reform Act extended the carryforward period of net operating losses generated in tax years beginning on or after January 1, 2018 such that the losses may be carried forward indefinitely, subject to an annual limitation of 80% of taxable income. The tax attribute ordering rules provide that to offset taxable income, net operating losses must be used prior to the utilization of tax credits. Accordingly, we cannot assert, at the required more-likely-than-not level of certainty, that we will be able to realize the benefit of our federal research and development tax credit DTAs, with a limited 20 year carryforward period, prior to expiration.

After an evaluation of all available qualitative and quantitative evidence, both positive and negative in nature, we concluded that sufficient future taxable income will be generated to realize the benefits of our domestic DTAs prior to expiration, other than our federal research and development tax credit DTAs which are expected to expire before their utilization. As a result, in the period ended December 31, 2019, we continued to record a valuation allowance against our federal research and development tax credit. In addition, we continue to maintain a full valuation allowance against our California DTAs.

Our DTA balance also includes $3.1 million of tax attributes gained upon acquisition of a majority interest ownership in MVI. The acquired DTAs are subject to Separate Return Limitation Year ("SRLY") rules which will limit the utilization of pre-acquisition tax attributes to offset future taxable income solely generated by MVI. As of December 31, 2019, we could not conclude, at the required more-likely-than-not level of certainty, that MVI will generate sufficient taxable income to realize the benefit of its tax attributes prior to expiration and so a $3.1 million valuation allowance was recorded against the DTAs acquired from MVI.

We will continue to closely monitor the need for a valuation allowance against current and additional DTAs generated in each subsequent reporting period. The need for a valuation allowance can be impacted by actual operating results, forecasted financial performance, and variances between the two, and the rate at which future DTAs are generated. If our management was to determine that we would not be able to realize all or a portion of our net DTAs in the future, a valuation allowance related charge to earnings would be reflected in that period, which could have a material adverse impact on our financial condition and results of operations. If our management was to determine that we would be able to realize all net DTAs in the future, a reduction of the valuation allowance would be reflected as a benefit to earnings in that period, which could have a material positive impact on our financial condition and results of operations.

Goodwill

Goodwill represents the excess of the purchase price of an acquired business or assets over the fair value of the identifiable assets acquired and liabilities assumed. Goodwill is not amortized, but is tested for impairment at least annually, or more frequently if events or circumstances indicate the carrying value may no longer be recoverable and that an impairment loss may have occurred. Circumstances that could trigger an impairment test include, but are not limited to, a significant adverse change in the business climate or legal factors, an adverse action or assessment by a regulator, change in customers, target market and strategy, unanticipated competition, loss of key personnel, or change in reporting units. We operate as one segment, which is considered to be the sole reporting unit, and therefore goodwill is tested for impairment at the consolidated level.

The authoritative guidance allows an entity to assess qualitative factors to determine whether it is necessary to perform the quantitative goodwill impairment test. If an entity determines that as a result of the qualitative assessment that it is more likely than not (i.e. greater than 50% likelihood) that the fair value of a reporting unit is less than its carrying amount, then the quantitative test is required. Otherwise, no further testing is required. The quantitative goodwill impairment test requires us to estimate and compare the fair value of our reporting unit with its carrying value.

Application of the goodwill impairment test requires judgments, including: identification of the reporting units, assigning goodwill to reporting units, a qualitative assessment to determine whether there are any impairment indicators, and determining the fair value of each reporting unit. Qualitative factors may include, but are not limited to, macroeconomic conditions, industry conditions, the competitive environment, changes in the market for our products and services, regulatory and political developments, cost factors, and entity specific factors such as strategies, overall financial performance (both current and projected) and market capitalization. In the fourth quarter of 2019 and 2018, we performed qualitative assessments for goodwill impairment and determined there we no indicators of impairment. Refer to Note “8. Goodwill” to our consolidated financial statements in Part II, Item 8 of this Form 10-K for more information.

Valuation of Intangible Assets

The valuation of identifiable intangible assets acquired in a business combination or asset acquisitions are determined based on detailed valuations that use information and assumptions provided by management. In determining the fair value of identifiable intangible assets, management provides its best estimates of inputs and assumptions that a market participant would use. Certain estimates used in this process include the amount and timing of projected milestone-based payments on sales that are considered probable and estimable, the amount and timing of projected future cash flows of each acquired intangible asset, the discount rate used to discount those cash flows to present value, the assessment of the asset’s life cycle, and the consideration of legal, technical, regulatory, economic, and competitive risks.

Indefinite-lived intangible assets are tested for impairment at least annually in the fourth quarter of each year, or more frequently if events or circumstances indicate that it is more likely than not that the asset is impaired. In conducting the annual impairment test for its indefinite-lived intangible assets, we may first perform a qualitative assessment to determine whether it is more likely than not (greater than 50% likelihood) that an indefinite-lived intangible asset is impaired. In accordance with the authoritative guidance, we may elect to bypass the qualitative assessment and proceed directly to the quantitative test to compare the fair value of the indefinite-lived intangible asset to the carrying amount. If we perform the quantitative test for indefinite-lived intangible assets, we generally use a discounted cash flow method based on the present value of projected cash flows to estimate fair value. Assumptions used in these cash flow projections are generally consistent with our internal forecasts and discounted using a rate that is reflective of the inherent risks and uncertainties associated with the projected cash flows of the business. Management believes the assumptions used for the impairment tests are consistent with those that would be utilized by a market participant performing similar analysis and valuations. Adverse changes in future market conditions or weaker operating results compared to our expectations may impact our projected cash flows, which could result in a potential impairment charge to the carrying value of our indefinite-lived intangible asset. In the fourth quarter of 2019, we performed a qualitative impairment analysis on our indefinite-lived intangible asset and determined that it was not more likely than not that the asset was impaired. Refer to Note “7. Intangible Assets” to our consolidated financial statements in Part II, Item 8 of this Form 10-K for more information.

Finite-lived intangible assets are amortized over the estimated economic useful lives of the assets, which is the period during which expected cash flows support the fair value of such intangible assets. We review finite-lived intangible assets for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. If such an event occurs, management determines whether there has been impairment by comparing the anticipated undiscounted future net cash flows to the related asset group's carrying value. If an asset is considered impaired, the asset will be written down to the determined fair value based on discounted cash flows. We also periodically review the useful lives assigned to our intangible assets to ensure that our initial estimates do not exceed any revised estimated periods from which we expect to realize cash flows from the underlying intangible asset. If a change were to occur in any of the above-mentioned factors or estimates, the likelihood of a material change in our reported results would increase.

Valuation of Contingent Consideration Liabilities

Certain agreements the Company enters into, including business combinations, involve the potential payment of future consideration that is contingent upon certain performance and revenue milestones being achieved.

Contingent consideration obligations incurred in connection with a business combination are recorded at their fair values on the acquisition date and remeasured at their fair values each subsequent reporting period using Level 3 inputs until the related contingencies are resolved. The resulting changes in fair values are recognized generally within sales, general and administrative expense, depending on the nature of the contingent consideration liability, in the consolidated statements of operations. The fair value of our contingent consideration is determined using a Monte-Carlo valuation model that simulates outcomes based on management estimates. Significant increases or decreases in the fair value of our contingent consideration liabilities can result from a number of factors, including changes in the timing and amount of projected revenue, our estimates of the likelihood of achieving certain milestones, as well as changes in discount periods and rates.

Asset acquisitions are accounted for using a cost accumulation and allocation model and the cost of the acquisition is allocated to the assets acquired and liabilities assumed. Contingent consideration obligations incurred in connection with an asset acquisition are recorded when it is probable that they will occur and they can be reasonably estimated. Significant increases or decreases in our contingent consideration obligations incurred in connection with can result from a number of factors, including but not limited to, changes in the timing and amount of projected revenue and our estimates of the likelihood of achieving certain milestones.

Components of Results of Operations

Revenue. We sell our products directly to hospitals and through distributors for use in procedures performed by specialist physicians to treat patients in two key markets: neuro and vascular disease. We sell our products through purchase orders, and we do not have long term purchase commitments from our customers. Revenue from product sales is recognized either on the date of shipment or the date of receipt by the customer, but is deferred for certain transactions when control has not yet transferred. With respect to products that we consign to hospitals, which primarily consist of coils, we recognize revenue at the time hospitals utilize products in a procedure. Revenue also includes shipping and handling costs that we charge to customers.

Cost of Revenue. Cost of revenue consists primarily of the cost of raw materials and components, personnel costs, including stock-based compensation, inbound freight charges, receiving costs, inspection and testing costs, warehousing costs, royalty expense, shipping and handling costs and other labor and overhead costs incurred in the manufacturing of products. We manufacture substantially all of our products in our manufacturing facilities in Alameda and Roseville, California.

Operating Expenses

Research and Development ("R&D"). R&D expenses primarily consist of product development, clinical and regulatory expenses, materials, depreciation and other costs associated with the development of our products. R&D expenses also include salaries, benefits and other related costs, including stock-based compensation, for personnel and consultants. We expense R&D costs as they are incurred.

Sales, General and Administrative ("SG&A"). SG&A expenses primarily consist of salaries, benefits and other related costs, including stock-based compensation, for personnel and consultants engaged in sales, marketing, finance, legal, compliance, administrative, facilities and information technology and human resource activities. Our SG&A expenses also include marketing trials, medical education, training, commissions, generally based on sales, to direct sales representatives, amortization of acquired intangible assets and acquisition-related costs.

Income Tax Expense. We are taxed at the rates applicable within each jurisdiction in which we operate. The composite income tax rate, tax provisions, deferred tax assets and deferred tax liabilities will vary according to the jurisdiction in which profits arise. Tax laws are complex and subject to different interpretations by management and the respective governmental taxing authorities, and require us to exercise judgment in determining our income tax provision, our deferred tax assets and deferred tax liabilities and the potential valuation allowance recorded against our net DTAs. Deferred tax assets and liabilities are

determined using the enacted tax rates in effect for the years in which those tax assets are expected to be realized. A valuation allowance is established when it is more likely than not that the future realization of all or some of the DTAs will not be achieved.

Results of Operations

The following table sets forth the components of our consolidated statements of operations in dollars and as a percentage of revenue for the periods presented:

	Year Ended December 31,					
	2019		2018		2017	
	(in thousands, except for percentages)					
Revenue	$ 547,405	100.0 %	$ 444,938	100.0 %	$ 333,764	100.0 %
Cost of revenue	175,441	32.0 %	152,405	34.3 %	116,622	34.9 %
Gross profit	371,964	68.0 %	292,533	65.7 %	217,142	65.1 %
Operating expenses:						
Research and development	51,723	9.5 %	36,165	8.1 %	31,661	9.5 %
Sales, general and administrative	272,733	49.8 %	226,385	50.9 %	184,316	55.2 %
Acquired in-process research and development	—	— %	30,835	6.9 %	—	— %
Total operating expenses	324,456	59.3 %	293,385	65.9 %	215,977	64.7 %
Income (loss) from operations	47,508	8.7 %	(852)	(0.2)%	1,165	0.3 %
Interest income, net	2,854	0.5 %	2,964	0.7 %	2,653	0.8 %
Other expense, net	(227)	— %	(504)	(0.1)%	(1,342)	(0.4)%
Income before income taxes and equity in losses of unconsolidated investee	50,135	9.2 %	1,608	0.4 %	2,476	0.7 %
Provision for (benefit from) income taxes	3,131	0.6 %	(4,403)	(1.0)%	(3,611)	(1.1)%
Income before equity in losses of unconsolidated investee	47,004	8.6 %	6,011	1.4 %	6,087	1.8 %
Equity in losses of unconsolidated investee	—	— %	(3,101)	(0.7)%	(1,430)	(0.4)%
Consolidated net income	$ 47,004	8.6 %	$ 2,910	0.7 %	$ 4,657	1.4 %
Net loss attributable to non-controlling interest	(1,454)	(0.3)%	(3,691)	(0.8)%	—	— %
Net income attributable to Penumbra, Inc.	$ 48,458	8.9 %	$ 6,601	1.5 %	$ 4,657	1.4 %

Year Ended December 31, 2019 Compared to Year Ended December 31, 2018

Revenue

	Year Ended December 31,		Change	
	2019	2018	$	%
	(in thousands, except for percentages)			
Neuro	$ 331,685	$ 294,333	$ 37,352	12.7 %
Vascular	215,720	150,605	65,115	43.2 %
Total	$ 547,405	$ 444,938	$ 102,467	23.0 %

Revenue increased $102.5 million, or 23.0%, to $547.4 million in 2019, from $444.9 million in 2018. Our revenue growth resulted from further market penetration of our existing products and sales of new products. Increased sales within our neuro and vascular businesses accounted for approximately 35% and approximately 65% of the revenue increase, respectively, in the year ended December 31, 2019. These revenue increases take into account a shift in revenue from neuro to vascular as a result of our peripheral embolization launch in Japan in the fourth quarter of 2018.

Revenue from our neuro products increased $37.4 million, or 12.7%, to $331.7 million in 2019, from $294.3 million in 2018. This was primarily attributable to increased sales of our Penumbra System and neuro access products, which increased by approximately 85% and approximately 35% of the total change in neuro revenue, respectively. Our neuro product sales experienced strong momentum due to further market penetration and growth in the market for endovascular treatment of stroke, which led to an increase in the number of procedures performed by specialist physicians using these products. This growth was

partially offset by a decrease in sales of our neuro embolization products, which decreased by approximately 20% of the total change in neuro revenue, as demand for our neuro embolization products fluctuates from period to period due to the number of procedures performed. Prices for our neuro products remained substantially unchanged during the period.

Revenue from our vascular products increased $65.1 million, or 43.2%, to $215.7 million in 2019, from $150.6 million in 2018. This was primarily attributable to increased sales of our Indigo System products, which accounted for approximately 55% of the vascular revenue increase for the year ended December 31, 2019. This increase was driven by further market penetration which led to increases in the number of procedures performed by specialist physicians using our products. Prices for our vascular products remained substantially unchanged during the period.

Revenue by Geographic Area

The following table presents revenue by geographic area, based on our customers' shipping destinations:

	Year Ended December 31,				Change	
	2019		2018		$	%
	(in thousands, except for percentages)					
United States	$ 355,222	64.9 %	$ 290,716	65.3 %	$ 64,506	22.2 %
Japan	42,520	7.8 %	41,805	9.4 %	715	1.7 %
Other International	149,663	27.3 %	112,417	25.3 %	37,246	33.1 %
Total	$ 547,405	100.0 %	$ 444,938	100.0 %	$ 102,467	23.0 %

Revenue from sales in international markets increased $38.0 million, or 24.6%, to $192.2 million in 2019, from $154.2 million in 2018. Revenue from international sales represented 35.1% and 34.7% of our total revenue in 2019 and 2018, respectively.

Gross Margin

	Year Ended December 31,		Change	
	2019	2018	$	%
	(in thousands, except for percentages)			
Cost of revenue	$ 175,441	$ 152,405	$ 23,036	15.1 %
Gross profit	$ 371,964	$ 292,533	$ 79,431	27.2 %
Gross margin %	68.0 %	65.7 %		

Gross margin increased by 2.3 percentage points to 68.0% in 2019, from 65.7% in 2018. The increase in gross margin was primarily due to improvements in production productivity.

Research and Development ("R&D")

	Year Ended December 31,		Change	
	2019	2018	$	%
	(in thousands, except for percentages)			
R&D	$ 51,723	$ 36,165	$ 15,558	43.0 %
R&D as a percentage of revenue	*9.4 %*	*8.1 %*		

R&D expenses increased by $15.6 million or 43.0%, to $51.7 million in 2019, from $36.2 million in 2018. The increase was primarily due to a $6.9 million increase in personnel-related expenses primarily due to an increase in headcount to support our growth, and a $6.8 million increase in product development and testing costs.

We have made investments, and plan to continue to make investments, in the development of our products, which may include hiring additional research and development employees. In addition, we have experienced in the past, and may continue to experience in the future, variability in expenses incurred due to the timing and costs of clinical trials.

Sales, General and Administrative ("SG&A")

	Year Ended December 31,		Change	
	2019	2018	$	%
	(in thousands, except for percentages)			
SG&A	$ 272,733	$ 226,385	$ 46,348	20.5 %
SG&A *as a percentage of revenue*	*49.8 %*	*50.9 %*		

SG&A expenses increased by $46.3 million, or 20.5%, to $272.7 million in 2019, from $226.4 million in 2018. The increase was primarily due to a $26.9 million increase in personnel-related expenses driven by an increase in headcount to support our growth and a $7.5 million increase related to marketing events.

As we continue to invest in our growth, we have expanded and expect to continue to expand our sales, marketing, general and administrative teams through the hiring of additional employees. In addition, we have experienced in the past, and may continue to experience in the future, variability in expenses incurred due to the timing and costs of investments in infrastructure to support the business.

Acquired In-Process Research and Development

	Year Ended December 31,		Change	
	2019	2018	$	%
	(in thousands, except for percentages)			
Acquired in-process research and development	$ —	$ 30,835	$ (30,835)	(100.0)%
Acquired in-process research and development as a percentage of revenue	*— %*	*6.9 %*		

During 2018, we recorded a $30.8 million acquired IPR&D charge in connection with the acquisition of a controlling interest in MVI which was accounted for as an asset acquisition. There were no acquired IPR&D charges during the year ended December 31, 2019.

Provision for (Benefit from) Income Taxes

	Year Ended December 31,		Change	
	2019	2018	$	%
	(in thousands, except for percentages)			
Provision for (benefit from) income taxes	$ 3,131	$ (4,403)	$ 7,534	(171.1)%
Effective tax rate	*6.2 %*	*(273.8)%*		

Our provision for income taxes increased $7.5 million, to $3.1 million in 2019, from a benefit of $4.4 million in 2018. Our effective tax rate changed to 6.2% in 2019, compared to (273.8)% in 2018. The tax provision for the year ended December 31, 2019 was primarily due to income taxes attributable to our worldwide profits, offset by excess tax benefits from stock-based compensation associated with our US jurisdiction. The tax benefit for the year ended December 31, 2018 was primarily due to the inclusion of excess tax benefits from stock-based compensation associated with our US jurisdiction, offset by income taxes attributable to our foreign jurisdictions and a tax charge resulting from the IPR&D expense associated with the acquisition of a controlling interest in MVI, which is not deductible for tax purposes.

Our effective tax rate is driven by (1) permanent differences in taxable income for tax and financial reporting purposes, (2) tax expense attributable to our foreign jurisdictions, (3) changes to the valuation allowance maintained against our deferred tax assets, and (4) discrete tax adjustments such as excess tax benefits related to stock-based compensation. Our income tax provision is subject to volatility as the amount of excess tax benefits can fluctuate from period to period based on the price of our stock, the volume of share-based grants settled or vested, and the fair value assigned to equity awards under U.S. GAAP. In addition, changes in tax law or our interpretation thereof, and changes to our valuation allowance could cause us to experience an effective tax rate significantly different from previous periods.

Year Ended December 31, 2018 Compared to Year Ended December 31, 2017

Revenue

	Year Ended December 31,		Change	
	2018	2017	$	%
	(in thousands, except for percentages)			
Neuro	$ 294,333	$ 232,446	$ 61,887	26.6 %
Vascular	150,605	101,318	49,287	48.6 %
Total	$ 444,938	$ 333,764	$ 111,174	33.3 %

Revenue increased $111.2 million, or 33.3%, to $444.9 million in 2018, from $333.8 million in 2017. Our revenue growth resulted from further market penetration of our existing products and sales of new products. Increased sales within our neuro and vascular businesses accounted for approximately 55% and 45% of the revenue increase, respectively, in the year ended December 31, 2018.

Revenue from our neuro products increased $61.9 million, or 26.6%, to $294.3 million in 2018, from $232.4 million in 2017. This was primarily attributable to increased sales of our Penumbra System and neuro access products, which accounted for approximately 85% and slightly less than 20% of the neuro revenue increase, respectively. Our neuro product sales experienced strong momentum due to further market penetration and growth in the market for endovascular treatment of stroke, which led to an increase in the number of procedures performed by specialist physicians using these products. This growth was partially offset by a decrease in sales of our neuro embolization products, which decreased by slightly less than 5% of the total change in neuro revenue, as demand for our neuro embolization products fluctuates from period to period due to the number of procedures performed. Prices for our neuro products remained substantially unchanged during the period.

Revenue from our vascular products increased $49.3 million, or 48.6%, to $150.6 million in 2018, from $101.3 million in 2017. This was primarily attributable to increased sales of our Indigo System products, which accounted for slightly more than 45% of the vascular revenue increase for the year ended December 31, 2018. This increase was driven by further market penetration which led to increases in the number of procedures performed by specialist physicians using our products. Prices for our vascular products remained substantially unchanged during the period.

Revenue by Geographic Area

The following table presents revenue by geographic area and from countries that exceeded 10% of our total revenue, based on our customers' shipping destinations:

	Year Ended December 31,				Change	
	2018		2017		$	%
	(in thousands, except for percentages)					
United States	$ 290,716	65.3 %	$ 219,173	65.7 %	$ 71,543	32.6 %
Japan	41,805	9.4 %	33,790	10.1 %	$ 8,015	23.7 %
Other International	112,417	25.3 %	80,801	24.2 %	$ 31,616	39.1 %
Total	$ 444,938	100.0 %	$ 333,764	100.0 %	$ 111,174	33.3 %

Revenue from sales in international markets increased $39.6 million, or 34.6%, to $154.2 million in 2018, from $114.6 million in 2017. Revenue from international sales represented 34.7% and 34.3% of our total revenue in 2018 and 2017, respectively.

Gross Margin

	Year Ended December 31,		Change	
	2018	2017	$	%
	(in thousands, except for percentages)			
Cost of revenue	$ 152,405	$ 116,622	$ 35,783	30.7 %
Gross profit	$ 292,533	$ 217,142	$ 75,391	34.7 %
Gross margin %	65.7 %	65.1 %		

Gross margin increased by 0.6 percentage points percentage points to 65.7% in 2018, from 65.1% in 2017. The increase in gross margin was primarily due to a more favorable product and geographic mix.

Research and Development ("R&D")

	Year Ended December 31,		Change	
	2018	2017	$	%
	(in thousands, except for percentages)			
R&D	$ 36,165	$ 31,661	$ 4,504	14.2 %
R&D as a percentage of revenue	*8.1 %*	*9.5 %*		

R&D expenses increased by $4.5 million or 14.2%, to $36.2 million in 2018, from $31.7 million in 2017. The increase was primarily due to a $4.3 million increase in personnel-related expenses primarily due to an increase in headcount to support our growth and a $3.2 million increase in product development and testing costs. This was partially offset by a $2.5 million decrease in clinical trial costs and a $0.8 million decrease in consultant and contractor expenses.

We have made investments, and plan to continue to make investments, in the development of our products, which includes hiring additional research and development employees. We expect our R&D expenditures in 2019 to significantly increase over 2018 levels due to the full year inclusion of R&D expenses from the acquisition of a controlling interest in MVI on August 31, 2018. In addition, we have experienced in the past, and may continue to experience in the future, variability in expenses incurred due to the timing and costs of clinical trials.

Sales, General and Administrative ("SG&A")

	Year Ended December 31,		Change	
	2018	2017	$	%
	(in thousands, except for percentages)			
SG&A	$ 226,385	$ 184,316	$ 42,069	22.8 %
SG&A *as a percentage of revenue*	*50.9 %*	*55.2 %*		

SG&A expenses increased by $42.1 million, or 22.8%, to $226.4 million in 2018, from $184.3 million in 2017. The increase was primarily due to a $30.8 million increase in personnel-related expenses driven by an increase in headcount to support our growth, a $3.5 million increase in travel-related expenses, a $1.2 million increase related to a benefit recorded in the third quarter of the prior year due to a net refund of previously paid medical device excise tax, and a $1.0 million increase in information technology expenses.

As we continue to invest in our growth, we have expanded and expect to continue to expand our sales, marketing, general and administrative teams through the hiring of additional employees. In addition, we have experienced in the past, and may continue to experience in the future, variability in expenses incurred due to the timing and costs of investments in infrastructure to support the business.

Acquired In-Process Research and Development

	Year Ended December 31,		Change	
	2018	2017	$	%
	(in thousands, except for percentages)			
Acquired in-process research and development	$ 30,835	$ —	$ 30,835	not meaningful
Acquired in-process research and development as a percentage of revenue	*6.9 %*	*— %*		

During the year ended December 31, 2018, we recorded a $30.8 million acquired IPR&D charge in connection with the acquisition of a controlling interest in MVI which was accounted for as an asset acquisition.

Benefit from Income Taxes

	Year Ended December 31,		Change	
	2018	2017	$	%
	(in thousands, except for percentages)			
Benefit from income taxes	$ (4,403)	$ (3,611)	$ (792)	21.9 %
Effective tax rate	*(273.8)%*	*(145.8)%*		

Our benefit from income taxes increased $0.8 million, to a benefit of $4.4 million in 2018, from a benefit of $3.6 million in 2017. Our effective tax rate changed to (273.8)% in 2018, compared to (145.8)% in 2017. The tax benefit for the twelve months ended December 31, 2018 was primarily attributable to the inclusion of excess tax benefits from stock-based compensation associated with our US jurisdiction, offset by income taxes attributable to our foreign jurisdictions and a tax charge resulting

from the IPR&D expense associated with the acquisition of a controlling interest in MVI, which is not deductible for tax purposes. The tax benefit for the twelve months ended December 31, 2017 was primarily attributable to excess tax benefits from stock-based compensation associated with our US jurisdiction, offset by income taxes attributable to our foreign jurisdictions, establishing a valuation allowance against our federal research and development tax credit deferred tax asset, and an adjustment to deferred income tax expense due to the reduced U.S. corporate income tax rate pursuant to the Tax Reform Act.

Our effective tax rate is driven by (1) permanent differences in taxable income for tax and financial reporting purposes, (2) tax expense attributable to our foreign jurisdictions, (3) changes to the valuation allowance maintained against our deferred tax assets, and (4) discrete tax adjustments such as excess tax benefits related to stock-based compensation. Our income tax provision is subject to volatility as the amount of excess tax benefits can fluctuate from period to period based on the price of our stock, the volume of share-based grants settled or vested, and the fair value assigned to equity awards under U.S. GAAP. In addition, changes in tax law or our interpretation thereof, and changes to our valuation allowance could cause us to experience an effective tax rate significantly different from previous periods.

Quarterly Results of Operations

For our unaudited quarterly results of operations for the eight quarters ended December 31, 2019, please see Note "17. Selected Quarterly Financial Data (Unaudited)" in Part II, Item 8 of this Annual Report on Form 10-K.

Our quarterly results of operations should be read in conjunction with the consolidated financial statements and related notes thereto. We have prepared the unaudited information on the same basis as our audited consolidated financial statements. Our operating results for any quarter are not necessarily indicative of results for any future quarters or for a full year. Our unaudited quarterly results tables include all adjustments, consisting only of normal recurring adjustments, that we consider necessary for a fair presentation of our consolidated financial position and operating results for the quarters presented. Seasonal fluctuations, underlying business trends have affected, and are likely to continue to affect, our business. Commercial queries typically increase significantly in the fourth quarter of each year. These seasonal trends have caused, and will likely continue to cause, fluctuations in our quarterly results, including fluctuations in sequential revenue growth rates.

Our revenue and gross profit increased sequentially for all quarters presented. However, we may have quarters for which we experience significant revenue and gross profit growth followed by quarters with limited revenue and gross profit growth due to a number of factors, including mix of products sold, limited growth in demand and the effects of hiring and integrating new sales people and their transition into existing or new sales territories. Other factors affecting our revenue and gross profit growth include acceptance of new products by specialist physicians and successfully transitioning these physicians to new products from existing products, buildup of inventory of new products and write downs or write offs of inventory of older products, introduction of new products by competitors, publication of clinical results that may influence specialist physicians and the fact that the specialist physicians who use our products may not perform procedures during certain times of the year due to their attendance at major medical conferences or for other reasons, the time of which occurs irregularly during the year and from year to year.

Liquidity and Capital Resources

As of December 31, 2019, we had $372.1 million in working capital, which included $72.8 million in cash and cash equivalents and $116.6 million in marketable investments. As of December 31, 2019, we held approximately 23.8% of our cash and cash equivalents in foreign entities.

In March 2017, we issued and sold an aggregate of 1,495,000 shares of our common stock at public offering price of $76.00 per share, less the underwriters' discounts and commissions, pursuant to an underwritten public offering. We received approximately $106.3 million in net cash proceeds after deducting underwriting discounts and commissions of $6.8 million and other offering expenses of $0.5 million. We will continue to use the net proceeds from this offering for general corporate purposes, including working capital, continued development of our products, including research and development and clinical trials, potential acquisitions and other business opportunities. Pending the use of the net proceeds from this offering, we are investing the net proceeds in investment grade, interest bearing securities.

In addition to our existing cash and cash equivalents and marketable investment balances, our principal source of liquidity is our accounts receivable. We believe these sources of liquidity will be sufficient to meet our liquidity requirements for at least the next 12 months. Our principal liquidity requirements are to fund our operations, expand manufacturing operations which includes, but is not limited to, maintaining sufficient levels of inventory to meet the anticipated demand of our customers, fund research and development activities and fund our capital expenditures. We may also lease or purchase additional facilities to facilitate our growth. We expect to continue to make investments as we launch new products, expand our manufacturing

operations and IT infrastructures and further expand into international markets. We may, however, require or elect to secure additional financing as we continue to execute our business strategy. If we require or elect to raise additional funds, we may do so through equity or debt financing, which may not be available on favorable terms, could result in dilution to our stockholders and could require us to agree to covenants that limit our operating flexibility.

The following table summarizes our cash and cash equivalents, marketable investments and selected working capital data as of December 31, 2019 and December 31, 2018:

	Year Ended December 31,	
	2019	2018
	(in thousands)	
Cash and cash equivalents	$ 72,779	$ 67,850
Marketable investments	116,610	133,039
Accounts receivable, net	105,901	81,896
Accounts payable	15,111	8,176
Accrued liabilities	67,630	57,886
Working capital[(1)]	372,086	344,664

[(1)] Working capital consists of total current assets less total current liabilities.

The following table sets forth, for the periods indicated, our beginning balance of cash and cash equivalents, net cash flows provided by (used in) operating, investing and financing activities and our ending balance of cash and cash equivalents:

	Year Ended December 31,		
	2019	2018	2017
		(in thousands)	
Cash and cash equivalents at beginning of year	$ 67,850	$ 50,637	$ 13,236
Net cash provided by operating activities	26,652	28,808	12,691
Net cash used in investing activities	(12,711)	(385)	(77,653)
Net cash (used in) provided by financing activities	(8,959)	(9,815)	104,359
Cash and cash equivalents at end of year	72,779	67,850	50,637

Net Cash Provided by Operating Activities

Net cash provided by operating activities consists primarily of net income adjusted for certain non-cash items (including depreciation and amortization, stock-based compensation expense, loss on non-marketable equity investments, provision for doubtful accounts, inventory write-offs and write-downs, changes in deferred tax balances, acquired IPR&D charges and changes in the fair value of contingent consideration), and the effect of changes in working capital and other activities.

Net cash provided by operating activities was $26.7 million in 2019 and consisted of net income of $47.0 million and non-cash items of $36.5 million offset by net changes in operating assets and liabilities of $56.8 million. The change in operating assets and liabilities includes an increase in inventories of $41.4 million to support our revenue growth, an increase in accounts receivable of $25.0 million, an increase in prepaid expenses and other current and non-current assets of $4.0 million, partially offset by an increase in accrued expenses and other non-current liabilities of $7.6 million, and an increase in accounts payable of $6.0 million as a result of the growth in our business activities.

Net cash provided by operating activities was $28.8 million in 2018 and consisted of net income of $2.9 million and non-cash items of $56.2 million offset by net changes in operating assets and liabilities of $30.3 million. The change in operating assets and liabilities includes an increase in accounts receivable of $25.8 million, the increase in inventories of $22.3 million to support our revenue growth, partially offset by an increase in accrued expenses and other non-current liabilities of $14.2 million, a decrease in prepaid expenses and other current and non-current assets of $2.2 million, and an increase in accounts payable of $1.3 million as a result of the growth in our business activities.

Net cash provided by operating activities was $12.7 million in 2017 and consisted of net income of $4.7 million and non-cash items of $21.5 million offset by net changes in operating assets and liabilities of $13.5 million. The change in operating

assets and liabilities includes the increase in inventories of $18.8 million to support our revenue growth, an increase in accounts receivable of $9.1 million, partially offset by an increase in accrued expenses and other non-current liabilities of $10.2 million, a decrease in prepaid expenses and other current and non-current assets of $2.4 million, and an increase in accounts payable of $1.9 million as a result of the growth in our business activities.

Net Cash Used in Investing Activities

Net cash used in investing activities relates primarily to purchases of marketable investments, the acquisition of assets or a business, capital expenditures, payments for leases that have not yet commenced, and non-marketable investments, partially offset by proceeds from maturities and sales of marketable investments.

Net cash used in investing activities was $12.7 million in 2019 and consisted of capital expenditures of $22.1 million, and payments for leases that have not yet commenced of $6.6 million, partially offset by proceeds from maturities and sales of marketable investments, net of purchases, of $18.0 million.

Net cash used in investing activities was $0.4 million in 2018 and consisted of $20.4 million in payments, net of cash acquired, for the asset acquisition of MVI, capital expenditures of $9.6 million and contributions to non-marketable investments of $1.4 million. This was partially offset by proceeds from the maturities and sales of marketable investments, net of purchases, of $31.0 million.

Net cash used in investing activities was $77.7 million in 2017 and consisted of purchases of marketable investments, net of sales and maturities, of $48.1 million, capital expenditures of $12.5 million, $9.3 million related to the acquisition of Crossmed net of cash acquired, purchase of non-marketable investments of $5.3 million, and purchases of intangible assets of $2.5 million.

Net Cash (Used In) Provided by Financing Activities

Net cash used in and provided by financing activities primarily relates to capital raising activities through equity, certain acquisition-related payments and payments related to finance lease obligations.

Net cash used in financing activities was $9.0 million in 2019 and primarily consisted of payments of employee taxes related to vested common and restricted stock of $18.5 million, payments related to finance lease obligations of $2.6 million and payments related to contingent consideration payments in connection with our acquisition in 2017 of $1.8 million, partially offset by proceeds from the issuance of stock under our employee stock purchase plan of $9.0 million and proceeds from exercises of stock options of $4.1 million.

Net cash used in financing activities was $9.8 million in 2018 and primarily consisted of payments of employee taxes related to vested common and restricted stock of $17.7 million and payments related to the 2017 acquisition of Crossmed of $4.5 million, partially offset by proceeds from the issuance of stock under our employee stock purchase plan of $7.2 million and proceeds from exercises of stock options of $5.1 million.

Financing activities in 2017 provided net cash of $104.4 million due to proceeds from the issuance of common stock net of issuance costs of $106.3 million, proceeds from the issuance of stock under our employee stock purchase plan of $5.8 million and proceeds from exercises of stock options of $5.0 million. This was partially offset by payment of employee taxes related to vested common and restricted stock of $11.7 million and payment of debt obligations and credit facilities of $1.1 million.

Contractual Obligations and Commitments

The following table summarizes our contractual obligations as of December 31, 2019:

	Payments Due by Period				
	Total	Less Than One Year	1-3 Years	3-5 Years	More than Five Years
			(in thousands)		
Rent obligations[1]	$ 112,522	$ 11,808	$ 17,860	$ 17,837	$ 65,017
Equipment lease obligations[2]	1,732	1,086	556	78	12
Purchase commitments[3]	15,099	13,231	984	884	—
Licensing arrangement obligations[4]	11,743	865	10,878	—	—
Acquisition-related obligations[5]	1,291	1,291	—	—	—
Total	$ 142,387	$ 28,281	$ 30,278	$ 18,799	$ 65,029

(1) Our rent obligations in the table above exclude the 1310 Harbor Bay Lease and potential obligations for additional space(s) that may be added to our lease by our landlord in the future. For example, if any space becomes vacant in any of the buildings located in the same business park as our corporate headquarters and manufacturing facilities in Alameda, California through 2035, that space will be added to the lease. The additional space could potentially result in approximately $3.1 million of annual rent expense based on current terms of the lease. The Company has a right of first offer to lease any space that becomes available after such date.

(2) We lease equipment and automobiles primarily under operating leases.

(3) Purchase commitments primarily consist of contracts with suppliers to purchase raw materials to be used to manufacture products.

(4) During the year ended December 31, 2017, we entered into an exclusive technology license agreement that requires us to make future revenue milestone-based payments on sales of products covered by the licensed intellectual property. While the agreement is cancelable, the future payments are estimable and probable as of December 31, 2019. Refer to Note "6. Intangible Assets" for more information.

(5) Acquisition-related obligations consist of the fair value of contingent consideration related to future cash milestone payments related to the acquisition of Crossmed as of December 31, 2019. Refer to Note "5. Business Combinations" in Part II, Item 8 of this Annual Report on Form 10-K for more information.

At December 31, 2019, the liability recorded for uncertain tax positions, excluding associated interest and penalties, was approximately $1.7 million, which are not included in the table above. The ultimate amount and timing of any related future cash settlements cannot be predicted with reasonable certainty.

The amounts in the table above do not reflect royalty obligations under a license agreement as amounts due thereunder fluctuate depending on sales levels. Royalty expense included in cost of sales for the years ended December 31, 2019, 2018 and 2017 was $3.8 million, $3.4 million and $4.1 million, respectively. For more information on these royalty obligations, refer to Note "10. Commitments and Contingencies" to our consolidated financial statements in Part II, Item 8 of this Annual Report on Form 10-K.

Off-Balance Sheet Arrangements

We do not have any significant off-balance sheet arrangements or holdings in variable interest entities.

Recently Issued Accounting Standards

For information with respect to recently issued accounting standards and the impact of these standards on our consolidated financial statements, refer to Note "2. Summary of Significant Accounting Policies" to our consolidated financial statements in Part II, Item 8 of this Annual Report on Form 10-K.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK.

We are exposed to various market risks, which may result in potential losses arising from adverse changes in market rates, such as interest rates and foreign exchange rates. We do not enter into derivatives or other financial instruments for trading or speculative purposes and do not believe we are exposed to material market risk with respect to our cash and cash equivalents and/or our marketable investments.

Interest Rate Risk. We had cash and cash equivalents of $72.8 million as of December 31, 2019, which consisted of funds held in general checking and savings accounts. In addition, we had marketable investments of $116.6 million, which consisted primarily of commercial paper, corporate bonds, U.S. agency and government sponsored securities, securities issued by U.S. states and municipalities and U.S. Treasury securities. Our investment policy is focused on the preservation of capital and supporting our liquidity needs. Under the policy, we invest in highly rated securities, while limiting the amount of credit exposure to any one issuer other than the U.S. government. We do not invest in financial instruments for trading or speculative purposes, nor do we use leveraged financial instruments. We utilize external investment managers who adhere to the guidelines of our investment policy. A hypothetical 100 basis point change in interest rates would not have a material impact on the value of our cash and cash equivalents or marketable investments.

Foreign Exchange Risk Management. We operate in countries other than the United States, and, therefore, we are exposed to foreign currency risks. We bill most sales outside of the United States in local currencies, primarily euro and Japanese yen, with some sales being denominated in other currencies. We expect that the percentage of our sales denominated in foreign currencies may increase in the foreseeable future as we continue to expand into international markets. When sales or expenses are not denominated in U.S. dollars, a fluctuation in exchange rates could affect our net income. An immediate 10% adverse change in foreign exchange rates would have impacted our net income by 6%. We do not currently hedge our exposure to foreign currency exchange rate fluctuations; however, we may choose to hedge our exposure in the future.

We do not believe that inflation and changes in prices had a significant impact on our results of operations for any periods presented on our consolidated financial statements.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA.
PENUMBRA, INC.
INDEX TO THE CONSOLIDATED FINANCIAL STATEMENTS

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the stockholders and the Board of Directors of Penumbra, Inc.

Opinion on the Financial Statements

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

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control — Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission and our report dated February 25, 2020, expressed an unqualified opinion on the Company's internal control over financial reporting.

Change in Accounting Principle

As discussed in Note 9 to the financial statements, effective January 1, 2019, the Company adopted ASC Topic 842, *Leases*, using the modified retrospective transition approach.

Basis for Opinion

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

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

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current-period audit of the financial statements that were communicated or required to be communicated to the audit committee and that (1) relate to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Income Taxes –Realizability of Deferred Tax Assets — Refer to Notes 2 and 14 to the financial statements

Critical Audit Matter Description

The Company recognizes deferred income taxes based on differences between the financial reporting and tax bases of assets and liabilities at the enacted statutory tax rates and laws in effect for the years in which the differences are expected to reverse. Valuation allowances are established when necessary to reduce deferred tax assets ("DTAs") to the amounts expected to be realized based on estimates of future taxable income. The Company's net DTA as of December 31, 2019 was $29.5 million after a reduction of a valuation allowance of $21.6 million.

We identified management's determination that a valuation allowance is necessary to reduce deferred tax assets to their estimated realizable value as a critical audit matter because management utilized significant judgments and estimates in their evaluation, including estimates of future taxable income, cumulative results of operations in recent years, and the respective carryforward periods of tax attributes available to date. This in turn led to a high degree of auditor judgment and subjectivity in applying procedures relating to assessing such positive and negative evidence, including assessing how management's assumptions may be affected by the future operations of the Company, market, and/or economic conditions.

How the Critical Audit Matter Was Addressed in the Audit

Our audit procedures related to estimated future taxable income and the determination of whether it is more likely than not that the deferred tax assets will be realized included the following, among others:

- We tested the effectiveness of controls over deferred tax assets, including management's controls over the estimates of taxable income and the determination of whether it is more likely than not that the deferred tax assets will be realized.
- We evaluated the reasonableness of the methods and assumptions used by management to determine whether a valuation allowance is necessary.
- With the assistance of our income tax specialists, we considered the following sources of information used in management's evaluation of whether deferred taxes are more likely than not to be realized:
    - Estimates of future taxable income.
    - The length of net operating loss carryforward periods.
    - The ability to carryback losses to prior years.
    - Tax credit carryforwards and consideration of when those will expire.
- We evaluated whether the taxable income in historical periods was of the appropriate character and available under the tax law.
- We evaluated management's assessment of the positive and negative evidence utilized to conclude if a valuation allowance was necessary.

Roseville Financing Lease — Refer to Notes 2 and 9 to the financial statements

Critical Audit Matter Description

On September 17, 2018, the Company entered into a fifteen-year lease for a manufacturing facility in Roseville, California (the "Roseville Lease"). In November 2019, the Roseville lease commenced when the building was ready and available for its intended use. The Roseville lease was recorded as a finance lease on the balance sheet as of December 31, 2019. The total amount of estimated minimum lease payments over the fifteen-year lease term represents the majority of the finance lease right of use asset and finance lease liability recorded on the balance sheet as of December 31, 2019.

Auditing management's evaluation of finance lease classification and the determination of the commencement date for the Roseville lease includes judgment around subjective evidence related to the property's underlying fair value and availability for its intended use. Additionally, auditing management's assessment of the incremental borrowing rate is subjective and judgmental as the Company does not carry any debt, secured or otherwise that would have comparable collateral or similar terms as the underlying Roseville manufacturing facility, which caused us to involve our valuation specialists.

How the Critical Audit Matter Was Addressed in the Audit

Our audit procedures related to evaluating appropriateness of the lease commencement date, assessment of classification, and evaluation of the incremental borrowing rate included the following, among others:

- We tested the effectiveness of controls over the accounting for the Roseville lease, including management's controls over evaluating lease commencement, assessing lease classification upon commencement, and management's review of the determination of a synthetic credit rating to be used in the determination of the incremental borrowing rate to value the right of use asset.

- With the assistance of our valuation specialists, we performed the following procedures on management's calculation of the incremental borrowing rate:
    - Evaluated the methodology used to estimate the incremental borrowing rate.
    - Assessed the credit rating ascribed to the Company and the base rate and spreads applied in determining the incremental borrowing rate.
    - Checked the accuracy of the model and mathematical calculations.
- We evaluated the appropriateness of the lease classification by performing the following procedures:
    - Read the executed Lease agreement, including any and all associated amendments.
    - Enlisted the assistance of our real estate specialists to provide comparable real estate listings which we used to assess the Company's determination of the fair value of the underlying asset.
    - Evaluated the lease against the lease classification criteria in ASC 842-10-25-2.
- We assessed the appropriateness of the commencement date through inquiry of facility personnel and evaluation of when personnel began working at the facility.

/s/ Deloitte & Touche LLP

San Francisco, California
February 25, 2020

We have served as the Company's auditor since 2008.

Penumbra, Inc.
Consolidated Balance Sheets
(in thousands, except share and per share amounts)

	December 31,	
	2019	2018
Assets		
Current assets:		
Cash and cash equivalents	$ 72,779	$ 67,850
Marketable investments	116,610	133,039
Accounts receivable, net of doubtful accounts of $2,946 and $2,782 at December 31, 2019 and December 31, 2018, respectively	105,901	81,896
Inventories	152,992	115,741
Prepaid expenses and other current assets	14,852	12,200
Total current assets	463,134	410,726
Property and equipment, net	51,812	35,407
Operating lease right-of-use assets	43,717	—
Finance lease right-of-use assets	39,924	—
Intangible assets, net	25,407	27,245
Goodwill	7,656	7,813
Deferred taxes	31,305	32,940
Other non-current assets	2,946	875
Total assets	$ 665,901	$ 515,006
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable	$ 15,111	$ 8,176
Accrued liabilities	67,630	57,886
Current operating lease liabilities	4,142	—
Current finance lease liabilities	4,165	—
Total current liabilities	91,048	66,062
Deferred rent	—	7,586
Non-current operating lease liabilities	47,242	—
Non-current finance lease liabilities	26,748	—
Other non-current liabilities	15,250	18,943
Total liabilities	180,288	92,591
Commitments and contingencies (Note 10)		
Stockholders' equity:		
Preferred stock, $.001 par value per share - 5,000,000 shares authorized, none issued and outstanding at December 31, 2019 and December 31, 2018	—	—
Common stock, $.001 par value per share - 300,000,000 shares authorized, 35,001,581 issued and outstanding at December 31, 2019; 300,000,000 shares authorized, 34,437,339 issued and outstanding at December 31, 2018	35	34
Additional paid-in capital	430,659	415,084
Accumulated other comprehensive loss	(2,324)	(1,942)
Retained earnings	57,522	9,064
Total Penumbra, Inc. stockholders' equity	485,892	422,240
Non-controlling interest	(279)	175
Total stockholders' equity	$ 485,613	$ 422,415
Total liabilities and stockholders' equity	$ 665,901	$ 515,006

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

Penumbra, Inc.
Consolidated Statements of Operations
(in thousands, except share and per share amounts)

	Year Ended December 31,		
	2019	2018	2017
Revenue	$ 547,405	$ 444,938	$ 333,764
Cost of revenue	175,441	152,405	116,622
Gross profit	371,964	292,533	217,142
Operating expenses:			
Research and development	51,723	36,165	31,661
Sales, general and administrative	272,733	226,385	184,316
Acquired in-process research and development	—	30,835	—
Total operating expenses	324,456	293,385	215,977
Income (loss) from operations	47,508	(852)	1,165
Interest income, net	2,854	2,964	2,653
Other expense, net	(227)	(504)	(1,342)
Income before income taxes and equity in losses of unconsolidated investee	50,135	1,608	2,476
Provision for (benefit from) income taxes	3,131	(4,403)	(3,611)
Income before equity in losses of unconsolidated investee	47,004	6,011	6,087
Equity in losses of unconsolidated investee	—	(3,101)	(1,430)
Consolidated net income	$ 47,004	$ 2,910	$ 4,657
Net loss attributable to non-controlling interest	(1,454)	(3,691)	—
Net income attributable to Penumbra, Inc.	$ 48,458	$ 6,601	$ 4,657
Net income attributable to Penumbra, Inc. per share:			
Basic	$ 1.39	$ 0.19	$ 0.14
Diluted	$ 1.34	$ 0.18	$ 0.13
Weighted average shares outstanding:			
Basic	34,750,706	34,138,176	32,978,065
Diluted	36,265,999	36,086,821	35,319,103

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

Penumbra, Inc.
Consolidated Statements of Comprehensive Income (Loss)
(in thousands)

	Year Ended December 31,		
	2019	2018	2017
Consolidated net income	$ 47,004	$ 2,910	$ 4,657
Other comprehensive (loss) income, net of tax:			
Foreign currency translation adjustments, net of tax	(1,120)	(3,246)	6,387
Net change in unrealized gains (losses) on available-for-sale securities, net of tax	738	(265)	(130)
Total other comprehensive (loss) income, net of tax	$ (382)	$ (3,511)	$ 6,257
Consolidated comprehensive income (loss)	$ 46,622	$ (601)	$ 10,914
Net loss attributable to non-controlling interest	$ (1,454)	$ (3,691)	$ —
Comprehensive income attributable to Penumbra, Inc.	$ 48,076	$ 3,090	$ 10,914

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

Penumbra, Inc.
Consolidated Statements of Stockholders' Equity
(in thousands, except share amounts)

	Common Stock							
	Shares	Amount	Additional Paid-in Capital	Accumulated Other Comprehensive (Loss) Income	Retained Earnings (Accumulated Deficit)	Total Penumbra, Inc. Stockholders' Equity	Non-Controlling Interest	Total Stockholders' Equity
Balance at December 31, 2016	31,108,828	$ 31	$ 273,865	$ (4,688)	$ (2,661)	$ 266,547	$ —	$ 266,547
Issuance of common stock	1,131,344	—	5,048	—	—	5,048	—	5,048
Issuance of common stock under employee stock purchase plan	91,685	—	5,809	—	—	5,809	—	5,809
Issuance of common stock upon underwritten public offering, net of issuance cost	1,495,000	2	106,267	—	—	106,269	—	106,269
Shares held for tax withholding	(141,711)	—	(11,686)	—	—	(11,686)	—	(11,686)
Stock-based compensation	—	—	17,507	—	—	17,507	—	17,507
Other comprehensive income	—	—	—	6,257	—	6,257	—	6,257
Net income	—	—	—	—	4,657	4,657	—	4,657
Balance at December 31, 2017	33,685,146	$ 33	$ 396,810	$ 1,569	$ 1,996	$ 400,408	$ —	$ 400,408
Issuance of common stock	774,475	1	5,063	—	—	5,064	—	5,064
Issuance of common stock under employee stock purchase plan	74,344	—	7,231	—	—	7,231	—	7,231
Issuance of common stock pursuant to royalty buyout	53,256	—	5,256	—	—	5,256	—	5,256
Shares held for tax withholding	(149,882)	—	(17,725)	—	—	(17,725)	—	(17,725)
Stock-based compensation	—	—	18,449	—	—	18,449	—	18,449
Cumulative effect adjustments[(1)]	—	—	—	—	467	467	—	467
Asset acquisition date fair value of non-controlling interest	—	—	—	—	—	—	3,366	3,366
Capital contribution from non-controlling interest	—	—	—	—	—	—	500	500
Other comprehensive loss	—	—	—	(3,511)	—	(3,511)	—	(3,511)
Net income (loss)	—	—	—	—	6,601	6,601	(3,691)	2,910
Balance at December 31, 2018	34,437,339	$ 34	$ 415,084	$ (1,942)	$ 9,064	$ 422,240	$ 175	$ 422,415
Issuance of common stock	612,221	1	4,120	—	—	4,121	—	4,121
Issuance of common stock under employee stock purchase plan	81,644	—	8,984	—	—	8,984	—	8,984
Shares held for tax withholding	(129,623)	—	(18,535)	—	—	(18,535)	—	(18,535)
Stock-based compensation	—	—	21,006	—	—	21,006	—	21,006
Capital contributions of non-controlling interest	—	—	—	—	—	—	1,000	1,000
Other comprehensive loss	—	—	—	(382)	—	(382)	—	(382)
Net income (loss)	—	—	—	—	48,458	48,458	(1,454)	47,004
Balance at December 31, 2019	35,001,581	$ 35	$ 430,659	$ (2,324)	$ 57,522	$ 485,892	$ (279)	$ 485,613

(1) Cumulative effect adjustments relate to the adoption of Accounting Standard Update ("ASU") No. 2014-09 - Revenue from Contracts with Customers ("Topic 606"), ASU No. 2016-16 - Income Taxes ("Topic 740"), and ASU No. 2018-02 - Income Statement - Reporting Comprehensive Income ("Topic 220"). Refer to the accompanying notes, including Note "2. Summary of Significant Accounting Policies," for more information.

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

Penumbra, Inc.
Consolidated Statements of Cash Flows
(in thousands)

	Year Ended December 31,		
	2019	2018	2017
CASH FLOWS FROM OPERATING ACTIVITIES:			
Net income	$ 47,004	$ 2,910	$ 4,657
Adjustments to reconcile net income to net cash provided by (used in) operating activities:			
Depreciation and amortization	8,104	6,168	3,781
Stock-based compensation	21,485	18,422	17,812
Loss on non-marketable equity investments	—	3,101	1,430
Provision for doubtful accounts	656	1,563	606
Inventory write-offs and write-downs	4,411	1,700	1,037
Deferred taxes	1,820	(6,480)	(4,288)
Acquired in-process research and development	—	30,835	—
Change in fair value of contingent consideration	(35)	950	109
Other	49	(101)	1,036
Changes in operating assets and liabilities:			
Accounts receivable	(25,029)	(25,762)	(9,118)
Inventories	(41,407)	(22,288)	(18,826)
Prepaid expenses and other current and non-current assets	(4,001)	2,231	2,436
Accounts payable	6,038	1,329	1,851
Accrued expenses and other non-current liabilities	7,557	14,230	10,168
Net cash provided by operating activities	26,652	28,808	12,691
CASH FLOWS FROM INVESTING ACTIVITIES:			
Asset acquisition (Note 3 and Note 6) and acquisition of business (Note 5), net of cash acquired	—	(20,414)	(9,253)
Contributions to non-marketable investments	—	(1,382)	(5,265)
Lease payments made prior to commencement	(6,636)	—	—
Purchases of marketable investments	(77,326)	(108,227)	(189,658)
Proceeds from sales of marketable investments	4,746	12,129	28,752
Proceeds from maturities of marketable investments	90,614	127,112	112,803
Acquisition of intangible assets from a licensing agreement	—	—	(2,500)
Purchases of property and equipment	(22,109)	(9,603)	(12,532)
Other	(2,000)	—	—
Net cash used in investing activities	(12,711)	(385)	(77,653)
CASH FLOWS FROM FINANCING ACTIVITIES:			
Proceeds from issuance of common stock upon underwritten public offering, net of issuance cost	—	—	106,267
Proceeds from exercises of stock options	4,120	5,064	5,048
Proceeds from issuance of stock under employee stock purchase plan	8,984	7,231	5,809
Payment of obligations on debt and credit facilities	—	(404)	(1,079)
Payment of employee taxes related to vested common and restricted stock	(18,535)	(17,725)	(11,686)
Payments of finance lease obligations	(2,570)	—	—
Payment of acquisition-related obligations	(1,758)	(4,481)	—
Proceeds from capital contribution from non-controlling interest	800	500	—
Net cash (used in) provided by financing activities	(8,959)	(9,815)	104,359
Effect of foreign exchange rate changes on cash and cash equivalents	(53)	(1,395)	(1,996)
NET INCREASE IN CASH AND CASH EQUIVALENTS	4,929	17,213	37,401
CASH AND CASH EQUIVALENTS—Beginning of period	67,850	50,637	13,236
CASH AND CASH EQUIVALENTS—End of period	$ 72,779	$ 67,850	$ 50,637
SUPPLEMENTAL DISCLOSURES OF CASH FLOW INFORMATION:			
Cash paid for income taxes	$ 175	$ 156	$ 141
NONCASH INVESTING AND FINANCING ACTIVITIES:			
Common shares issued as consideration in connection with a buyout agreement (Notes 7, 10 and 11)	$ —	$ 5,256	$ —
Purchase of property and equipment funded through accounts payable and accrued liabilities	$ 2,903	$ 1,037	$ 977
Asset acquisition (Note 3 and Note 6) and acquisition of business (Note 5) related contingent and working capital liabilities	$ —	$ 4,000	$ 6,067
Indefinite-lived intangible assets related to licensed technology related contingent liabilities (Note 7)	$ —	$ —	$ 12,717

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

1. Organization and Description of Business

Penumbra, Inc. (the "Company") is a global healthcare company focused on innovative therapies. The Company designs, develops, manufactures and markets medical devices and has a broad portfolio of products that addresses challenging medical conditions and significant clinical needs.

2. Summary of Significant Accounting Policies

Basis of Presentation and Consolidation

The accompanying consolidated financial statements have been prepared in accordance with generally accepted accounting principles in the United States ("U.S. GAAP"). Certain changes in presentation were made in the consolidated financial statements for the year ended December 31, 2018 and 2017, to conform to the presentation for the year ended December 31, 2019.

The consolidated financial statements include the accounts of the Company, its wholly-owned subsidiaries and its majority-owned subsidiary. The portion of equity not attributable to the Company is considered non-controlling interest and is classified separately in the consolidated financial statements. Any subsequent changes in the Company's ownership interest while the Company retains its controlling interest in its majority-owned subsidiary will be accounted for as equity transactions. All intercompany balances and transactions have been eliminated in consolidation.

Use of Estimates

The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets, liabilities and equity accounts; disclosure of contingent assets and liabilities at the date of the financial statements; and the reported amounts of revenues and expenses during the reporting period. On an ongoing basis, the Company evaluates its estimates, including those related to marketable investments, provisions for doubtful accounts, the amount of variable consideration included in the transaction price, warranty reserve, valuation of inventories, useful lives of property and equipment, operating and finance lease right-of-use ("ROU") assets and liabilities, income taxes, contingent consideration and other contingencies, among others. The Company 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 data. Actual results could differ from those estimates.

Segments

The Company determined its operating segment on the same basis that it uses to evaluate its performance internally. The Company has one business activity: the design, development, manufacturing and marketing of innovative medical devices, and operates as one operating segment. The Company's chief operating decision-maker ("CODM"), its Chief Executive Officer, reviews its consolidated operating results for the purpose of allocating resources and evaluating financial performance. The Company's entity-wide disclosures are included in Note "16. Revenues."

Foreign Currency Translation

The Company's consolidated financial statements are prepared in United States Dollars ("USD"). Its foreign subsidiaries use their local currency as their functional currency and maintain their records in the local currency. Accordingly, the assets and liabilities of these subsidiaries are translated into USD using the current exchange rates in effect at the balance sheet date and equity accounts are translated into USD using historical rates. Revenues and expenses are translated using the average exchange rates in effect for the year involved. The resulting foreign currency translation adjustments are recorded in accumulated other comprehensive loss in the consolidated balance sheets. Transactions denominated in currencies other than the respective functional currencies are translated at exchange rates as of the date of transaction with foreign currency gains and losses recorded in other expense, net in the consolidated statements of operations. The Company realized net foreign currency transaction losses of $0.8 million, $0.9 million and $1.0 million during the years ended December 31, 2019, 2018 and 2017, respectively.

As the Company's international operations grow, its risks associated with fluctuation in currency rates will become greater, and the Company will continue to reassess its approach to managing this risk. In addition, currency fluctuations or a weakening USD can increase the costs of the Company's international expansion. To date, the Company has not entered into any foreign currency hedging contracts.

Concentration of Credit Risk

Financial instruments that potentially subject the Company to a concentration of credit risk consist of cash and cash equivalents, marketable investments (as described in greater detail in this footnote under the header "Cash, Cash Equivalents and Marketable Investments" below) and accounts receivable. The majority of the Company's cash is held by one financial institution in the U. S. in excess of federally insured limits. The Company maintained investments in money market funds that were not federally insured during the year ended December 31, 2019 and held cash in foreign entities of approximately $17.3 million and $23.4 million at December 31, 2019 and 2018, respectively, which was not federally insured.

The Company's revenue has been derived from sales of its products in the United States and international markets. The Company uses both its own salesforce and independent distributors to sell its products. Concentrations of credit risk with respect to accounts receivable are limited due to the large number of entities comprising the Company's customer base. The Company performs ongoing credit evaluations of its customers, including its distributors, does not require collateral, and maintains allowances for potential credit losses on customer accounts when deemed necessary.

During the year ended December 31, 2019 and 2018, no customer accounted for greater than 10% of the Company's revenue. During December 31, 2017, one customer, a distributor, accounted for 10.1% of the Company's revenue. One customer accounted for greater than 10% of the Company's accounts receivable balance as of December 31, 2019. No customers accounted for greater than 10% of the Company's accounts receivable balance as of December 31, 2018.

Significant Risks and Uncertainties

The Company is subject to risks common to medical device companies including, but not limited to, new technological innovations, dependence on key personnel, protection of proprietary technology, compliance with government regulations, product liability, uncertainty of market acceptance of products and the potential need to obtain additional financing. The Company is dependent on third party suppliers, in some cases single-source suppliers.

There can be no assurance that the Company's products will continue to be accepted in the marketplace, nor can there be any assurance that any future products can be developed or manufactured at an acceptable cost and with appropriate performance characteristics, or that such products will be successfully marketed, if at all.

The Company's products require approval or clearance from the FDA prior to commencing commercial sales in the United States. There can be no assurance that the Company's products will receive all of the required approvals or clearances. Approvals or clearances are also required in foreign jurisdictions in which the Company sells its products. If the Company is denied such approvals or clearances or such approvals or clearances are delayed, it may have a material adverse impact on the Company's results of operations, financial position and liquidity.

Fair Value of Financial Instruments

Carrying amounts of certain of the Company's financial instruments, including cash equivalents, accounts receivable, prepaid expenses and other current assets, accounts payable and accrued liabilities, approximate fair value due to their relatively short maturities.

Cash, Cash Equivalents and Marketable Investments

The Company invests its cash primarily in highly liquid corporate debt securities, debt instruments of U.S. federal, state and municipal governments, and their agencies, in money market funds and in commercial paper. All highly liquid investments with stated maturities of three months or less from the date of purchase are classified as cash equivalents; all highly liquid investments with stated maturities of greater than three months are classified as marketable investments. The majority of the Company's cash and investments are held in U.S. banks.

The Company determines the appropriate classification of its investments in marketable investments at the time of purchase and re-evaluates such designation at each balance sheet date. The Company's marketable investments have been classified and accounted for as available-for-sale. Investments with remaining maturities of more than one year are viewed by the Company as available to support current operations and are classified as current assets under the caption marketable investments in the accompanying consolidated balance sheets. Investments in marketable investments are carried at fair value, with the unrealized gains and losses reported as a component of accumulated other comprehensive loss. Any realized gains or losses on the sale of marketable investments are determined on a specific identification method, and such gains and losses are reflected as a component of other income (expense), net.

Impairment of Marketable Investments

After determining the fair value of available-for-sale debt instruments, unrealized gains or losses on these securities are recorded to accumulated other comprehensive loss until either the security is sold or the Company determines that the decline in value is other-than-temporary. The primary differentiating factors that the Company considers in classifying impairments as either temporary or other-than-temporary impairments is the intent and ability to retain the investment in the issuer for a period of time sufficient to allow for any anticipated recovery in market value, the length of the time and the extent to which the market value of the investment has been less than cost, the financial condition, and near-term prospects of the issuer. There were no other-than-temporary impairments for the years ended December 31, 2019, 2018 or 2017.

Non-Marketable Equity Investments

Entities in which the Company has at least a 20%, but not more than a 50%, interest are accounted for under the equity method unless it is determined that the Company has a controlling financial interest in the entity, in which case the entity would be consolidated. Non-marketable equity investments are classified as long-term investments on the consolidated balance sheet. The Company's proportionate share of the operating results of its non-marketable equity method investments are recorded as profit or loss and presented in equity in losses of unconsolidated investee, in the consolidated statements of operations. See Note "3. Investments and Fair Value of Financial Instruments" for further details.

Accounts Receivable

Accounts receivable are stated at invoice value less estimated allowances for doubtful accounts. The Company continually monitors customer payments and maintains a reserve for estimated losses resulting from its customers' inability to make required payments. The Company considers factors such as historical experience, credit quality, age of the accounts receivable balances, geographic related risks and economic conditions that may affect a customer's ability to pay. In cases where there are circumstances that may impair a specific customer's ability to meet its financial obligations, a specific allowance is recorded against amounts due, and thereby reduces the net recognized receivable to the amount reasonably believed to be collectible.

Inventories

Inventories are stated at the lower of cost (determined under the first-in first-out method) or net realizable value. Write-downs are provided for raw materials, components or finished goods that are determined to be excessive or obsolete. The Company regularly reviews inventory quantities in consideration of actual loss experience, projected future demand and remaining shelf life to record a provision for excess and obsolete inventory when appropriate. As a result of these evaluations, the Company recognized total write-offs and write-downs of $4.4 million, $1.7 million, and $1.0 million for the years ended December 31, 2019, 2018 and 2017.

Property and Equipment, net

Property and equipment are stated at cost less accumulated depreciation. Depreciation is computed using the straight-line method over the estimated useful lives of the assets. Leasehold improvements are amortized using the straight-line method over the shorter of the lease term or estimated useful life. Machinery and equipment and furniture and fixtures are depreciated over a five to ten year period and computers and software are depreciated over two to five years. Upon retirement or sale, the cost and the related accumulated depreciation are removed from the consolidated balance sheet and the resulting gain or loss is reflected in operations. Maintenance and repairs are charged to consolidated statements of operations as incurred.

Impairment of Long-Lived Assets

The Company reviews long-lived assets for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. When such an event occurs, management determines whether there has been impairment by comparing the anticipated undiscounted future net cash flows to the related asset group's carrying value. If an asset is considered impaired, the asset is written down to fair value, which is determined based either on discounted cash flows or appraised value, depending on the nature of the asset. There was no impairment of long-lived assets during the years ended December 31, 2019, 2018 or 2017.

Contingent Consideration

Certain agreements the Company enters into, including business combinations, involve the potential payment of future consideration that is contingent upon certain performance and revenue milestones being achieved. Contingent consideration obligations incurred in connection with a business combination are recorded at their fair values on the acquisition date and remeasured at their fair values each subsequent reporting period until the related contingencies are resolved. The resulting changes in fair values are recognized generally within sales, general and administrative expense, depending on the nature of the

contingent consideration liability, in the consolidated statements of operations. Asset acquisitions are accounted for using a cost accumulation and allocation model and the cost of the acquisition is allocated to the assets acquired and liabilities assumed. Contingent consideration obligations incurred in connection with an asset acquisition are recorded when it is probable that they will occur and they can be reasonably estimated.

As of December 31, 2019 and 2018, the Company's contingent consideration obligations in connection with business combinations relate to milestone payments for the acquisition of Crossmed S.p.A. ("Crossmed"). For more information with respect to the fair value of contingent consideration, refer to Note "5. Business Combinations."

Intangible Assets

Intangible assets primarily consist of purchased rights to licensed technology, customer relationships, and trade secrets and processes.

Indefinite-lived intangible assets relate to an exclusive right to licensed technology. The acquired licensed technology is accounted for as an indefinite-lived intangible asset. Upon the commercialization of the underlying product utilizing the licensed technology, the capitalized amount will be amortized over its estimated useful life. Indefinite-lived intangible assets are tested for impairment at least annually, in the fourth quarter, or more frequently if events or circumstances indicate that it is more likely than not that the asset is impaired. If the fair value of the asset is less than the carrying amount, an impairment loss would be recognized in an amount equal to the difference between the carrying amount and the fair value. Refer to Note "7. Intangible Assets" for more information on the Company's intangible assets.

Finite-lived intangible assets are amortized over the estimated economic useful lives of the assets, which is the period during which expected cash flows support the fair value of such intangible assets. The Company reviews finite-lived intangible assets for impairment whenever events or changes in circumstances indicate that the carrying amount of the assets or asset group may not be recoverable. When such an event occurs, management determines whether there has been impairment by comparing the anticipated undiscounted future net cash flows to the related asset group's carrying value. Refer to Note "7. Intangible Assets" for more information on the Company's intangible assets.

Goodwill

Goodwill represents the excess of the purchase price of an acquired business or assets over the fair value of the identifiable assets acquired and liabilities assumed. Goodwill is not amortized, but is tested for impairment annually in the fourth quarter, or more frequently if events or circumstances indicate the carrying value may no longer be recoverable and that an impairment loss may have occurred. The Company operates as one segment, which is considered to be the sole reporting unit, and therefore goodwill is tested for impairment at the consolidated level. Refer to Note "5. Business Combinations" and Note "8. Goodwill" for more information.

Revenue Recognition

Revenue is comprised of product revenue net of returns, discounts, administration fees and sales rebates. The Company adopted the guidance under ASC 606 on January 1, 2018 using the modified retrospective method for all contracts not completed as of the date of adoption. Therefore, the financial information for the year ended December 31, 2017 has not been adjusted and continues to be reported under ASC 605 with the impact of the adoption reflected in opening retained earnings in 2018. Under ASC 606, the Company recognizes revenue when control of the promised goods or services is transferred to our customers, in an amount that reflects the consideration we expect to be entitled to in exchange for those goods or services. Revenue from product sales is recognized either on the date of shipment or the date of receipt by the customer, but is deferred for certain transactions when control has not yet transferred. With respect to products that the Company consigns to hospitals, which primarily consist of coils, the Company recognizes revenue at the time hospitals utilize products in a procedure.

Deferred revenue represents amounts that the Company has already invoiced and are ultimately expected to be recognized as revenue, but for which not all revenue recognition criteria have been met. As of December 31, 2019 and December 31, 2018, respectively, the Company's deferred revenue balance was not material.

Revenue is recorded at the net sales price, which includes estimates of variable consideration such as product returns utilizing historical return rates, rebates, discounts, and other adjustments to net revenue. To the extent the transaction price includes variable consideration, the Company estimates the amount of variable consideration that should be included in the transaction price. Variable consideration is included in revenue only to the extent that it is probable that a significant reversal of the revenue recognized will not occur when the uncertainty associated with the variable consideration is subsequently resolved.

The Company's terms and conditions permit product returns and exchanges. The Company bases its estimates for sales returns on actual historical returns over the prior three years and they are recorded as reductions in revenue at the time of sale. Upon recognition, the Company reduces revenue and cost of revenue for the estimated return. Return rates can fluctuate over time, but are sufficiently predictable to allow the Company to estimate expected future product returns.

For more information and disclosures on the Company's revenue, refer to Note "16. Revenues."

Shipping Costs

Shipping and handling costs charged to customers are recorded as revenue. Shipping and handling costs are included in cost of revenue.

Research and Development ("R&D") Costs

R&D costs primarily consist of product development, clinical and regulatory expenses, materials, depreciation and other costs associated with the development of the Company's products. R&D costs also include related personnel and consultants' salaries, benefits and related costs, including stock-based compensation. The Company expenses R&D costs as they are incurred.

The Company's clinical trial accruals are based on estimates of patient enrollment and related costs at clinical investigator sites. The Company estimates preclinical and clinical trial expenses based on the services performed pursuant to contracts with research institutions and clinical research organizations that conduct and manage preclinical studies and clinical trials on its behalf. In accruing service fees, the Company estimates the time period over which services will be performed and the level of patient enrollment and activity expended in each period. If the actual timing of the performance of services or the level of effort varies from the estimate, the Company will adjust the accrual accordingly. Payments made to third parties under these arrangements in advance of the receipt of the related services are recorded as prepaid expenses until the services are rendered.

Internal Use Software

The Company capitalizes certain costs incurred for the development of computer software for internal use. These costs generally relate to third-party software as well as the internal development of software associated with our REAL Immersive System offerings. The Company capitalizes these costs when it is determined that it is probable that the project will be completed and the software will be used to perform the function intended, and the preliminary project stage is completed. Capitalized internal use software development costs are included in property and equipment, net within the consolidated balance sheets.

Capitalized internal use software is amortized on a straight-line basis over its estimated useful life. For software that supports our REAL Immersive System, the amortization expense is recorded in cost of revenue within the consolidated statements of operations. Costs related to the preliminary project stage, post-implementation, training and maintenance are expensed as incurred.

Advertising Costs

Advertising costs are included in sales, general and administrative expenses and are expensed as incurred. Advertising costs were $0.5 million, $0.5 million and $0.7 million for the years ended December 31, 2019, 2018 and 2017, respectively.

Stock-Based Compensation

The Company recognizes the cost of stock-based compensation in the financial statements based upon fair value. The fair value of restricted stock and restricted stock unit ("RSU") awards is determined based on the number of units granted and the closing price of the Company's common stock as of the grant date. The fair value of each purchase under the employee stock purchase plan ("ESPP") is estimated at the beginning of the offering period using the Black-Scholes option pricing model. The fair value of stock options is determined as of the grant date using the Black-Scholes option pricing model. The Company's determination of the fair value of equity-settled awards is impacted by the price of the Company's common stock as well as changes in assumptions regarding a number of complex and subjective variables. These variables include, but are not limited to, the expected term that awards will remain outstanding, expected common stock price volatility over the term of the awards, risk-free interest rates and expected dividends.

The fair value of an award is recognized over the requisite service period (usually the vesting period) on a straight-line basis. Stock-based compensation expense recognized at fair value includes the impact of estimated forfeitures. The Company estimates future forfeitures at the date of grant and revises the estimates, if necessary, in subsequent periods if actual forfeitures differ from those estimates. To the extent actual forfeiture results differ from the estimates, the difference is recorded as a

cumulative adjustment in the period forfeiture estimates are revised. No compensation cost is recorded for awards that do not vest.

Prior to the adoption of Accounting Standard Update ("ASU") No. 2018-07, "Compensation – Stock Compensation," the Company recorded its equity instruments issued to non-employees at their fair value on the measurement date and were subject to periodic adjustments as the Company remeasured the fair value of the non-employee awards at each reporting period prior to vesting and at the vesting dates of each non-employee award. In the third quarter of 2018, the Company adopted ASU 2018-07 and recognizes the fair value of non-employee awards over the requisite service period (usually the vesting period) on a straight-line basis. Therefore, equity instruments issued to non-employees are recorded at their fair value on the grant date in the same manner as employee awards. The fair value of these equity instruments is expensed over the service period.

Estimates of the fair value of equity-settled awards as of the grant date using valuation models, such as the Black-Scholes option pricing model, are affected by assumptions regarding a number of complex variables. Changes in the assumptions can materially affect the fair value of the award and ultimately how much stock-based compensation expense is recognized. These inputs are subjective and generally require significant analysis and judgment to develop. For all stock options granted prior to the Company's IPO, the Company estimated the volatility data based on a study of publicly traded industry peer companies. For purposes of identifying these peer companies, the Company considered the industry, stage of development, size and financial leverage of potential comparable companies. The risk-free interest rate is based on the yield available on U.S. Treasury zero-coupon issues similar in duration to the expected term of the equity-settled award. For all stock options granted prior to the IPO, the Company used the Staff Accounting Bulletin, No. 110 ("SAB 110") simplified method to calculate the expected term, which is the average of the contractual term and vesting period. For stock options granted post-IPO, the Company used its historical data to calculate the expected term and volatility used in the valuation of options.

Income Taxes

The Company accounts for income taxes using the asset and liability method, whereby deferred tax asset ("DTA") and liability account balances are determined based on differences between the financial reporting and tax bases of assets and liabilities, and are measured using the enacted tax rates and laws that will be in effect when the differences are expected to reverse. The Company provides a valuation allowance to reduce the net DTAs to their estimated realizable value.

The calculation of the Company's current provision for income taxes involves the use of estimates, assumptions and judgments while taking into account current tax laws, interpretation of current tax laws and possible outcomes of future tax audits. The Company has established reserves to address potential exposures related to tax positions that could be challenged by tax authorities. Although the Company believes its estimates, assumptions and judgments to be reasonable, any changes in tax law or its interpretation of tax laws and the resolutions of potential tax audits could significantly impact the amounts provided for income taxes in the Company's consolidated financial statements.

The calculation of the Company's DTA balance involves the use of estimates, assumptions and judgments while taking into account estimates of the amounts and type of future taxable income. Actual future operating results and the underlying amount and type of income could differ materially from the Company's estimates, assumptions and judgments thereby impacting the Company's financial position and results of operations.

The Company follows the guidance relating to accounting for uncertainty in income taxes, which prescribes a recognition threshold and measurement attribute for the financial statement recognition and measurement of uncertain tax positions taken or expected to be taken in the Company's income tax return, and also provides guidance on derecognition, classification, interest and penalties, accounting in interim periods and disclosure.

The Company includes interest and penalties related to unrecognized tax benefits within income tax expense in the accompanying consolidated statements of operations.

Comprehensive Income

Comprehensive income consists of net income, unrealized gains or losses on available-for-sale investments and the effects of foreign currency translation adjustments. The Company presents comprehensive income and its components in the consolidated statements of comprehensive (loss) income.

Net Income (Loss) Per Share of Common Stock

The Company's basic net income (loss) attributable to Penumbra, Inc. per share is calculated by dividing the net income attributable to Penumbra, Inc. per share by the weighted average number of shares of common stock outstanding for the period. The diluted net income (loss) per share attributable to Penumbra, Inc. is computed by giving effect to all potential dilutive

common stock equivalents outstanding for the period. For purposes of this calculation, options to purchase common stock, restricted stock and restricted stock units are considered common stock equivalents.

Leases

The Company adopted the guidance under ASC Topic 842, “Leases” ("ASC 842") on January 1, 2019 using the modified retrospective transition approach. There was no cumulative-effect adjustment recorded to retained earnings upon adoption.

Under ASC 842, the Company determines if an arrangement is a lease at inception. In addition, the Company determines whether leases meet the classification criteria of a finance or operating lease at the lease commencement date considering: (1) whether the lease transfers ownership of the underlying asset to the lessee at the end of the lease term, (2) whether the lease contains a bargain purchase option, (3) whether the lease term is for a major part of the remaining economic life of the underlying asset, (4) whether the present value of the sum of the lease payments and residual value guaranteed by the lessee equals or exceeds substantially all of the fair value of the underlying asset, and (5) whether the underlying asset is of such a specialized nature that it is expected to have no alternative use to the lessor at the end of the lease term. As of December 31, 2019, the Company's lease population consisted of operating and finance real estate, equipment and vehicle leases. As of the date of adoption of ASC 842 the Company did not have material finance leases.

Operating leases are included in operating lease right-of-use assets, current operating lease liabilities, and non-current operating lease liabilities in our consolidated balance sheet. Finance leases are included in finance lease right-of-use assets, current finance lease liabilities, and non-current finance lease liabilities in our consolidated balance sheet. ROU assets represent the Company’s right to use an underlying asset for the lease term and lease liabilities represent the Company’s obligation to make lease payments arising from the lease. Lease ROU assets and liabilities are recognized at the lease commencement date based on the present value of lease payments over the lease term. In determining the present value of lease payments, the Company uses its incremental borrowing rate which requires management’s judgement as the rate implicit in the lease is generally not readily determinable. The determination of the Company’s incremental borrowing rate requires management judgment including, the development of a synthetic credit rating and cost of debt as the Company currently does not carry any debt. The operating lease ROU assets also include adjustments for prepayments, accrued lease payments and exclude lease incentives. The Company’s lease terms may include options to extend or terminate the lease when it is reasonably certain that the Company will exercise such options. Operating lease cost is recognized on a straight-line basis over the expected lease term. Finance lease cost is recognized as depreciation expense on a straight-line basis over the expected lease term and interest expense using the accelerated interest method of recognition. Lease agreements entered into after the adoption of ASC 842 that include lease and non-lease components are accounted for as a single lease component. Lease agreements with a non-cancelable term of less than 12 months are not recorded on the Company’s consolidated balance sheet. For more information about the impact of adoption and disclosures on the Company’s leases, refer to Note “9. Leases."

Recent Accounting Guidance

Recently Adopted Accounting Standards

On January 1, 2019, the Company adopted Accounting Standard Update (“ASU”) No. 2016-02, Leases (Topic 842), and its associated amendments using the modified retrospective transition approach by applying the new standard to all leases existing at the date of initial application and not restating comparative periods. There was no cumulative-effect adjustment recorded to retained earnings upon adoption. Under the standard, a lessee is required to recognize a lease liability and ROU asset for all leases. The new guidance also modified the classification criteria and requires additional disclosures to enable users of financial statements to understand the amount, timing, and uncertainty of cash flows arising from leases. Consistent with current guidance, a lessee’s recognition, measurement, and presentation of expenses and cash flows arising from a lease continues to depend primarily on its classification. The Company elected the package of practical expedients permitted under the transition guidance, which allowed the Company to carryforward its historical lease classification, its assessment on whether a contract was or contains a lease, and its initial direct costs for any leases that existed prior to January 1, 2019. In addition, the Company elected the following transitional practical expedients: (1) the short-term lease exception and (2) to not separate its non-lease components for its real estate, vehicle and equipment leases. The impact of adoption and additional disclosures required by the ASU have been included in “Significant Accounting Policies - Leases” below and in Note “9. Leases.”

Recently Issued Accounting Standards

In June 2016, the Financial Accounting Standards Board (“FASB”) issued ASU No. 2016-13, Financial Instruments—Credit Losses. The standard changes how entities will measure credit losses for most financial assets and certain other instruments that are not measured at fair value through net income. In April 2019, the FASB issued ASU No. 2019-04 which provides additional clarification and addresses stakeholders’ specific issues about certain aspects of the amendments in the previously issued ASU No. 2016-13. In May 2019, the FASB issued ASU No. 2019-05 which further amends ASU No.

2016-13 by providing an option to irrevocably elect the fair value option for certain financial assets previously measured at amortized cost basis. In November 2019, the FASB issued ASU No. 2019-11 which further provides additional clarification and addresses stakeholders' specific issues about certain aspects of the amendments in the previously issued ASU No. 2016-13. The standard is effective for fiscal years and interim periods beginning after December 15, 2019. Early adoption is permitted for all periods beginning after December 15, 2018. The Company determined that it will apply the modified retrospective transition method and does not expect the adoption of this standard to have a material impact on its investments. Additionally, the Company is currently evaluating the impact of this standard on its trade receivables and related disclosures.

In August 2018, the FASB issued ASU 2018-13, Disclosure Framework—Changes to the Disclosure Requirements for Fair Value Measurement. The primary focus of the standard is to improve the effectiveness of the disclosure requirements for fair value measurements. The standard is effective for fiscal years and interim periods beginning after December 15, 2019. An entity is permitted to early adopt the removed or modified disclosures upon the issuance of the standard and may delay adoption of the additional disclosures until their effective date. The Company is currently evaluating the impact of adopting this standard.

In December 2019, the FASB issued ASU No. 2019-12, Income Taxes— Simplifying the Accounting for Income Taxes. The standard intends to simplify and reduce the cost of accounting for income taxes. The new guidance removes certain exceptions for recognizing deferred taxes for foreign investments, the incremental approach to performing intraperiod allocation, and calculating income taxes in interim periods for year to date losses that exceed anticipated full year losses. The standard also adds guidance to reduce complexity in certain areas, including accounting for franchise taxes that are partially based on income, transactions with a government that result with a step up in the tax basis of goodwill, enacted changes in tax law during interim periods, and allocating taxes to members of a consolidated group which are not subject to tax. For public business entities, the amendments in ASU 2019-12 are effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2020. Early adoption is permitted for all periods in which financial statements have not yet been issued, including interim periods. The Company is currently evaluating the impact of adopting the new guidance.

3. Investments and Fair Value of Financial Instruments

Marketable Investments

The Company's marketable investments have been classified and accounted for as available-for-sale. The Company's marketable investments as of December 31, 2019 and 2018 were as follows (in thousands):

	December 31, 2019			
	Cost	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value
Commercial paper	$ 7,456	$ 1	$ —	$ 7,457
U.S. treasury	4,972	7	—	4,979
U.S. agency securities and government sponsored securities	2,499	19	—	2,518
U.S. states and municipalities	4,889	4	—	4,893
Corporate bonds	96,484	282	(3)	96,763
Total	$ 116,300	$ 313	$ (3)	$ 116,610

	December 31, 2018			
	Cost	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value
Commercial paper	$ 13,701	$ —	$ (3)	$ 13,698
U.S. treasury	6,400	—	(22)	6,378
U.S. agency securities and government sponsored securities	7,699	18	(27)	7,690
U.S. states and municipalities	5,134	—	(12)	5,122
Corporate bonds	100,606	14	(469)	100,151
Total	$ 133,540	$ 32	$ (533)	$ 133,039

The following tables present the gross unrealized losses and the fair value for those marketable investments that were in an unrealized loss position for less than and more than twelve months as of December 31, 2019 and 2018 (in thousands):

	December 31, 2019					
	Less than 12 months		More than 12 months		Total	
	Fair Value	Gross Unrealized Losses	Fair Value	Gross Unrealized Losses	Fair Value	Gross Unrealized Losses
Corporate bonds	$ 7,875	$ (3)	$ —	$ —	$ 7,875	$ (3)
Total	$ 7,875	$ (3)	$ —	$ —	$ 7,875	$ (3)

	December 31, 2018					
	Less than 12 months		More than 12 months		Total	
	Fair Value	Gross Unrealized Losses	Fair Value	Gross Unrealized Losses	Fair Value	Gross Unrealized Losses
Commercial paper	$ 12,208	$ (3)	$ —	$ —	$ 12,208	$ (3)
U.S. treasury	—	—	6,378	(22)	6,378	(22)
U.S. agency securities and government sponsored securities	1,436	(5)	2,759	(22)	4,195	(27)
U.S. states and municipalities	1,529	(5)	3,593	(7)	5,122	(12)
Corporate bonds	58,961	(176)	33,215	(293)	92,176	(469)
Total	$ 74,134	$ (189)	$ 45,945	$ (344)	$ 120,079	$ (533)

The contractual maturities of the Company's marketable investments as of December 31, 2019 and 2018 were as follows (in thousands):

	December 31,	
	2019	2018
Marketable Investments	Fair Value	Fair Value
Due in one year	$ 51,990	$ 83,391
Due in one to five years	64,620	49,648
Total	$ 116,610	$ 133,039

Non-Marketable Equity Investments

In the second quarter of 2017, the Company and Sixense Enterprises, Inc. ("Sixense") formed MVI as a privately-held joint venture for the purpose of exploring healthcare applications of virtual reality technology, with each party holding 50% of the issued and outstanding equity of MVI. On August 31, 2018 ("Transfer Agreement Closing Date"), the Company entered into a Stock Transfer Agreement (the "Transfer Agreement") between the Company, MVI and Sixense, to purchase an additional 40% of the equity interest in MVI from Sixense for an initial cash purchase price of $20.0 million, excluding the additional $4.5 million of probable future payments relating to an anti-dilution provision in the Transfer Agreement. Following the Transfer Agreement Closing Date, the Company owns a 90% controlling interest in MVI and Sixense retains the remaining 10% minority interest.

Prior to the Transfer Agreement Closing Date, the Company accounted for its investment in MVI under the equity method and was not required to consolidate MVI and determined that MVI was not a variable interest entity ("VIE"). Furthermore, pursuant to agreements between the parties at the time of MVI's formation, the Company was obligated to perform certain services or make additional cash contributions to MVI for no additional equity interest. These services included, but were not limited to, information technology, accounting, other administrative services and research and development. The Company's contributions made prior to the Transfer Agreement Closing Date are presented as a component of the "Contributions to non-marketable investments" in the consolidated statements of cash flows.

For the eight months ended August 31, 2018, prior to the Transfer Agreement Closing Date, MVI had no revenue and recorded a net loss of $6.2 million. The Company reflected its 50% share of MVI's losses as equity in losses of unconsolidated investee in the consolidated statements of operations through the Transfer Agreement Closing Date.

Prior to the Transfer Agreement Closing Date, the unconsolidated balance sheet of MVI had total assets of $5.2 million, total liabilities of $1.0 million and total equity of $4.2 million. As of December 31, 2018, the unconsolidated balance sheet of MVI primarily consists of cash remaining from the initial investment and intangible assets totaling $7.9 million.

Impact of Transfer Agreement on Non-Marketable Equity Investments

The Company accounted for the Transfer Agreement as an asset acquisition, as it was determined that the transaction did not meet the definition of a business under the framework of the authoritative accounting guidance for business combinations. The total consideration transferred has been allocated to the non-monetary assets acquired and liabilities assumed based on their relative fair value.

The following table presents the components of the consideration transferred at fair value as of the Transfer Agreement Closing Date (amounts presented in thousands):

	Amount
Cash transferred	$ 20,000
Anti-dilution protection at Transfer Agreement Closing Date	4,500
Carrying amount of Penumbra's equity method investment in MVI	2,202
Fair value of the remaining non-controlling interest	3,365
Total consideration transferred	$ 30,067

In addition to the cash transferred, the consideration included a probable contingent liability related to an anti-dilution provision whereby the Company may be obligated to contribute funds for the issuance of additional shares of MVI to Sixense with an aggregate value of up to $4.5 million. The consideration transferred also included the $2.2 million carrying amount of the Company's equity method investment in MVI as of the Transfer Agreement Closing Date, which was written-off as part of the accounting for the Transfer Agreement. The Company also recorded $3.4 million in non-controlling interest on the consolidated financial statements related to the fair value of the remaining minority interest held by Sixense as of the Transfer Agreement Closing Date.

The primary asset acquired in the Transfer Agreement constitutes an in-process research and development asset ("IPR&D"). Due to the nature of the other assets acquired and liabilities assumed, the difference between the fair value of the consideration transferred and the fair value of the tangible net liabilities acquired was allocated solely to the IPR&D. The Company recorded a charge of $30.8 million to acquired in-process research and development expense in the consolidated statements of operations at the Transfer Agreement Closing Date because the Company determined that (1) the IPR&D asset had not yet reached technological feasibility and MVI had not yet obtained the appropriate regulatory approval for any products and (2) the asset had no alternative future use as of the Transfer Agreement Closing Date. Following the Transfer Agreement Closing Date, the financial results of MVI have been consolidated into the accompanying consolidated financial statements, with the amounts attributable to the non-controlling interest classified separately. Refer to Note "6. Asset Acquisition" for more information on the anti-dilution provision and payments related to the 2018 asset acquisition of MVI.

Fair Value of Financial Instruments

Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability (an exit price) in an orderly transaction between market participants at the reporting date. The accounting guidance establishes a three-tiered hierarchy, which prioritizes the 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 Level 1 that are observable, either directly or indirectly, such as 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.

The categorization of a financial instrument within the valuation hierarchy is based on the lowest level of input that is significant to the fair value measurement.

The Company classifies its cash equivalents and marketable investments within Level 1 and Level 2, as it uses quoted market prices or alternative pricing sources and models utilizing market observable inputs.

The Company determined the fair value of its Level 1 financial instruments, which are traded in active markets, using quoted market prices for identical instruments.

Marketable investments classified within Level 2 of the fair value hierarchy are valued based on other observable inputs, including broker or dealer quotations or alternative pricing sources. When quoted prices in active markets for identical assets or liabilities are not available, the Company relies on non-binding quotes from its investment managers, which are based on proprietary valuation models of independent pricing services. These models generally use inputs such as observable market data, quoted market prices for similar instruments, historical pricing trends of a security as relative to its peers. To validate the fair value determination provided by its investment managers, the Company reviews the pricing movement in the context of overall market trends and trading information from its investment managers. In addition, the Company assesses the inputs and methods used in determining the fair value in order to determine the classification of securities in the fair value hierarchy.

The following tables set forth the Company's financial assets and liabilities measured at fair value by level within the fair value hierarchy (in thousands):

	As of December 31, 2019			
	Level 1	Level 2	Level 3	Fair Value
Financial Assets				
Cash equivalents:				
Commercial paper	$ —	$ 9,474	$ —	$ 9,474
Money market funds	24,054	—	—	24,054
Marketable investments:				
Commercial paper	—	7,457	—	7,457
U.S. treasury	4,979	—	—	4,979
U.S. agency and government sponsored securities	—	2,518	—	2,518
U.S. states and municipalities	—	4,893	—	4,893
Corporate bonds	—	96,763	—	96,763
Total	$ 29,033	$ 121,105	$ —	$ 150,138

	As of December 31, 2018			
	Level 1	Level 2	Level 3	Fair Value
Financial Assets				
Cash equivalents:				
Commercial paper	$ —	$ 10,967	$ —	$ 10,967
Money market funds	12,087	—	—	12,087
Marketable investments:				
Commercial paper	—	13,698	—	13,698
U.S. treasury	6,378	—	—	6,378
U.S. agency and government sponsored securities	—	7,690	—	7,690
U.S. states and municipalities	—	5,122	—	5,122
Corporate bonds	—	100,151	—	100,151
Total	$ 18,465	$ 137,628	$ —	$ 156,093
Financial Liabilities:				
Contingent consideration obligations	$ —	$ —	$ 2,571	$ 2,571
Total	$ —	$ —	$ 2,571	$ 2,571

Contingent Consideration Obligations

As of December 31, 2019, there is no contingent consideration liability balance classified as Level 3. The Company's contingent consideration liability balance of $1.2 million as of December 31, 2019 is based on actual revenue performance for the year ended December 31, 2019 and is not based on unobservable inputs. As of December 31, 2018, the Company's contingent consideration liability relates to milestone payments due in connection with the acquisition of Crossmed and is classified as a Level 3 measurement for which fair value is derived from various inputs, including forecasted revenues during

the earn-out milestone periods, revenue volatilities, discount rates, and estimates in the timing and likelihood of achieving revenue-based milestones. The fair value of the contingent consideration liability is remeasured each reporting period. Of the $2.6 million contingent consideration liability as of December 31, 2018, $1.3 million relates to a liability based on actual revenue performance for the year ended December 31, 2018 and is not based on unobservable inputs. Accordingly, only the portion of the contingent consideration liability based on unobservable inputs is included in the table below. The following table presents quantitative information about certain unobservable inputs used in the Level 3 fair value measurement of the Company's contingent consideration liability, other than the forecasted revenues during the earn-out milestone period:

	Fair Value at December 31, 2018 (in thousands)	Valuation Method	Unobservable Inputs	Inputs
Crossmed: Revenue-based milestones	$ 1,268	Monte Carlo Simulation	Earn-out period over which revenue-based milestone payments are made	2019
			Risk-adjusted discount rate	15%
			Revenue volatilities for each type of revenue-based milestone	5.1% and 18.4%

The following table summarizes the changes in fair value of the contingent consideration obligation for the year ended December 31, 2019 (in thousands):

	Fair Value of Contingent Consideration
Balance at December 31, 2018	$ 2,571
Payments of contingent consideration liabilities	(1,296)
Changes in fair value	(35)
Foreign currency remeasurement	(34)
Balance at December 31, 2019	$ 1,206

	Fair Value of Contingent Consideration
Balance at December 31, 2017	$ 4,675
Payments of contingent consideration liabilities	(3,017)
Changes in fair value	950
Foreign currency remeasurement	(37)
Balance at December 31, 2018	$ 2,571

During the year ended December 31, 2019, there were no material changes to the fair value of the contingent consideration obligation for the final remaining earn-out payment. During the year ended December 31, 2018, the fair value of the contingent consideration obligation increased by $1.0 million, which was recorded in sales, general and administrative expense in the consolidated statements of operations. The fair value of the contingent consideration increased as a result of updates to the underlying forecasts based on actual results to date and changes in estimates. For more information related to the payment of the contingent consideration liabilities refer to Note "5. Business Combinations."

During the years ended December 31, 2019, 2018, and 2017, the Company did not record impairment charges related to its marketable investments and the Company did not hold any Level 3 marketable investments as of December 31, 2019 and 2018. During the year ended December 31, 2019 and 2018, the Company did not have any transfers between Level 1, Level 2 or Level 3 of the fair value hierarchy. Additionally, the Company did not have any financial assets and liabilities measured at fair value on a non-recurring basis as of December 31, 2019 and 2018.

4. Balance Sheet Components

Accounts Receivable, Net

The Company's allowance for doubtful accounts comprised of the following (in thousands):

	Balance At Beginning Of Year	Charged To Costs And Expenses	Deductions[1]	Balance At End Of Year
For the year ended:				
December 31, 2017	$ 684	$ 606	$ —	$ 1,290
December 31, 2018	1,290	1,563	(71)	2,782
December 31, 2019	2,782	656	(492)	2,946

[1] Represents the effect of currency translation adjustments and write-offs of uncollectible accounts, net of recoveries.

Inventories

The components of inventories consisted of the following (in thousands):

	December 31,	
	2019	2018
Raw materials	$ 21,646	$ 18,829
Work in process	21,651	10,630
Finished goods	109,695	86,282
Inventories	$ 152,992	$ 115,741

Property and Equipment, Net

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

	December 31,	
	2019	2018
Machinery and equipment	$ 20,959	$ 15,400
Furniture and fixtures	9,307	7,140
Leasehold improvements	20,283	17,665
Software	5,830	4,095
Computers	5,702	3,289
Construction in progress	11,146	3,234
Total property and equipment	73,227	50,823
Less: Accumulated depreciation and amortization	(21,415)	(15,416)
Property and equipment, net	$ 51,812	$ 35,407

Depreciation and amortization expense, excluding intangible assets and software, was $5.9 million, $4.4 million and $3.0 million for the years ended December 31, 2019, 2018 and 2017, respectively. Software amortization expense was $0.9 million, $0.7 million and $0.4 million for the years ended December 31, 2019, 2018 and 2017, respectively. The Company had accumulated software amortization of $2.3 million and $1.3 million for the years ended December 31, 2019 and 2018, respectively.

Accrued Liabilities

The following table shows the components of accrued liabilities as of December 31, 2019 and 2018 (in thousands):

	December 31, 2019	December 31, 2018
Payroll and employee-related expenses	$ 37,727	$ 33,838
Accrued expenses	7,811	4,088
Sales return reserve	1,821	2,986
Product warranty	2,318	1,875
Contingent consideration & other acquisition-related costs[(1)]	4,291	4,439
Other accrued liabilities	13,662	10,660
Total accrued liabilities	$ 67,630	$ 57,886

[(1)] Acquisition-related costs consist of the current portion of contingent liabilities related to (1) the cash milestone payments and working capital adjustment liabilities for the acquisition of Crossmed and (2) an anti-dilution provision for the asset acquisition of MVI. Refer to Note "5. Business Combinations" for more information on the acquisition of Crossmed and Note "3. Investments and Fair Value of Financial Instruments" and Note "6. Asset Acquisition" for more information on the MVI asset acquisition.

The following table shows the changes in the Company's estimated product warranty accrual, included in accrued liabilities, as of December 31, 2019, 2018 and 2017 (in thousands):

	December 31,		
	2019	2018	2017
Balance at the beginning of the year	$ 1,875	$ 1,088	$ 1,254
Accruals of warranties issued	1,065	1,336	471
Settlements of warranty claims	(622)	(549)	(637)
Balance at the end of the year	$ 2,318	$ 1,875	$ 1,088

Other Non-Current Liabilities

The following table shows the components of other non-current liabilities as of December 31, 2019 and 2018 (in thousands):

	December 31,	
	2019	2018
Deferred tax liabilities	$ 4,005	$ 4,171
Licensing-related cost[(1)]	10,878	11,506
Other non-current liabilities	367	3,266
Total other non-current liabilities	$ 15,250	$ 18,943

[(1)] Amount relates to the non-current liability recorded for probable future milestone payments to be made under the indefinite-lived intangible assets related to licensed technology described in Note "7. Intangible Assets." Refer therein for more information.

5. Business Combinations

On July 3, 2017 (the "Closing Date"), the Company completed the acquisition of Crossmed, a joint stock company organized under the laws of Italy. Crossmed is engaged in the business of distributing medical supplies and equipment in Italy, San Marino, Vatican City and Switzerland. Crossmed was the Company's exclusive distributor in Italy, San Marino, and Vatican City and the acquisition provides the Company with a direct relationship with its customers in these regions.

The Company is obligated to pay additional consideration in the form of milestone payments based on Crossmed's net revenue and may be required to pay additional consideration based on incremental net revenue for each of the years ended December 31, 2017, 2018, and 2019. There is no limit on the milestone payments that can be paid out. As of December 31, 2019 and December 31, 2018, the fair value of the liability related to the future cash milestone payments was $1.2 million and

$2.6 million and was classified as a current liability on the consolidated balance sheet. For more information with respect to the nature and fair value of the Company's contingent consideration obligations, refer to Note "3. Investments and Fair Value of Financial Instruments." During the year ended December 31, 2019, the Company made $1.3 million in milestone payments of which $0.6 million is presented in operating activities and $0.7 million is presented in financing activities in the consolidated statements of cash flows. During the year ended December 31, 2018, the Company made $4.5 million in cash payments to the Sellers, of which $3.0 million related to the achievement of the 2017 milestones and the remainder related to working capital and financial debt adjustments. These payments have been presented as a component of financing activities in the consolidated statements of cash flows due to the nature and timing of the payments.

The purchase price measurement period was closed as of June 30, 2018. For the periods ended December 31, 2019 and 2018, Crossmed results of operations were included in the consolidated statements of operations. The following table presents the allocation of the purchase price for Crossmed, reflecting the measurement period adjustments recorded in 2017 (in thousands):

	Acquisition-Date Fair Value	Estimated Useful Life of Finite-Lived Intangible Assets
Tangible assets acquired and (liabilities) assumed:		
Current assets	$ 5,749	
Other current and non-current assets	1,596	
Property and equipment, net	829	
Current liabilities	(5,080)	
Other non-current liabilities	(797)	
Intangible assets acquired:		
Customer relationships	$ 6,790	15 years
Other	1,750	5 years
Goodwill	7,867	
Total purchase price	$ 18,704	

The intangible assets acquired are amortized on a straight-line basis over their assigned estimated useful lives. The amortization of the acquired intangible assets are not deductible for tax purposes. As a result, a $2.5 million deferred tax liability was recorded as of the Closing Date. The goodwill arising from the Crossmed acquisition is primarily attributed to expected synergies from future growth and assembled workforce. Goodwill is not deductible for tax purposes.

The following table presents certain unaudited pro forma information, for illustrative purposes only, for the year ended December 31, 2017, as if Crossmed had been acquired on January 1, 2016. The pro forma information may not be indicative of what would have occurred had the acquisition taken place on January 1, 2016, and may not be indicative of the Company's future consolidated results. The unaudited pro forma information is presented below (unaudited, in thousands):

	December 31, 2017
Pro forma net revenue	$ 336,557
Pro forma net income	5,992

6. Asset Acquisition

Payments Related to 2018 MVI Asset Acquisition

In the third quarter of 2018, the Company completed its asset acquisition to obtain a controlling interest of MVI pursuant to the Transfer Agreement between the Company, MVI and Sixense to obtain a controlling interest of MVI. During the year ended December 31, 2019, the Company contributed $1.0 million to MVI related to the anti-dilution provision, $0.8 million relates to cash payments which is presented in financing activities in the consolidated statements of cash flows and $0.2 million relates to non-cash contributions primarily related to in-kind services and goods provided to MVI. During the year ended December 31, 2018, the Company contributed $0.5 million to MVI related to the anti-dilution provision. As of December 31, 2019, the Company's consolidated balance sheet included $3.0 million in current liabilities related to the anti-dilution provision in the Transfer Agreement. As of December 31, 2018, the Company's consolidated balance sheet included $1.5 million and $2.5 million, respectively, in current and non-current liabilities related to the anti-dilution provision in the Transfer Agreement.

7. Intangible Assets

The following table presents details of the Company's acquired finite-lived and indefinite-lived intangible assets as of December 31, 2019 and 2018 (in thousands, except weighted-average amortization period):

As of December 31, 2019	Weighted-Average Amortization Period	Gross Carrying Amount	Accumulated Amortization	Net
Customer relationships	15.0 years	$ 6,686	$ (1,114)	$ 5,572
Trade secrets and processes	20.0 years	5,256	(526)	4,730
Other	5.0 years	1,724	(862)	862
Total intangible assets subject to amortization	16.4 years	$ 13,666	$ (2,502)	$ 11,164
Indefinite-lived intangible assets:				
Intangible assets related to licensed technology		14,243	—	14,243
Total intangible assets		$ 27,909	$ (2,502)	$ 25,407

As of December 31, 2018	Weighted-Average Amortization Period	Gross Carrying Amount	Accumulated Amortization	Net
Customer relationships	15.0 years	$ 6,823	$ (681)	$ 6,142
Trade secrets and processes	20.0 years	5,256	(263)	4,993
Other	5.0 years	1,759	(528)	1,231
Total intangible assets subject to amortization	16.0 years	$ 13,838	$ (1,472)	$ 12,366
Indefinite-lived intangible assets:				
Intangible assets related to licensed technology		14,879	—	14,879
Total intangible assets		$ 28,717	$ (1,472)	$ 27,245

The customer relationships and other intangible assets subject to amortization relate to the acquisition of Crossmed during the third quarter of 2017. The gross carrying amount and accumulated amortization of these intangible assets are subject to foreign currency translation effects. Refer to Note "5. Business Combinations" for more information. The Company's $5.3 million trade secrets and processes intangible asset was recognized in connection with a royalty buyout agreement during the first quarter of 2018, which is discussed further in Note "10. Commitments and Contingencies" and Note "11. Stockholders' Equity."

The following table presents the amortization recorded related to the Company's finite-lived intangible assets for the years ended December 31, 2019, 2018 and 2017 (in thousands):

	Year Ended December 31,		
	2019	2018	2017
Cost of revenue	$ 263	$ 263	$ —
Sales, general and administrative	789	832	418
Total	$ 1,052	$ 1,095	$ 418

As of December 31, 2019, expected amortization expense for the unamortized acquired intangible assets for the next five years and thereafter is as follows (in thousands):

	Amortization Expense
2020	$ 1,053
2021	1,053
2022	881
2023	709
2024	709
Thereafter	6,759
Total amortization	$ 11,164

Licensed technology

During the third quarter of 2017, the Company entered into an exclusive technology license agreement (the "License Agreement") that required the Company to pay an upfront payment to the licensor of $2.5 million and future revenue milestone-based payments on sales of products covered by the licensed intellectual property. The Company accounted for the transaction as an asset acquisition and recorded an indefinite-lived intangible asset as it was determined to have alternative future use. The Company recorded an indefinite-lived intangible asset equal to the total payments made and expected to be made under the License Agreement and a corresponding contingent liability for the probable future milestone payments not yet paid. Upon the commercialization of the underlying product utilizing the licensed technology, the capitalized amount will be amortized over its estimated useful life.

At the end of each reporting period the Company adjusts the contingent liabilities to reflect the amount of future milestone payments that are probable to be paid. Prior to the commercialization of products utilizing the underlying technology, any changes in the contingent liability are recorded as an adjustment between the liability balances and the gross carrying amount of the indefinite-lived intangible asset. As of December 31, 2019, the balance of the contingent liability related to probable future milestone payments under the License Agreement was $11.7 million, of which $0.8 million and $10.9 million were included in accrued liabilities and other non-current liabilities on the condensed consolidated balance sheet, respectively. As of December 31, 2018, the balance of the contingent liability related to probable future milestone payments under the Licensing Agreement was $12.4 million, of which $0.9 million and $11.5 million were included in accrued liabilities and other non-current liabilities on the consolidated balance sheet, respectively.

As of December 31, 2019, the gross carrying amount of the indefinite-lived intangible asset was $14.2 million.The Company completed its annual impairment analysis of its indefinite-lived intangible asset during the fourth quarter of 2019 and determined that there was no impairment of the indefinite-lived intangible asset.

8. Goodwill

The following table presents the changes in goodwill during the year ended December 31, 2019 (in thousands):

	Total Company
Balance as of December 31, 2018	$ 7,813
Foreign currency translation adjustments	(157)
Balance as of December 31, 2019	$ 7,656

Goodwill Impairment Review

The Company reviews goodwill for impairment annually during the fourth quarter, on October 31st, or more frequently if events or circumstances indicate that an impairment loss may have occurred. During the fourth quarter of 2019 and 2018, the Company reviewed goodwill for impairment and no impairment was identified.

9. Leases

Adoption of ASC Topic 842, "Leases"

The Company adopted the guidance under ASC 842 on January 1, 2019 using the modified retrospective transition approach. Therefore the comparative prior year information has not been adjusted and continues to be reported under ASC 840.

The impact of the adoption of ASC 842 on the Company's consolidated balance sheet as of January 1, 2019 was as follows (in thousands):

	December 31, 2018	Adjustments due to the adoption of Topic 842	January 1, 2019
Assets			
Prepaid expenses and other current assets[1]	$ 12,200	$ (424)	$ 11,776
Total current assets	410,726	(424)	410,302
Operating lease right-of-use assets[1]	—	43,277	43,277
Total assets	$ 515,006	$ 42,853	$ 557,859
Liabilities and Stockholders' Equity			
Accrued liabilities[2]	$ 57,886	$ (132)	$ 57,754
Current operating lease liabilities[2]	—	3,608	3,608
Total current liabilities	66,062	3,476	69,538
Deferred rent[2]	7,586	(7,586)	—
Non-current operating lease liabilities[2]	—	46,963	46,963
Total liabilities	92,591	42,853	135,444
Total liabilities and stockholders' equity	$ 515,006	$ 42,853	$ 557,859

[1] Upon the adoption of ASC 842, prepaid rent is included in the operating lease right-of-use assets.
[2] Upon the adoption of ASC 842, current and non-current deferred rent is included in the current and non-current operating lease liabilities.

Lease Overview

As of December 31, 2018 and December 31, 2019, the Company's contracts that contained a lease consisted of real estate, equipment and vehicle leases.

The Company leases real estate for office and warehouse space under non-cancelable operating and finance leases that expire at various dates through 2035
, subject to the Company's option to renew certain leases for an additional five to fifteen years. The Company also leases other equipment and vehicles primarily under non-cancelable operating leases that expire at various dates through 2024.

The following table presents the components of the Company's lease cost, lease term and discount rate during the year ended December 31, 2019 (in thousands, except years and percentages):

	Year Ended December 31, 2019
Lease Cost	
Operating lease cost	$ 7,293
Finance lease cost:	
Amortization of right-of-use assets	284
Interest on lease liabilities	186
Variable lease cost[1]	3,570
Total lease costs	$ 11,333
Weighted Average Remaining Lease Term	
Operating leases	10.0 years
Finance leases	15.0 years
Weighted Average Discount Rate	
Operating leases	6.20 %
Finance leases	5.42 %

[(1)] Variable lease costs represent payments that are dependent on usage, a rate or index. Variable lease cost primarily relates to common area maintenance charges for its real estate leases as the Company elected not to separate non-lease components from lease components upon adoption of ASC 842.

Prior to January 1, 2019, the Company recorded operating lease rent expense under ASC 840 on a straight-line basis over the non-cancelable lease term. Rent expense for the year ended December 31, 2018 and 2017 was $5.8 million and $5.8 million, respectively. As of December 31, 2018, the Company did not have material finance leases.

During the third quarter of 2019, the Company signed a fifteen year lease for additional space at the Company's headquarters located at 1310 Harbor Bay Business Park, Alameda, California (the "1310 Harbor Bay Lease") which has not yet commenced as of December 31, 2019. The 1310 Harbor Bay Lease is expected to commence upon substantial completion of lessor owned improvements in connection with the development of the building which the Company anticipates will occur in the next two years.

During the third quarter of 2018, the Company signed a fifteen year lease for a manufacturing facility in Roseville, California (as amended, the "Roseville Lease"). In the fourth quarter of 2019, the Roseville lease commenced once the building was made ready and available for its intended use. The Company determined that the Roseville lease is a non-cancelable finance lease which will expire in 2035.

The following table is a schedule, by years, of maturities of the Company's operating and finance lease liabilities as of December 31, 2019 (in thousands):

	Operating Lease Payments[(1)]	Finance Lease Payments
Year Ending December 31:		
2020	$ 7,189	$ 5,705
2021	6,817	2,473
2022	6,637	2,489
2023	6,464	2,538
2024	6,325	2,588
Thereafter	36,444	28,585
Total undiscounted lease payments	69,876	44,378
Less imputed interest	(18,492)	(13,465)
Present value of lease liabilities	$ 51,384	$ 30,913

[(1)] The table above excludes the estimated future minimum lease payment for the 1310 Harbor Bay Lease due to uncertainty around the timing of when the 1310 Harbor Bay Lease will commence and payments will be due. The total estimated lease payments over the fifteen year lease term will be calculated based on the total development costs incurred in connection with the development of the building which will be determined upon substantial completion of the building.

The following table below shows the maturities of the Company's operating lease liabilities previously disclosed under ASC 840 as of December 31, 2018 (in thousands):

	Lease Payments[(1)]
Year Ending December 31:	
2019	$ 6,575
2020	6,571
2021	5,809
2022	5,772
2023	5,735
Thereafter	40,194
Total future minimum lease payments	$ 70,656

(1) The table above excluded the estimated future minimum lease payment for the Roseville Lease, due to the uncertainty around the timing of when the Roseville Lease would commence and payments would be due as of December 31, 2018.

Supplemental cash flow information related to leases during the year ended December 31, 2019 are as follows (in thousands):

	Year Ended December 31, 2019
Cash paid for amounts included in the measurement of lease liabilities:	
Operating cash flows from operating leases	$ 6,829
Financing cash flows from finance leases	$ 2,570
Right-of-use assets obtained in exchange for lease obligations:	
Operating leases	$ 4,261
Finance leases	$ 33,283

10. Commitments and Contingencies

Purchase Commitments

As of December 31, 2019, the Company had non-cancelable purchase obligations to suppliers of $15.1 million.

Royalty Obligations

In March 2005, the Company entered into a license agreement that requires the Company to make minimum royalty payments to the licensor, on a quarterly basis. As of December 31, 2018 and 2017, the license agreement requires minimum annual royalty payments of $0.1 million in equal quarterly installments. On each January 1, the quarterly calendar year minimum royalty shall be adjusted to equal the prior year's minimum royalty adjusted by a percentage equal to the percentage change in the "consumer price index for all urban consumers" for the prior calendar year as reported by the U.S. Department of Labor. Unless terminated earlier, the term of the license agreement shall continue until the expiration of the last to expire patent that covers that licensed product or for the period of fifteen years following the first commercial sale of such licensed product, whichever is longer. The first commercial sale of covered products occurred in June 2007. In July 2019, the Company amended the license agreement to extend the term for an additional ten years. As of December 31, 2019, the amended license agreement required minimum annual royalty payments of $0.3 million in equal quarterly installments through 2027.

In April 2012, the Company entered into an agreement that requires the Company to pay, on a quarterly basis, a 5% royalty on sales of products covered under applicable patents. The first commercial sale of covered products occurred in April 2014. Unless terminated earlier, the royalty term for each applicable product shall continue for fifteen years following the first commercial sale of such patented product, or when the applicable patent covering such product has expired, whichever is sooner.

In November 2013, the Company entered into an agreement that requires the Company to pay, on a quarterly basis, a 3% royalty on the first $5 million in sales and a 1% royalty on sales thereafter of products covered under applicable patents. The agreement was terminated effective January 1, 2018.

In April 2015, the Company entered into a royalty agreement that required the Company to pay a 2% royalty on sales of certain products covered by the agreement, on a quarterly basis, in exchange for certain trade secrets and processes which were used to develop such covered products. The Company began the first commercial sale of the covered products in July 2015. In the first quarter of 2018, the Company entered into a buyout of this agreement (the "Buyout Agreement") in which future royalty payments were canceled in exchange for shares of the Company's common stock with a fair value of $5.3 million. The Company recorded an intangible asset equal to the $5.3 million buyout amount which will be amortized into cost of revenue over the period in which the Company receives future economic benefit. After determining that the pattern of future cash flows associated with this intangible asset could not be reliably estimated with a high level of precision, the Company concluded that the intangible asset will be amortized on a straight-line basis over its estimated useful life. For more information refer to Note "11. Stockholders' Equity."

Royalty expense included in cost of sales for the years ended December 31, 2019, 2018 and 2017 was $3.8 million, $3.4 million and $4.1 million, respectively.

Contingencies

From time to time, the Company may have certain contingent liabilities that arise in the ordinary course of business. The Company accrues a liability for such matters when it is probable that future expenditures will be made and such expenditures can be reasonably estimated. Refer to Note "3. Investments and Fair Value of Financial Instruments," Note "5. Business Combinations" and Note "7. Intangible Assets" for more information on contingent liabilities recorded on the consolidated balance sheet.

Indemnification

The Company enters into standard indemnification arrangements in the ordinary course of business. In many such arrangements, the Company agrees to indemnify, hold harmless, and reimburse the indemnified parties for losses suffered or incurred by the indemnified parties in connection with any trade secret, copyright, patent or other intellectual property infringement claim by any third-party with respect to the Company's technology. The Company also agrees to indemnify many indemnified parties for product defect and similar claims. The term of these indemnification agreements is generally perpetual. The maximum potential amount of future payments the Company could be required to make under these agreements is not determinable because it involves claims that may be made against the Company in the future, but have not yet been made.

The Company has entered into indemnification agreements with its directors and officers that may require the Company to indemnify its directors and officers against liabilities that may arise by reason of their status or service as directors or officers, other than liabilities arising from willful misconduct of the individual.

The Company has not incurred costs to defend lawsuits or settle claims related to these indemnification agreements. No liability associated with any of these indemnification requirements has been recorded to date.

Litigation

From time to time, the Company is subject to other claims and assessments in the ordinary course of business. The Company is not currently a party to any such litigation matter that, individually or in the aggregate, is expected to have a material adverse effect on the Company's business, financial condition, results of operations or cash flows.

11. Stockholders' Equity

Stockholders' Equity

Preferred Stock

The Company has 5,000,000 of authorized preferred stock issuable. There is no preferred stock outstanding as of December 31, 2019 and 2018.

Common Stock

Each share of common stock is entitled to one vote. The holders of common stock are also entitled to receive dividends whenever funds are legally available and when declared by the board of directors, subject to the prior rights of holders of all classes of stock outstanding.

In the first quarter of 2018, the Company issued 53,256 fully vested restricted stock units with a fair value of $5.3 million in connection with the Buyout Agreement, as discussed in Note "10. Commitments and Contingencies." The Company recorded the $5.3 million fair value of the shares issued to additional-paid in capital on the consolidated balance sheet upon the issuance of the awards, with the associated expense being amortized into cost of sales over the period in which the Company receives future economic benefit from the buyout.

Issuance of Common Stock in Public Offerings

In March 2017, the Company issued and sold an aggregate of 1,495,000 shares of common stock at a public offering price of $76.00 per share, less the underwriters' discounts and commissions, pursuant to an underwritten public offering. The Company received approximately $106.3 million in net cash proceeds after deducting underwriting discounts and commissions of $6.8 million and other offering expenses of $0.5 million.

Stock-Based Benefit Plans

2005 Stock Plan

The Company adopted the Penumbra, Inc. 2005 Stock Plan (the "2005 Plan") in January 2005. The 2005 Plan was subsequently amended and restated in 2006, 2007, 2008 and 2010. Under the 2005 Plan, the board of directors could grant incentive stock options ("ISOs"), non-qualified stock options ("NSOs"), and/or stock awards to eligible persons, including employees, non-employees, directors, consultants and other independent advisors who provide services to the Company. Stock purchase rights could also be granted under the 2005 Plan. The board of directors had the authority to determine to whom options would be granted, the number of options, the term and the exercise price. ISOs could only be granted to Company employees, which include officers and directors of the Company. NSOs and stock purchase rights could be granted to employees and consultants. For individuals holding more than 10% of the voting rights of all classes of stock, the exercise price for an ISO could not be less than 110% of the fair market value of a share of common stock on the date of grant. Options granted under the 2005 Plan permitted an optionee to exercise options immediately upon grant irrespective of the vesting term. Options generally vest annually at a rate of 1/4 after the first year and 1/48 per month thereafter. The term of the options is no longer than five years for ISOs, for which the grantee owns greater than 10% of the voting power of all classes of stock and no longer than 10 years for all other options. On September 17, 2015, the Penumbra, Inc. 2014 Equity Incentive Plan (as amended and restated, the "2014 Plan") replaced the 2005 Plan and no further equity awards may be granted under the 2005 Plan. The remaining 564 shares of common stock available for issuance from the 2005 Plan were transferred to and may be granted under the 2014 Plan. As of December 31, 2019, 187,985 shares of common stock were reserved for issuance under the 2005 Plan.

2011 Equity Incentive Plan

The Company adopted the Penumbra, Inc. 2011 Equity Incentive Plan (the "2011 Plan") in October 2011. Under the 2011 Plan, the board of directors could grant ISOs, NSOs, restricted stock, and/or RSUs to eligible persons, including employees, directors and consultants who provide services to the Company. Stock Appreciation Rights ("SAR") could also be granted under the 2011 Plan. The board of directors had the authority to determine to whom options would be granted, the number of options, the term and the exercise price. ISOs could only be granted to Company employees, which include officers and directors of the Company. NSOs, SARs, restricted stock and RSUs could be granted to employees and consultants. For individuals holding more than 10% of the voting rights of all classes of stock, the exercise price for an ISO could not be less than 110% of the fair market value of a share of common stock on the date of grant. Stock options granted under the 2011 Plan generally have a contractual life of ten years, and generally vest over a period of four years. On September 17, 2015, the 2014 Plan replaced the 2011 Plan and no further equity awards may be granted under the 2011 Plan. The remaining 89,559 shares of common stock available for issuance under the 2011 Plan were transferred to and may be granted under the 2014 Plan. As of December 31, 2019, 145,000 shares of common stock were reserved for issuance under the 2011 Plan.

Amended and Restated 2014 Equity Incentive Plan

The Company adopted the Penumbra, Inc. 2014 Equity Incentive Plan in May 2014. The plan was amended and restated as of September 17, 2015 (as amended and restated, the "2014 Plan"). The 2014 Plan replaced the 2011 Plan and the 2005 Plan and no further equity awards may be granted under the 2011 Plan or the 2005 Plan. As of December 31, 2019, 8,376,751 shares of common stock were reserved for issuance and 6,959,455 shares of common stock were available for grant under the 2014 Plan.

Employee Stock Purchase Plan

The Penumbra, Inc. Employee Stock Purchase Plan (the "ESPP"), became effective on September 17, 2015. The ESPP initially reserved 600,000 shares of common stock for purchase under the ESPP, with the number of shares reserved for purchase increasing each year pursuant to an "evergreen" provision set forth in the ESPP. As of December 31, 2019, 1,095,695 shares of common stock were reserved and available for issuance under the plan. All qualifying employees of the Company and its designated subsidiaries are eligible to participate in the ESPP. Each offering to the Company's employees to purchase stock under the ESPP will begin on each May 20 and November 20 and will end on the following November 19 and May 19, respectively, each referred to as offering periods except that the first offering period under the ESPP began on September 17, 2015 and ended on May 19, 2016. Under the ESPP, each employee may purchase shares by authorizing payroll deductions at a minimum of 1% and up to 15% of his or her eligible compensation for each pay period during the offering period. Unless the participating employee withdraws from the offering, his or her accumulated payroll deductions will be used to purchase the Company's common stock on the last business day of the offering period at a price equal to 85% of the fair market value of the common stock on either the first or the last day of the offering period, whichever is lower, provided that no more than 2,000 shares of the Company's common stock or such other lesser maximum number established by the ESPP administrator

may be purchased by any one employee during each offering period. Under applicable tax rules, an employee may purchase no more than $25,000 worth of common stock, valued at the start of the purchase period (corresponding to an offering period), under the ESPP in any calendar year.

Early Exercises

The 2005 Plan and 2011 Plan allow the board of directors to grant stock options that provide employee option holders the right to elect to exercise unvested options in exchange for restricted common stock. As of December 31, 2019 and 2018, there were no such early exercised unvested shares.

Stock-Based Benefit Plan Activity and Stock-Based Compensation

Stock Options

Activity of stock options under the 2005 Plan, 2011 Plan and 2014 Plan (collectively, the "Plans") is set forth below:

	Number of Shares	Weighted-Average Exercise Price	Weighted Average Remaining Contractual Life (in years)	Aggregate Intrinsic Value (in thousands)
Balance at December 31, 2018	1,688,881	$ 18.91		
Grants	7,900	$ 158.30		
Exercised	(314,433)	$ 13.12		
Canceled/Forfeited	(3,273)	$ 21.94		
Balance at December 31, 2019	1,379,075	$ 21.02		
Vested and expected to vest—December 31, 2019	1,378,440	$ 20.95	4.98	$ 197,551
Balance at Exercisable—December 31, 2019	1,371,175	$ 20.23	4.95	$ 197,508

The total intrinsic value of stock options exercised during the years ended December 31, 2019, 2018 and 2017 was $46.1 million, $49.1 million and $56.4 million, respectively. The intrinsic value is calculated as the difference between the estimated fair value of the Company’s common stock at the exercise date and the exercise price of the stock option.

The weighted average grant date fair value of stock options was $69.73 per share for the year ended December 31, 2019. The Company did not grant stock options during the years ended December 31, 2018 and 2017.

Restricted Stock and Restricted Stock Units

The activity of unvested restricted stock and restricted stock units ("RSU") under the Plans is set forth below:

	Number of Shares	Weighted Average Grant Date Fair Value
Unvested at December 31, 2018	451,463	$ 57.29
Granted	261,071	151.44
Released/Vested - Restricted Stock/RSUs	(297,788)	44.11
Canceled/Forfeited	(43,540)	88.16
Unvested at December 31, 2019	371,206	$ 130.47

The fair value of the restricted stock and RSUs that vested during the years ended December 31, 2019, 2018 and 2017 was $42.7 million, $47.0 million and $29.1 million, respectively. As of December 31, 2019, 348,676, RSUs are expected to vest.

Employee Stock Purchase Plan

Under the ESPP, employees purchased 81,644 shares, 74,344 shares, and 91,685 shares for $9.0 million, $7.2 million, and $5.8 million during the years ended December 31, 2019, 2018, and 2017 respectively.

Stock-based Compensation

The Company uses the Black-Scholes option pricing model to determine the fair value of stock options and ESPP rights. The valuation model for stock compensation expense requires the Company to make assumptions and judgments about the variables used in the calculation including the expected term (weighted average period of time that the options granted are expected to be outstanding); expected volatility of the Company's common stock and an assumed risk-free interest rate.

The Company used the following assumptions in its Black-Scholes option pricing model to determine the fair value of stock options granted in 2019:

	Stock Options
	Year Ended December 31,
	2019
Expected term (in years)	6.89
Expected volatility	40%
Risk-free interest rate	1.82%
Expected dividend yield	0%

The Company did not grant stock options during the years ended December 31, 2018 and 2017.

The Company used the following assumptions in its Black-Scholes option pricing model to determine the fair value of ESPP rights:

	ESPP Rights		
	Year Ended December 31,		
	2019	2018	2017
Expected term (in years)	0.50	0.50	0.50
Expected volatility	45%	42%	34%
Risk-free interest rate	2.30%	2.36%	1.26%
Expected dividend yield	0%	0%	0%

Weighted Average Expected Term. The Company's expected term for stock options and ESPP rights is based on historical data.

Volatility. In 2019, 2018 and 2017, volatility assumptions used in the valuation of options and ESPP rights were calculated based on the historical volatility of the Company's stock.

Risk-Free Interest Rate. The risk-free interest rate is based upon U.S. Treasury zero-coupon issues with remaining terms similar to the expected term of the stock options or ESPP rights.

Dividend Yield. The Company has never paid any dividends and does not plan to pay dividends in the foreseeable future, and therefore, used an expected dividend yield of zero in the valuation model.

Forfeitures. The Company estimates forfeitures at the time of grant, and revises those estimates in subsequent periods if actual forfeitures differ from those estimates. The Company uses historical data to estimate pre-vesting forfeitures and record stock-based compensation expense only for those awards that are expected to vest. To the extent actual forfeitures differ from the estimates, the difference will be recorded as a cumulative adjustment in the period that the estimates are revised.

The following table sets forth the stock-based compensation expense included in the consolidated statements of operations (in thousands):

	Year Ended December 31,		
	2019	2018	2017
Cost of sales	$ 1,396	$ 1,004	$ 1,009
Research and development	2,835	1,597	1,289
Sales, general and administrative	17,254	15,821	15,514
	$ 21,485	$ 18,422	$ 17,812

As of December 31, 2019, total unrecognized compensation cost was $43.0 million related to unvested stock-based compensation arrangements which is expected to be recognized over a weighted average period of 3.1 years.

The total stock-based compensation cost capitalized in inventory was $0.8 million, $0.4 million and $0.2 million as of December 31, 2019, 2018 and 2017, respectively.

12. Accumulated Other Comprehensive Loss

Other comprehensive (loss) income consists of two components: unrealized gains or losses on the Company's available-for-sale marketable investments and gains or losses from foreign currency translation adjustments. Until realized and reported as a component of consolidated net income, these comprehensive (loss) income items accumulate and are included within accumulated other comprehensive loss. Unrealized gains and losses on our marketable investments are reclassified from accumulated other comprehensive loss into earnings when realized upon sale, and are determined based on specific identification of securities sold. Gains and losses from the translation of assets and liabilities denominated in non-U.S. dollar functional currencies are included in accumulated other comprehensive loss.

The following table summarizes the changes in the accumulated balances during the period, and includes information regarding the manner in which the reclassifications out of accumulated other comprehensive loss into earnings affect our consolidated statements of comprehensive income (loss) (in thousands):

	Year Ended December 31, 2019			Year Ended December 31, 2018		
	Marketable Investments	Currency Translation Adjustments	Total	Marketable Investments	Currency Translation Adjustments	Total
Balance, beginning of the year	$ (500)	$ (1,442)	$ (1,942)	$ (235)	$ 1,804	$ 1,569
Other comprehensive (loss) income before reclassifications:						
Unrealized losses (gains) — marketable investments	811	—	811	(165)	—	(165)
Foreign currency translation losses	—	(1,120)	(1,120)	—	(3,027)	(3,027)
Income tax effect — expense	(73)	—	(73)	(100)	(219)	(319)
Net of tax	738	(1,120)	(382)	(265)	(3,246)	(3,511)
Amounts reclassified from accumulated other comprehensive loss to consolidated net income						
Realized (gain) loss — marketable investments	—	—	—	—	—	—
Income tax effect — (expense) benefit	—	—	—	—	—	—
Net of tax	—	—	—	—	—	—
Net current-year other comprehensive loss	738	(1,120)	(382)	(265)	(3,246)	(3,511)
Balance, end of the year	$ 238	$ (2,562)	$ (2,324)	$ (500)	$ (1,442)	$ (1,942)

13. Employee Benefit Plan

The Company offers a retirement savings plan under Section 401(k) of the Internal Revenue Code ("IRC") to its eligible U.S. employees whereby they may contribute up to the maximum amount permitted by the IRC. The Company makes 401(k) matching contributions of eligible compensation under the plan, subject to a maximum dollar threshold. Contribution expense was $3.2 million, $1.6 million, and $1.1 million for the years ended December 31, 2019, 2018 and 2017, respectively.

14. Income Taxes

The Company's income tax (benefit) expense, deferred tax assets and liabilities, and reserves for unrecognized tax benefits reflect management's best assessment of estimated current and future taxes to be paid. The Company is subject to income taxes in both the United States and foreign jurisdictions. Significant judgments and estimates are required in determining the consolidated income tax (benefit) expense.

The Company is incorporated in the United States and operates in various countries with different tax laws and rates. A portion of the Company's income or (loss) before taxes and the (benefit from) provision for income taxes are generated from international operations.

Income (loss) before income taxes and equity in losses of unconsolidated investee for the years ended December 31, 2019, 2018 and 2017 is summarized as follows (in thousands):

	Year Ended December 31,		
	2019	2018	2017
United States	$ 46,859	$ (2,790)	$ 543
Foreign	3,276	4,398	1,933
Total income (loss) before income taxes and equity in losses of unconsolidated investee	$ 50,135	$ 1,608	$ 2,476

Income tax (benefit) or provision in 2019, 2018 and 2017 is comprised of federal, state, and foreign taxes.

The components of the (benefit from) provision for income taxes are summarized as follows (in thousands):

	Year Ended December 31,		
	2019	2018	2017
Current:			
Federal	$ (738)	$ 290	$ (13)
State	34	183	259
Foreign	2,458	1,689	739
Total current	$ 1,754	$ 2,162	$ 985
Deferred:			
Federal	1,556	(5,436)	(2,502)
State	295	(770)	(1,742)
Foreign	(474)	(359)	(352)
Total deferred	$ 1,377	$ (6,565)	$ (4,596)
(Benefit from) Provision for Income Taxes	$ 3,131	$ (4,403)	$ (3,611)

The Company's actual (benefit from) or provision for tax differed from the amounts computed by applying the Company's U.S. federal statutory income tax rate to pretax income as a result of the following:

	Year Ended December 31,		
	2019	2018	2017
Income tax at federal statutory rate	21.0 %	21.0 %	34.0 %
State income taxes, net of federal benefit	0.4	(33.1)	(94.6)
Foreign taxes differential	2.2	37.2	(4.2)
Prepaid tax ASC 810-10	(0.8)	5.0	(39.8)
IPR&D charge	—	402.5	—
Stock-based compensation	(20.8)	(809.6)	(802.0)
Non-deductible meals and entertainment	1.6	31.3	19.4
Imputed interest	0.6	19.8	19.1
Tax credits	—	—	(0.5)
Remeasurement of deferred tax assets and liabilities	—	—	622.5
Transfer pricing tax benefit	—	—	(35.3)
Global intangible low-taxed income ("GILTI")	0.8	14.0	—
Contingent liabilities	—	12.4	—
Executive compensation	0.4	6.5	—
Non-deductible expenses	—	15.3	—
Other	0.8	3.9	8.0
Change in valuation allowance	—	—	127.6
Effective tax rate	6.2 %	(273.8)%	(145.8)%

Deferred income tax assets and liabilities consist of the following (in thousands):

	December 31,	
	2019	2018
Deferred tax assets:		
Net operating loss carryforwards	$ 24,470	$ 27,456
Tax credits	15,992	11,459
Accruals and reserves	4,700	6,078
Stock-based compensation	4,252	3,485
Translation adjustment	155	527
UNICAP adjustments	6,816	4,993
ASC 842 Lease Liabilities	20,183	—
Other	471	464
Gross deferred tax assets	77,039	54,462
Valuation allowance	(21,558)	(17,284)
Total deferred tax assets	55,481	37,178
Deferred tax liabilities:		
Depreciation and amortization	(5,550)	(6,293)
Unrealized Gains	(73)	—
ASC 842 Lease ROU Assets	(20,394)	—
Total deferred tax liabilities	(26,017)	(6,293)
Net deferred tax assets	$ 29,464	$ 30,885

As of December 31, 2019, the Company had approximately $89.3 million, $78.6 million and $0.4 million of federal, state and foreign net operating loss carryforwards, respectively, available to offset future taxable income. The federal net operating loss will begin to expire in 2036, except for $24.0 million that has an indefinite carryforward period but is limited to offset 80% of taxable income in the year utilized. The state net operating loss carryforwards will begin to expire in 2020. As of December 31, 2019, the Company had federal research credits of $9.2 million and California state tax credits of $10.5 million. The federal research credits are generally carried forward for 20 years. California state tax credits may be carried forward indefinitely.

On December 22, 2017, the Tax Cuts and Jobs Act of 2017, (the “Tax Reform Act”) was enacted. The Tax Reform Act significantly revised the U.S. corporate income tax regime. Also on December 22, 2017, the Securities and Exchange Commission issued Staff Accounting Bulletin 118 (“SAB 118”), which provided for a measurement period that should not extend beyond one year from the Tax Reform Act enactment date. As of December 31, 2018, the Company completed its accounting for the tax effects of the Tax Reform Act under FASB ASC 740 “Income Taxes”. The Company’s financial statements reflect tax law interpretations based on authoritative guidance available to date. Legislative guidance continues to be issued which could impact the Company’s current interpretations.

The Company maintains that all foreign earnings, with the exception of a portion of the earnings of its German subsidiary, are permanently reinvested outside the U.S. and therefore deferred taxes attributable to such are not provided for in the Company’s financial statements as of December 31, 2019. The Company will repatriate foreign earnings only to the extent doing so will not result with any material U.S. tax consequences. Thus, deferred taxes on any potential future repatriation of a portion of the earnings of its German subsidiary were not reflected in the Company’s financial statements as of December 31, 2019.

The Company generated significant domestic DTAs in recent years, primarily due to the excess tax benefits from stock option exercises and vesting of restricted stock. The Company assessed its ability to realize the benefits of its domestic DTAs by evaluating all available positive and negative evidence, objective and subjective in nature, including (1) cumulative results of operations in recent years, (2) sources of recent pre-tax income, (3) estimates of future taxable income, (4) respective carryback and/or carryforward periods of tax attributes available to date, and (5) limitations on net operating loss (“NOL”) utilization against taxable income. The Company determined it would be in a three-year cumulative taxable income position, had it not been for the impact of excess tax deductions from stock-based compensation. The Company also measured its current DTA balances against estimates of future income based on objectively verifiable operating results from the Company’s recent history.

The Company considered its projections of future taxable income in conjunction with relevant provisions of the Tax Reform Act, including but not limited to, the indefinite carryforward period for NOLs generated in years beginning on or after

January 1, 2018. The Company also considered its three-year cumulative taxable income position, exclusive of the impact of excess tax deductions from stock-based compensation. After an evaluation of all available qualitative and quantitative evidence, both positive and negative in nature, the Company concluded that sufficient future taxable income will be generated to realize the benefits of its federal DTAs prior to expiration other than its federal research and development tax credit DTAs. The tax attribute ordering rules provide that net operating losses must be used to offset taxable income prior to the utilization of tax credits. Accordingly, the Company could not assert, at the required more-likely-than-not level of certainty, that it will be able to realize the benefit of its federal research and development tax credit DTAs, with a limited 20 year carryforward period, prior to expiration. As a result, as of December 31, 2019, the Company maintained a full valuation allowance against its federal research and development tax credit DTAs.

For years ended December 31, 2019, 2018 and 2017, a full valuation allowance remains against the Company's California DTA balances.

As of December 31, 2019, the Company's DTA balance included $3.1 million of tax attributes gained upon acquisition of a majority interest ownership in MVI. The acquired DTAs are subject to Separate Return Limitation Year ("SRLY") rules which will limit the utilization of the pre-acquisition tax attributes to offset future taxable income solely generated by MVI. As of December 31, 2019, the Company could not conclude, at the required more-likely-than-not level of certainty, that MVI will generate sufficient taxable income to realize the benefit of its tax attributes prior to expiration. As a result, a $3.1 million valuation allowance is maintained against the DTAs acquired from MVI.

The change in the Company's deferred tax valuation allowance against net DTAs from January 1, 2017 to December 31, 2019, is as follows (in thousands):

	Beginning Balance	Additions Charged To Expenses or Other Accounts[1]	Deductions Credited to Expenses or Other Accounts[2]	Ending Balance
For the year ended:				
December 31, 2017	$ 6,062	$ 4,400	$ (167)	$ 10,295
December 31, 2018	10,295	6,989	—	17,284
December 31, 2019	17,284	4,395	(121)	21,558

[1] Additions include current year additions charged to expenses and current year build due to increases in net DTAs, return to provision true-ups, and other adjustments.
[2] Deductions include current year releases credited to expenses and current year reductions due to decreases in net DTAs, return to provision true-ups, and other adjustments.

The Company will continue to closely monitor the need for a valuation allowance against its existing domestic and foreign DTAs and any additional DTAs that are generated in each subsequent reporting period. The need for a valuation allowance can be impacted by actual operating results, forecasted financial performance, variances between the two, and the rate at which future DTAs are generated.

IRC Sections 382 and 383 limit the use of net operating losses and business credits if there is a change in ownership. In 2009, the Company determined there were changes in ownership in 2004 and 2008, which did not cause any impairment of tax attributes.

A reconciliation of the change in the gross unrecognized tax benefits from January 1, 2017 to December 31, 2019, is as follows (in thousands):

	December 31,		
	2019	2018	2017
Beginning Balance	$ 5,174	$ 4,152	$ 3,827
Gross increase for tax positions of current year	1,191	1,421	871
Gross increase for tax positions of prior years	386	238	130
Gross decrease for tax positions of prior years	(565)	(616)	(659)
Settlement	—	—	—
Lapse of statute of limitations	(111)	(21)	(17)
Ending Balance	$ 6,075	$ 5,174	$ 4,152

The Company recognizes interest and penalties related to uncertain tax positions in income tax expense. Income tax expense for the years ended December 31, 2019, 2018 and 2017 included interest and penalties that were not material. As of December 31, 2019, 2018 and 2017, the Company had approximately $0.2 million, $0.2 million, and $0.1 million, respectively, of accrued interest and penalties attributable to uncertain tax positions. Included in the $6.1 million balance of unrecognized tax benefits as of December 31, 2019 is $1.9 million of tax benefit that, if recognized, would affect the effective tax rate.

The Company files U.S., state and foreign income tax returns in jurisdictions with varying statutes of limitations. Due to net operating loss and credit carryovers, the tax years ending December 31, 2004 through December 31, 2019 remain subject to examination by federal and state tax authorities. In Australia and Canada, tax years ending December 31, 2009 through December 31, 2019 generally remain subject to examination by tax authorities. In Germany and Italy, tax years ending December 31, 2013 through December 31, 2019 remain subject to examination by tax authorities. In the year ended December 31, 2018, the German tax authority initiated an income tax audit for tax years ended December 31, 2014, 2015 and 2016. The Company believes that an adequate provision has been made for any adjustments that may result from the tax examination, however, the audit is in its preliminary stages and so the outcome and timing of resolution is uncertain.

The Company does not anticipate significant changes in the balance of gross unrecognized tax benefits over the next 12 months.

15. Net Income Attributable to Penumbra, Inc. Per Share

The Company computed basic net income attributable to Penumbra, Inc. per share based on the weighted average number of shares of common stock outstanding during the period. The Company computed diluted net income attributable to Penumbra, Inc. per share based on the weighted average number of shares of common stock outstanding plus potentially dilutive common stock equivalents outstanding during the period. For the purposes of this calculation, stock options, restricted stock, restricted stock units and stock sold through the ESPP are considered common stock equivalents.

A reconciliation of the numerator and denominator used in the calculation of the basic and diluted net income attributable to Penumbra, Inc. is as follows (in thousands, except share and per share amounts):

	Year Ended December 31,		
	2019	2018	2017
Numerator:			
Net income attributable to Penumbra, Inc.	$ 48,458	$ 6,601	$ 4,657
Denominator:			
Weighted average shares used to compute net income attributable to common stockholders:			
Basic	34,750,706	34,138,176	32,978,065
Potential dilutive stock-based options and awards, as calculated using treasury stock method	1,515,293	1,948,645	2,341,038
Diluted	36,265,999	36,086,821	35,319,103
Net income attributable to Penumbra, Inc. per share from:			
Basic	$ 1.39	$ 0.19	$ 0.14
Diluted	$ 1.34	$ 0.18	$ 0.13

For the year ended December 31, 2019, outstanding stock-based awards of 100 thousand shares were excluded from the computation of diluted net income attributable to Penumbra, Inc. per share because their effect would have been anti-dilutive. For the years ended December 31, 2018 and 2017, outstanding stock-based awards of 49 thousand and 54 thousand shares, respectively, were excluded from the computation of diluted net income attributable to Penumbra, Inc. per share because their effect would have been anti-dilutive.

16. Revenues

Adoption of ASC Topic 606, "Revenue from Contracts with Customers"

The Company adopted the guidance under ASC 606 on January 1, 2018 using the modified retrospective method for all contracts not completed as of the date of adoption. Therefore, the comparative prior year information has not been adjusted and continues to be reported under ASC 605 with the impact of the adoption reflected in opening retained earnings. As a result of adoption, the cumulative impact to our retained earnings at January 1, 2018 was $0.3 million.

The adoption of ASC 606 represents a change in accounting principle that more closely aligns the timing of revenue recognition with the point in time that a performance obligation is satisfied. The Company's performance obligations are satisfied at a point in time. The implementation of the new standard did not have a material impact on the measurement or recognition of revenue from prior periods, however additional disclosures have been added in accordance with the guidance.

Revenue Recognition

Revenue is recognized in an amount that reflects the consideration we expect to be entitled to in exchange for goods or services. All revenue recognized in the income statement is considered to be revenue from contracts with customers.

The Company's revenues, disaggregated by geography, based on the destination to which the Company ships its products, for the years ended December 31, 2019, 2018 and 2017 was as follows (in thousands):

	Year Ended December 31,		
	2019	2018	2017
United States	$ 355,222	$ 290,716	$ 219,173
Japan	42,520	41,805	33,790
Other International	149,663	112,417	80,801
Total	$ 547,405	$ 444,938	$ 333,764

The Company's revenues disaggregated by product category, for the years ended December 31, 2019, 2018 and 2017 was as follows (in thousands):

	Year Ended December 31,		
	2019	2018	2017
Neuro	$ 331,685	$ 294,333	$ 232,446
Vascular	215,720	150,605	101,318
Total	$ 547,405	$ 444,938	$ 333,764

Performance Obligations

Delivery of products - The Company's contracts with customers typically contain a single performance obligation, delivery of the Company's products. Satisfaction of that performance obligation occurs when control of the promised goods transfers to the customer, which is generally upon shipment for non-consignment sale agreements and upon utilization for consignment sale agreements.

Payment terms - Our payment terms vary by the type and location of our customer. The timing between fulfillment of performance obligations and when payment is due is not significant and does not give rise to financing transactions. The Company did not have any contracts with significant financing components as of December 31, 2019.

Product returns - The Company may allow customers to return products purchased at the Company's discretion. The Company estimates the amount of its product sales that may be returned by its customers and records this estimate as a

reduction of revenue in the period in which the related product revenue is recognized. The Company currently estimates product return liabilities using its own historic sales information, trends, industry data, and other relevant data points.

Warranties - The Company offers its standard warranty to all customers and it is not available for sale on a standalone basis. The Company's standard warranty represents its guarantee that its products function as intended, are free from defects, and comply with agreed-upon specifications and quality standards. This assurance does not constitute a service and is not a separate performance obligation.

Transaction Price

Revenue is recorded at the net sales price, which includes estimates of variable consideration such as product returns utilizing historical return rates, rebates, discounts, and other adjustments to net revenue. To the extent the transaction price includes variable consideration, the Company estimates the amount of variable consideration that should be included in the transaction price. When determining if variable consideration should be constrained, management considers whether there are factors that could result in a significant reversal of revenue and the likelihood of a potential reversal. Variable consideration is included in revenue only to the extent that it is probable that a significant reversal of the revenue recognized will not occur when the uncertainty associated with the variable consideration is subsequently resolved. These estimates are reassessed each reporting period as required. During the year ended December 31, 2019, the Company made no material changes in estimates for variable consideration. When the Company performs shipping and handling activities after control of goods is transferred to the customer, they are considered as fulfillment activities, and costs are accrued for when the related revenue is recognized. Taxes collected from customers relating to product sales and remitted to governmental authorities are excluded from revenues.

17. Selected Quarterly Financial Data (Unaudited)

The following tables provide the selected quarterly financial data for 2019 and 2018 (in thousands, except share and per share amounts):

	2019 Quarters Ended			
Selected Statement of Operations Data:	**March 31[1]**	**June 30**	**September 30**	**December 31**
Revenue	$ 128,439	$ 134,201	$ 139,502	$ 145,263
Cost of revenue	44,529	40,273	43,504	47,135
Gross profit	83,910	93,928	95,998	98,128
Total operating expenses	72,758	81,127	83,022	87,549
Income before provision for (benefit from) income taxes	11,909	13,514	12,963	11,749
Provision for (benefit from) income taxes	1,455	(2,735)	1,963	2,448
Consolidated net income	10,454	16,249	11,000	9,301
Net loss attributable to non-controlling interest	(244)	(339)	(483)	(388)
Net income attributable to Penumbra, Inc.	$ 10,698	$ 16,588	$ 11,483	$ 9,689
Net income attributable to Penumbra, Inc. per share:				
Basic	$ 0.31	$ 0.48	$ 0.33	$ 0.28
Diluted	$ 0.30	$ 0.46	$ 0.32	$ 0.27
Weighted average shares used to compute net income per share:				
Basic	34,507,279	34,694,228	34,840,370	34,955,043
Diluted	36,213,164	36,214,321	36,271,394	36,312,471

	2018 Quarters Ended			
Selected Statement of Operations Data:	**March 31[2]**	**June 30**	**September 30[3]**	**December 31**
Revenue	$ 102,701	$ 109,638	$ 111,806	$ 120,793
Cost of revenue	36,144	37,386	36,794	42,081
Gross profit	66,557	72,252	75,012	78,712
Acquired in-process research and development	—	—	30,835	—
Total operating expenses	62,512	62,969	95,861	72,043
Income (loss) before income taxes and equity in losses of unconsolidated investee	4,504	9,663	(19,908)	7,349
(Benefit from) provision for income taxes	(1,938)	(4,948)	1,598	885
Income (loss) before equity in losses of unconsolidated investee	6,442	14,611	(21,506)	6,464
Equity in losses of unconsolidated investee	(951)	(1,230)	(920)	—
Consolidated net income (loss)	5,491	13,381	(22,426)	6,464
Net loss attributable to non-controlling interest	—	—	(3,496)	(195)
Net income (loss) attributable to Penumbra, Inc.	$ 5,491	$ 13,381	$ (18,930)	$ 6,659
Net income (loss) per share:				
Basic	$ 0.16	$ 0.39	$ (0.55)	$ 0.19
Diluted	$ 0.15	$ 0.37	$ (0.55)	$ 0.18
Weighted average shares used to compute net income (loss) per share:				
Basic	33,846,142	34,072,223	34,248,484	34,378,415
Diluted	35,917,051	36,116,254	34,248,484	36,150,450

[1] In first quarter of 2019, the Company adopted Accounting Standard Update ("ASU") No. 2016-02, Leases (Topic 842), and its associated amendments. Under the standard, a lessee will be required to recognize a lease liability and right-of-use asset for all leases with terms in excess of twelve months. The Company elected to apply the modified retrospective transition approach to all leases existing at the date of initial application and not restate comparative periods. In addition, the Company elected the following transitional practical expedients: (1) the short-term lease exception and (2) to not separate its non-lease components for its real estate, vehicle and equipment leases. As a result of the adoption, there was no cumulative-effect adjustment recorded to retained earnings upon adoption. Refer to Note "2. Summary of Significant Accounting Policies" and Note "9. Leases" for more information.

[2] In the first quarter of 2018, the Company adopted Accounting Standard Update ("ASU") No. 2014-09, Revenue from Contracts with Customers ("Topic 606"), and its associated amendments. Under the standard, revenue is recognized when a customer obtains control of promised goods or services in an amount that reflects the consideration the entity expects to receive in exchange for those goods or services. The Company applied the five step method outlined in the ASU to all revenue streams and elected to utilize the modified retrospective implementation method. As a result of adoption, the Company recorded a $0.3 million cumulative adjustment to its retained earnings at January 1, 2018. Refer to Note "2. Summary of Significant Accounting Policies" and Note "16. Revenues" for more information.

[3] On August 31, 2018, the Company acquired a controlling interest in MVI which was accounted for as an asset acquisition. In connection with the transaction, the Company recorded a $30.8 million IPR&D charge during the three months ended September 30, 2018 in the consolidated statements of operations related to the acquired technology under development from MVI. Of the total IPR&D charge, $27.4 million was attributable to the net loss of Penumbra, Inc.

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

None.

ITEM 9A. CONTROLS AND PROCEDURES.

Evaluation of Disclosure Controls and Procedures

We maintain disclosure controls and procedures that are designed to ensure that the information required to be disclosed in our reports under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in SEC rules and forms and that such information is accumulated and communicated to management, including our principal executive officer and principal financial officer, as appropriate to allow 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, including our principal executive officer and principal financial officer, evaluated the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act) as of December 31, 2019. Based on this review, our principal executive officer and principal financial officer have concluded that the Company's disclosure controls and procedures were effective at the reasonable assurance level as of December 31, 2019.

Management's Report on Internal Control Over Financial Reporting

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

Our management, including our principal executive officer and principal financial officer, conducted an evaluation of the effectiveness of our internal control over financial reporting based on criteria established in "Internal Control-Integrated Framework (2013)" issued by the Committee of Sponsoring Organizations of the Treadway Commission ("COSO"). Our management concluded that our internal control over financial reporting was effective as of December 31, 2019.

The effectiveness of our internal control over financial reporting as of December 31, 2019 has been audited by Deloitte & Touche LLP, an independent registered public accounting firm, as stated in their report which is included in Part II, Item 9A of this Annual Report on Form 10-K.

Changes in Internal Control Over Financial Reporting

There was no change in our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act) that occurred during the quarterly period ended December 31, 2019 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the stockholders and the Board of Directors of Penumbra, Inc.

Opinion on Internal Control over Financial Reporting

We have audited the internal control over financial reporting of Penumbra, Inc. and subsidiaries (the "Company") as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by COSO.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets and related consolidated statements of operations, comprehensive (loss) income, stockholders' equity, and cash flows as of and for the year ended December 31, 2019 of the Company and our report dated February 25, 2020, expressed an unqualified opinion on those financial statements.

Basis for Opinion

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

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control over Financial Reporting

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

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

/s/ Deloitte & Touche LLP

San Francisco, CA
February 25, 2020

ITEM 9B. OTHER INFORMATION.

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE.

The information required by this item is incorporated by reference to the information set forth in our Definitive Proxy Statement to be filed with the SEC in connection with our Annual Meeting of Stockholders to be held in June 2020 (the "Proxy Statement").

ITEM 11. EXECUTIVE COMPENSATION.

The information required by this item is incorporated by reference to the information in the Proxy Statement.

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

The information required by this item is incorporated by reference to the information in the Proxy Statement.

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

The information required by this item is incorporated by reference to the information in the Proxy Statement.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES.

The information required by this item is incorporated by reference to the information in the Proxy Statement.

PART IV

ITEM 16. FORM 10-K SUMMARY.

None.

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES.

1. Financial Statements: The financial statements included in "Index to Consolidated Financial Statements" in Part II, Item 8 are filed as part of this Annual Report on Form 10-K.
2. Exhibits: The exhibits listed in the accompanying index to exhibits are filed or incorporated by reference as part of this Annual Report on Form 10-K.

EXHIBIT INDEX

Exhibit Number	Description	Incorporation by Reference			
		Form	File No.	Exhibit(s)	Filing Date
3.1	Restated Certificate of Incorporation of Penumbra, Inc.	8-K	001-37557	3.3	September 29, 2015
3.2	Amended and Restated Bylaws of Penumbra, Inc.	8-K	001-37557	3.4	September 29, 2015
4.1	Specimen Common Stock Certificate	S-1/A	333-206412	4.1	September 8, 2015
4.2*	Description of Securities Registered Pursuant to Section 12 of the Securities Exchange Act of 1934			4.2	
10.1	Lease for facilities at 1351 Harbor Bay Parkway, Alameda, California, dated November 28, 2007 and amended on May 7, 2008 and June 23, 2011	S-1	333-206412	10.1	August 14, 2015
10.2	Lease for facilities at 1411 Harbor Bay Parkway, Alameda, California, dated September 11, 2014	S-1	333-206412	10.2	August 14, 2015
10.3	Lease for facilities at 1321 Harbor Bay Parkway, Alameda, California, dated September 11, 2014	S-1	333-206412	10.3	August 14, 2015
10.4	Lease for facilities at 1301, 1311, 1401 and 1431 Harbor Bay Parkway, Alameda, California, dated December 17, 2015	10-K	001-37557	10.4	March 8, 2016
10.5#	Distribution Agreement between Penumbra, Inc. and Medico's Hirata, dated August 2, 2009, as amended	S-1	333-206412	10.4	August 14, 2015
10.6†	Amended and Restated 2014 Equity Incentive Plan, and forms of Restricted Stock Agreement, Stock Option Agreement and Early Exercise Stock Option Agreement	S-1	333-206412	10.19	August 14, 2015
10.7†	Amended and Restated 2014 Equity Incentive Plan - Restricted Stock Agreement	10-Q	001-37557	10.1	November 12, 2015
10.8†	Amended and Restated 2014 Equity Incentive Plan - Stock Option Agreement	10-Q	001-37557	10.2	November 12, 2015
10.9†	Amended and Restated 2014 Equity Incentive Plan - Restricted Stock Unit Agreement	10-K	001-37557	10.9	March 8, 2016
10.10†	2014 Equity Incentive Plan, and forms of Restricted Stock Agreement, Stock Option Agreement and Early Exercise Stock Option Agreement	S-1	333-206412	10.5	August 14, 2015
10.11†	2011 Equity Incentive Plan, and forms of Restricted Stock Agreement, Stock Grant Agreement, Stock Option Agreement and Early Exercise Stock Option Agreement	S-1	333-206412	10.6	August 14, 2015
10.12†	2005 Stock Plan, and forms of Notice of Grant and Early Exercise Stock Option Agreement	S-1	333-206412	10.7	August 14, 2015
10.13†	Amended and Restated 2014 Equity Incentive Plan - Form of Restricted Stock Unit Agreement	10-K	001-37557	10.13	February 26, 2019
10.14†	Amended and Restated 2014 Equity Incentive Plan - Form of Performance-Based Restricted Stock Unit Agreement	10-K	001-37557	10.14	February 26, 2019
10.15†	Form of Indemnification Agreement by and between Penumbra, Inc. and each of its directors and executive officers	S-1	333-206412	10.9	August 14, 2015
10.16†	Offer Letter with Adam Elsesser	S-1	333-206412	10.10	August 14, 2015
10.17†	Offer Letter with Arani Bose	S-1	333-206412	10.11	August 14, 2015
10.18†	Offer Letter with Sri Kosaraju	S-1	333-206412	10.12	August 14, 2015
10.19†*	Offer Letter with Johanna Roberts			10.19	
10.20†	Offer Letter with James Pray	S-1	333-206412	10.14	August 14, 2015
10.21†	Offer Letter with Lynn Rothman	S-1	333-206412	10.15	August 14, 2015
10.22†*	Offer Letter with Maggie Yuen			10.22	

10.23†	Form of Employee Nondisclosure and Assignment Agreement	S-1	333-206412	10.17	August 14, 2015
10.24†	Employee Stock Purchase Plan	S-1/A	333-206412	10.18	August 31, 2015
10.25*	Amended and Restated Lease for facilities at 630 Roseville Parkway, Roseville, California, dated January 29, 2019 and amended on July 31, 2019			10.25	
10.26	Lease for facilities at 1310 Harbor Bay Parkway, Alameda, California, dated September 3, 2019	10-Q	001-37557	10.1	November 7, 2019
21.1*	Subsidiaries of the Registrant				
23.1*	Consent of Deloitte & Touche LLP				
24.1*	Power of Attorney (included on signature page)				
31.1*	Certification of Principal Executive Officer required under Rule 13a-14(a) and 15d-14(a) of the Securities Exchange Act of 1934, as amended				
31.2*	Certification of Principal Financial Officer required under Rule 13a-14(a) and 15d-14(a) of the Securities Exchange Act of 1934, as amended				
32.1*	Certification of Principal Executive Officer and Principal Financial Officer required under Rule 13a-14(b) of the Securities Exchange Act of 1934, as amended, and 18 U.S.C. §1350				
101*	The following materials from the Company's Annual Report on Form 10-K for the year ended December 31, 2019 formatted in Inline Extensible Business Reporting Language (iXBRL) includes: (i) Consolidated Balance Sheets as of December 31, 2019 and December 31, 2018, (ii) Consolidated Statements of Operations for the year ended December 31, 2019, 2018 and 2017, (ii) Consolidated Statements of Comprehensive Income (Loss) for the year ended December 31, 2019, 2018 and 2017, (iii) Consolidated Statements of Stockholders' Equity for the year ended December 31, 2019, 2018 and 2017, (iv) Consolidated Statements of Cash Flows for the year December 31, 2019, 2018 and 2017, and (v) Notes to Consolidated Financial Statements.				
104*	Cover Page Interactive Data File (formatted as iXBRL with applicable taxonomy extension information contained in Exhibit 101)				

* Filed herewith.

** Furnished herewith.

† Indicates a management contract or compensatory plan or arrangement.

Portions of this exhibit (indicated by asterisks) have been omitted pursuant to a grant of confidential treatment.

SIGNATURES

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

PENUMBRA, INC.

Date: February 25, 2020

By: /s/ Maggie Yuen
Maggie Yuen
Chief Financial Officer
(Principal Financial Officer)

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Adam Elsesser and Maggie Yuen, and each of them, his or her attorney-in-fact, each with the power of substitution, for him or her in any and all capacities, to sign any amendments in this Annual Report on Form 10-K, and to file the same, with exhibits thereto and other documents in connections therewith, with the Securities and Exchange Commission, hereby ratifying and conforming all that each of said attorneys-in-fact, or his or her substitutes, may do or cause to be done by virtue of hereof.

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

Signature	Title	Date
/s/ Adam Elsesser Adam Elsesser	Chairman and Chief Executive Officer (Principal Executive Officer)	February 25, 2020
/s/ Maggie Yuen Maggie Yuen	Chief Financial Officer (Principal Financial Officer)	February 25, 2020
/s/ Lambert Shiu Lambert Shiu	Chief Accounting Officer (Principal Accounting Officer)	February 25, 2020
/s/ Arani Bose Arani Bose	Chief Innovator and Director	February 25, 2020
/s/ Don Kassing Don Kassing	Director	February 25, 2020
/s/ Harpreet Grewal Harpreet Grewal	Director	February 25, 2020
/s/ Thomas C. Wilder Thomas C. Wilder	Director	February 25, 2020
/s/ Bridget O'Rourke Bridget O'Rourke	Director	February 25, 2020
/s/ Janet Leeds Janet Leeds	Director	February 25, 2020

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Penumbra

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