

Cardiovascular Systems Inc
Form 424B5
May 22, 2012
Table of Contents

Filed Pursuant to Rule 424(b)(5)
Registration No. 333-174681

PROSPECTUS SUPPLEMENT

(To Prospectus dated June 17, 2011)

1,780,000 Shares

Common Stock

We are offering 1,780,000 shares of our common stock.

Our common stock trades on the Nasdaq Global Market under the symbol CSII. On May 21, 2012, the last reported sale price of our common stock was \$9.83 per share.

Investing in our common stock involves risks that are described in the Risk Factors section beginning on page S-7 of this prospectus supplement.

| | Per Share | Total |
|----------------------------------------|------------------|---------------|
| Public offering price | \$ 9.00 | \$ 16,020,000 |
| Underwriting discounts and commissions | \$ 0.54 | \$ 961,200 |
| Proceeds, before expenses, to us | \$ 8.46 | \$ 15,058,800 |

You should carefully read this prospectus supplement and the accompanying prospectus, together with the documents we incorporated by reference, before you invest in our stock.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or determined if this prospectus supplement or the accompanying prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

The shares of common stock will be ready for delivery on or about May 25, 2012.

Sole Book-Running Manager

Leerink Swann

Co-Manager

JMP Securities

The date of this prospectus supplement is May 22, 2012.

Table of Contents

Table of Contents

Prospectus Supplement

| | <u>Page</u> |
|----------------------------------------------------------|--------------------|
| <u>About this Prospectus Supplement</u> | S-ii |
| <u>Prospectus Supplement Summary</u> | S-1 |
| <u>The Offering</u> | S-4 |
| <u>Summary Consolidated Financial Information</u> | S-5 |
| <u>Risk Factors</u> | S-7 |
| <u>Special Note Regarding Forward-Looking Statements</u> | S-24 |
| <u>Use of Proceeds</u> | S-25 |
| <u>Dividend Policy</u> | S-25 |
| <u>Price Range of Common Stock</u> | S-26 |
| <u>Capitalization</u> | S-27 |
| <u>Description of Common Stock</u> | S-28 |
| <u>Underwriting</u> | S-30 |
| <u>Legal Matters</u> | S-33 |
| <u>Experts</u> | S-33 |
| <u>Where You Can Find More Information</u> | S-33 |
| <u>Incorporation of Documents By Reference</u> | S-34 |

Prospectus

| | |
|--------------------------------------------------------|----|
| <u>About This Prospectus</u> | i |
| <u>Our Company</u> | 1 |
| <u>Risk Factors</u> | 2 |
| <u>Forward-Looking Statements</u> | 2 |
| <u>Use of Proceeds</u> | 2 |
| <u>Plan of Distribution</u> | 3 |
| <u>Description of Common Stock</u> | 5 |
| <u>Description of Preferred Stock</u> | 7 |
| <u>Description of Warrants</u> | 8 |
| <u>Description of Debt Securities</u> | 9 |
| <u>Where You Can Find More Information</u> | 16 |
| <u>Incorporation of Certain Documents By Reference</u> | 16 |
| <u>Legal Matters</u> | 17 |
| <u>Experts</u> | 17 |

Table of Contents

About this Prospectus Supplement

We provide information to you about our common stock in two separate documents. This prospectus supplement describes the specific terms of this offering of our common stock and also adds to and updates information contained in the accompanying prospectus and the documents incorporated by reference into the accompanying prospectus. The accompanying prospectus provides more general information about the securities we may offer from time to time, some of which may not apply to the securities we are offering. In addition, we incorporate important information into this prospectus supplement and the accompanying prospectus by reference. You may obtain the information incorporated by reference into this prospectus supplement and the accompanying prospectus without charge by following the instructions under the section entitled "Where You Can Find More Information" in this prospectus supplement. To the extent information in this prospectus supplement is inconsistent with statements made in the accompanying prospectus or any documents incorporated by reference herein or therein, the statements made in this prospectus supplement shall be deemed to modify or supersede those made in the accompanying prospectus and the documents incorporated by reference herein or therein.

Neither we nor the underwriters have authorized anyone to provide you with information that is different from that contained or incorporated by reference in this prospectus supplement and the accompanying prospectus and any relevant free writing prospectus we have prepared or to which we have referred you. We take no responsibility for, and provide no assurance as to the reliability of, any other information that any party may give you. We are not, and the underwriters are not, making an offer to sell the common stock in any jurisdiction where the offer or sale is not permitted. You should not assume that the information contained or incorporated by reference in this prospectus supplement or the accompanying prospectus or any relevant free writing prospectus is accurate as of any date other than its respective date.

We further note that the representations, warranties and covenants made by us in any agreement that is filed as an exhibit to any document that is incorporated by reference into this prospectus supplement or the accompanying prospectus were made solely for the benefit of the parties to such agreement, including, in some cases, for the purpose of allocating risk among the parties to such agreements, and should not be deemed to be a representation, warranty or covenant to you. Moreover, such representations, warranties or covenants were accurate only as of the date when made. Accordingly, such representations, warranties and covenants should not be relied on as accurately representing the current state of our affairs.

It is important for you to read and consider all of the information contained in this prospectus supplement, the accompanying prospectus and the documents incorporated by reference herein and therein in making your investment decision. We include cross-references in this prospectus supplement and the accompanying prospectus to captions in these materials where you can find additional related discussions. The table of contents in this prospectus supplement provides the pages on which these captions are located.

In this prospectus, CSI, we, our, ours, and us refer to Cardiovascular Systems, Inc., except where the context otherwise requires or as otherwise indicated.

Table of Contents

Prospectus Supplement Summary

This summary highlights information contained in this prospectus supplement and the accompanying prospectus. Because it is a summary, it does not contain all the information you should consider before investing in our common stock. You should carefully read this entire prospectus supplement and the accompanying prospectus, including the Risk Factors section and the documents incorporated by reference, before making an investment decision.

Our Business

We are a medical device company focused on developing and commercializing minimally invasive treatment solutions for vascular disease. Interventional endovascular treatment of peripheral artery disease, or PAD, is our initial area of focus. PAD is caused by the accumulation of plaque in peripheral arteries, most commonly occurring in the pelvis and legs. PAD is a progressive disease, and, if left untreated, can lead to limb amputation or death.

Our primary products, the Diamondback 360° PAD System (Diamondback 360°), Diamondback Predator 360° PAD System (Predator 360°) and Stealth 360° PAD System (Stealth 360°), are catheter-based platforms capable of treating a broad range of plaque types in leg arteries both above and below the knee and address many of the limitations associated with existing treatment alternatives. We refer to the Diamondback 360°, the Predator 360° and the Stealth 360° collectively in this prospectus supplement as the PAD Systems. In August 2007, the U.S. Food and Drug Administration, or FDA, granted us 510(k) clearance for the use of the Diamondback 360° as a therapy in patients with PAD. We commenced a limited commercial introduction of the Diamondback 360° in the United States in September 2007 and began a full commercial launch during the quarter ended March 31, 2008. We received 510(k) clearance of the Predator 360° in March 2009 and commenced commercial launch in April 2009. We received 510(k) clearance of the Stealth 360° in March 2011 and commenced a commercial launch that same month. The Stealth 360° contains additional ease of use and physician control features while incorporating the orbital mechanism of action, optimal shaft and crown configurations of the Diamondback 360° and Predator 360°. As of March 31, 2012, we estimate that the PAD Systems had been utilized in more than 66,000 procedures.

We intend to leverage the capabilities of the PAD Systems to expand into the interventional coronary market, though we need to complete certain clinical trials and receive FDA approval to do so. In May 2011, we received approval from the FDA to complete enrollment of 429 patients in our ORBIT II clinical trial for a coronary application for the Diamondback 360°, which followed the FDA's review of data from the first 50 cases in the ORBIT II trial. As of May 2, 2012, patient enrollment in the ORBIT II trial was over 65% complete.

In addition to the PAD Systems, we are expanding our product portfolio through internal product development and establishment of business relationships with other medical device companies. We now offer multiple accessory products designed to complement the use of the PAD Systems, and we have entered into a distribution agreement with Asahi Intecc Co., Ltd. to market its peripheral guidewire line in the United States.

Our Market

Peripheral Artery Disease

PAD is a circulatory problem in which plaque deposits build up on the walls of the arteries, reducing blood flow to the limbs. The most common early symptoms of PAD are pain, cramping or fatigue in the leg or hip muscles while walking. Symptoms may progress to include numbness, tingling or weakness in the leg and, in severe cases, burning or aching pain in the leg, foot or toes while resting. As PAD progresses, additional signs and symptoms occur, including cooling or color changes in the skin of the legs or feet, and sores on the legs or feet that do not heal. If untreated, PAD may lead to critical limb ischemia, a condition in which the amount of oxygenated blood being delivered to the limb is insufficient to keep the tissue alive. Critical limb ischemia often leads to large non-healing ulcers, infections, gangrene and, eventually, limb amputation or death.

Table of Contents

According to a report by the U.S. Department of Health and Human Services in 2006, PAD affects approximately eight to 12 million people in the United States. According to 2007 statistics from the American Heart Association, PAD becomes more common with age and affects approximately 12% to 20% of the population over 65 years old. An aging population, coupled with increasing incidence of diabetes and obesity, is likely to increase the prevalence of PAD. In many older PAD patients, particularly those with diabetes, PAD is characterized by fibrotic (moderately hard) or calcified (extremely hard) plaque deposits that have not been successfully treated with existing non-invasive treatment techniques. PAD may involve arteries throughout the leg. Arteries above the knee are generally long, straight and relatively wide, while arteries below the knee are shorter and branch into arteries that are progressively smaller in diameter.

Despite the severity of PAD, it remains relatively underdiagnosed. According to an article published in Podiatry Today in 2006, only approximately 2.5 million of the eight to 12 million people in the United States with PAD are diagnosed. Although we believe the rate of diagnosis of PAD is increasing, underdiagnosis continues due to patients failing to display symptoms or physicians misinterpreting symptoms as normal aging. Recent emphasis on PAD education from medical associations, insurance companies and other groups, coupled with publications in medical journals, is increasing physician and patient awareness of PAD risk factors, symptoms and treatment options. The PARTNERS study, which was published in the Journal of the American Medical Association in 2001, advocated increased PAD screening by primary care physicians.

Physicians treat a significant portion of the 2.5 million people in the United States who are diagnosed with PAD using medical management, which includes lifestyle changes, such as diet and exercise and drug treatment. For instance, within a reference group of more than 1,000 patients from the PARTNERS study, 54% of the patients with a prior diagnosis of PAD were receiving antiplatelet medication treatment. While medications, diet and exercise may improve blood flow, they do not treat the underlying obstruction and many patients have difficulty maintaining lifestyle changes. Additionally, many prescribed medications are contraindicated, or inadvisable, for patients with heart disease, which often exists in PAD patients. As a result of these challenges, many medically managed patients develop more severe symptoms that require procedural intervention.

Coronary Artery Disease

Based on data from the U.S. Agency for Healthcare Research and Quality, or AHRQ, and the U.S. Centers for Medicare and Medicaid Services, we estimate that approximately 924,000 percutaneous coronary interventions, or PCI, procedures occurred in the United States in 2009. Based on various studies, we believe that more than 25% of PCI procedures involve moderate to severe levels of calcified coronary arteries and could benefit from the use of our device. In addition, based on AHRQ data, we estimate that in 2009 approximately 478,000 coronary artery bypass graft surgeries were performed in the United States. These patients generally have higher rates of calcification and we believe they could benefit from the use of our device.

Our Solution

The PAD Systems represent an innovative approach to the treatment of PAD that provides physicians and patients with a procedure that addresses many of the limitations of traditional treatment alternatives. The PAD Systems each use single-use catheters that incorporate a flexible drive shaft with an offset diamond grit coated crown. Physicians position the crown at the site of an arterial plaque-containing lesion and remove the plaque by positioning the crown to orbit against it, creating a smooth lumen, or channel, in the vessel. The PAD Systems are designed to differentiate between hard plaque and soft, compliant arterial tissue, a concept that we refer to as differential sanding.

Normal arteries are compliant and have the ability to expand and contract as needed to supply blood flow to the legs and feet. Arteries burdened with fibrotic and/or calcified plaque due to PAD lose their compliance which makes other therapies such as angioplasty, stenting, surgical bypass and atherectomy problematic. The PAD Systems sand plaque into small particles and restore both blood flow and vessel compliance. The particles created by the PAD Systems are generally smaller than red blood cells and are carried away by the bloodstream. The small size of the particles avoids the need for plaque collection reservoirs. The PAD Systems can typically

Table of Contents

treat the diseased arteries with less than two to three minutes of sanding time, potentially reducing the overall procedure time.

We believe that the PAD Systems offer the following key benefits:

Strong Safety Profile. The differential sanding of the device reduces the risk of arterial perforation and damage to the arterial wall. Moreover, the plaque particles sanded away by the device are so small that they reduce the risk of distal embolization and allow continuous blood flow during the entire procedure, which reduces the risk of complications such as excessive heat and tissue damage.

Proven Efficacy. The orbital motion of the device enables the continuous removal of plaque in both soft and difficult-to-treat calcified lesions, increasing blood flow through the resulting smooth lumen. The efficacy of the device was demonstrated in our pivotal OASIS trial.

Ease of Use. Utilizing familiar techniques, a physician trained in endovascular surgery can complete the treatment with a single insertion while utilizing limited amounts of fluoroscopy during plaque removal.

Treatment Area. The PAD Systems have the ability to treat the entire leg, including small vessels below the knee.

Cost and Time Efficient Procedure. The PAD Systems can create various lumen sizes using a single sized crown, which limits hospital inventory costs and allows a physician to complete a procedure with a single insertion, potentially reducing procedural time. Use of the PAD Systems may also require less expensive capital equipment than some other atherectomy procedures.

Our Strategy

Our goal is to be the leading provider of minimally invasive solutions for the treatment of vascular disease. The key elements of our strategy include:

driving device adoption through our direct sales organization and key opinion leaders;

collecting additional clinical evidence of the benefits of the PAD Systems;

expanding our product portfolio within the market for the treatment of peripheral arteries;

leveraging core technology into the coronary market; and

pursuing strategic acquisitions and partnerships.

Corporate Information

We were incorporated as Replidyne, Inc. in Delaware in 2000. On February 25, 2009, Replidyne, Inc. completed its business combination with Cardiovascular Systems, Inc., a Minnesota corporation (CSI-MN), in accordance with the terms of the Agreement and Plan of Merger and Reorganization, dated as of November 3, 2008, by and among Replidyne, Responder Merger Sub, Inc., a wholly-owned subsidiary of Replidyne (Merger Sub), and CSI-MN (the Merger Agreement). Pursuant to the Merger Agreement, Merger Sub merged with and into CSI-MN, with CSI-MN continuing after the merger as the surviving corporation and a wholly-owned subsidiary of Replidyne. At the effective time of the

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

merger, Replidyne changed its name to Cardiovascular Systems, Inc. and CSI-MN changed its name to CSI Minnesota, Inc. Following the merger of Merger Sub with CSI-MN, CSI-MN merged with and into CSI, with CSI continuing after the merger as the surviving corporation.

Our principal executive office is located at 651 Campus Drive, St. Paul, Minnesota 55112. Our telephone number is (651) 259-1600, and our website is www.csi360.com. The information contained in or accessible through our website is not incorporated by reference into, and should not be considered part of, this prospectus supplement, the accompanying prospectus or the information incorporated herein by reference.

S-3

Table of Contents

The Offering

Common stock offered by us 1,780,000 shares

Common stock to be outstanding after this offering 19,761,924 shares

Use of proceeds We estimate that the net proceeds to us from this offering, after deducting underwriting discounts and commissions and estimated offering expenses, will be approximately \$15.0 million. We intend to use the net proceeds from this offering for working capital and general corporate purposes, which may include the funding of clinical trials and studies, expanding our sales and marketing organization, physician education and awareness programs, development of new products, and repayment of indebtedness. See Use of Proceeds on page S-25 of this prospectus supplement.

Risk Factors Investing in our common stock involves a high degree of risk. You should carefully consider the information set forth in the section of this prospectus supplement entitled Risk Factors beginning on page S-7 as well as other information included in this prospectus supplement, the accompanying prospectus and the documents incorporated herein or therein by reference, including our Annual Report on Form 10-K for the fiscal year ended June 30, 2011 and our Quarterly Report on Form 10-Q for the quarter ended March 31, 2012, before deciding to invest in our common stock.

Nasdaq Global Market symbol CSII
The number of shares of our common stock to be outstanding after this offering is based on 17,981,924 shares of common stock outstanding as of March 31, 2012. Unless specifically stated otherwise, the information in this prospectus supplement excludes:

2,427,810 shares of our common stock issuable upon the exercise of stock options outstanding as of March 31, 2012, at a weighted average exercise price of \$10.25 per share, all of which were then exercisable;

790,780 shares of our common stock reserved for future grants of stock options (or other similar equity instruments) under our Amended and Restated 2007 Equity Incentive Plan, as of March 31, 2012;

90,709 shares of our common stock reserved for purchase under our Amended and Restated 2006 Employee Stock Purchase Plan, as of March 31, 2012;

2,438,784 shares of our common stock issuable upon the exercise of warrants outstanding as of March 31, 2012, at a weighted average exercise price of \$9.00 per share, all of which were then exercisable;

335,954 shares of our common stock issuable upon the conversion of senior convertible promissory notes outstanding as of March 31, 2012, at a weighted average conversion price of \$14.88 per share; and

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

1,702,785 shares of our common stock available for issuance as of March 31, 2012 upon the conversion of senior convertible promissory notes that may be issued under our Loan and Security Agreement with Partners for Growth III, L.P., dated April 14, 2010, as amended.

Shares available for future issuance under our Amended and Restated 2007 Equity Incentive Plan and Amended and Restated 2006 Employee Stock Purchase Plan do not include shares that may become available for issuance pursuant to provisions in these plans that provide for the automatic annual increase in the number of shares reserved thereunder and the re-issuance of shares that are cancelled or forfeited in accordance with such plans.

Unless otherwise indicated, all information in this prospectus supplement assumes:

no exercise of outstanding options or warrants to purchase shares of our common stock, and

no conversion of outstanding senior convertible promissory notes into shares of our common stock.

S-4

Table of Contents**Summary Consolidated Financial Information**

The following table summarizes our consolidated financial data. The following summary of our consolidated statements of operations data for the years ended June 30, 2009, 2010 and 2011 has been derived from, and should be read together with, our audited consolidated financial statements and related notes included in our Annual Report on Form 10-K for the fiscal year ended June 30, 2011 filed with the SEC on September 12, 2011 and incorporated by reference into this prospectus supplement, referred to in this prospectus supplement as the 2011 Form 10-K. The consolidated statements of operations data for the nine months ended March 31, 2011 and 2012 and the balance sheet data as of March 31, 2012 has been derived from our unaudited financial statements included in our Quarterly Report on Form 10-Q for the quarter ended March 31, 2012 filed with the SEC on May 8, 2012 and incorporated by reference into this prospectus supplement, referred to in this prospectus supplement as the third quarter 2012 Form 10-Q. The unaudited interim financial information set forth below has been prepared on the same basis as our audited financial statements and we have included all adjustments, consisting only of normal recurring adjustments, that we consider necessary for a fair statement of our financial position and operating results for such periods. Our historical results are not necessarily indicative of the results to be expected in any future period and the results for the nine months ended March 31, 2012 are not necessarily indicative of the results to be expected for the full fiscal year. You should read the summary financial data set forth below in conjunction with Management's Discussion and Analysis of Financial Condition and Results of Operations and our consolidated financial statements and related notes included in our 2011 Form 10-K and third quarter 2012 Form 10-Q.

| | 2009 ⁽¹⁾ | Year Ended June 30, 2010 | 2011 | Nine Months Ended March 31, 2011 | 2012 |
|------------------------------------------------------------|---------------------|----------------------------------------------------|-------------|-------------------------------------|-------------|
| | | (In thousands, except per share and share amounts) | | | |
| | | (Unaudited) | | | |
| Consolidated Statements of Operations | | | | | |
| Data: | | | | | |
| Revenues | \$ 56,461 | \$ 64,829 | \$ 78,780 | \$ 57,073 | \$ 59,583 |
| Cost of goods sold | 16,194 | 15,003 | 16,277 | 12,063 | 14,038 |
| Gross profit | 40,267 | 49,826 | 62,503 | 45,010 | 45,545 |
| Expenses: | | | | | |
| Selling, general and administrative | 59,822 | 62,447 | 62,372 | 46,597 | 47,892 |
| Research and development | 14,678 | 10,278 | 8,940 | 6,316 | 8,133 |
| Total expenses | 74,500 | 72,725 | 71,312 | 52,913 | 56,025 |
| Loss from operations | (34,233) | (22,899) | (8,809) | (7,903) | (10,480) |
| Interest and other, net | 2,338 | (1,005) | (2,316) | (739) | (1,705) |
| Net loss | (31,895) | (23,904) | (11,125) | (8,642) | (12,185) |
| Decretion of redeemable convertible preferred stock | 22,781 | | | | |
| Net loss available to common shareholders | \$ (9,114) | \$ (23,904) | \$ (11,125) | \$ (8,642) | \$ (12,185) |
| Net loss per common share: | | | | | |
| Basic and diluted ⁽¹⁾ | \$ (1.13) | \$ (1.62) | \$ (0.70) | \$ (0.55) | (0.69) |
| Weighted average common shares used in computation: | | | | | |
| Basic and diluted ⁽¹⁾ | 8,068,689 | 14,748,293 | 15,915,800 | 15,778,287 | 17,746,558 |

Table of Contents

- (1) See Note 12 of the notes to our unaudited consolidated financial statements included in our 2011 Form 10-K for a description of the method used to compute basic and diluted net loss per common share and basic and diluted weighted-average number of shares used in per common share calculations.

| | As of March 31, 2012 | |
|-------------------------------------------|----------------------|----------------------------|
| | Actual | As Adjusted ⁽¹⁾ |
| | (In thousands) | |
| | (Unaudited) | |
| Consolidated Balance Sheet Data: | | |
| Cash and cash equivalents | \$ 22,455 | \$ 37,414 |
| Working capital ⁽²⁾ | 28,111 | 43,070 |
| Total current assets | 44,249 | 59,208 |
| Total assets | 49,821 | 64,780 |
| Long-term debt, net of current maturities | 14,063 | 14,063 |
| Total liabilities | 30,482 | 30,482 |
| Total stockholders' equity | 19,339 | 34,298 |

- (1) On an adjusted basis to reflect the receipt of the estimated net proceeds from the sale of 1,780,000 shares of common stock in this offering at a public offering price of \$9.00 per share, after deducting underwriting discounts and commissions and estimated offering expenses payable by us.

- (2) Working capital is calculated as total current assets less total current liabilities as of the balance sheet date indicated.

Table of Contents

Risk Factors

Investing in our common stock involves a high degree of risk. You should carefully consider the risks described below, along with the other information in this prospectus supplement and the accompanying prospectus and the other information incorporated herein or therein by reference. If any of these risks occur, our business could be materially harmed, and our financial condition and results of operations could be materially and adversely affected. As a result, the price of our common stock could decline, and you could lose all or part of your investment.

Risks Relating to Our Business and Operations

We have a history of net losses and we are likely to continue to incur losses.

We are not profitable and have incurred net losses in each fiscal year since our formation in 1989. In particular, we had net losses of \$12.2 million in the nine months ended March 31, 2012, \$11.1 million in fiscal 2011, \$23.9 million in fiscal 2010 and \$31.9 million in fiscal 2009. As of March 31, 2012, we had an accumulated deficit of approximately \$174.6 million. We commenced commercial sales of the Diamondback 360° in September 2007, and our short commercialization experience makes it difficult for us to predict future performance. We also expect to incur significant additional expenses for sales and marketing and manufacturing as we continue to commercialize the PAD Systems and additional expenses as we seek to develop and commercialize future versions of the PAD Systems and other products. Additionally, we expect that our general and administrative expenses will increase as our business grows. As a result, our operating losses are likely to continue.

We may be unable to sustain our revenue growth.

Our revenue has grown in each of the three complete fiscal years since we commenced commercial sales of the Diamondback 360° in September 2007. Our ability to continue to increase our revenues in future periods will depend on our ability to increase sales of the PAD Systems and new and improved products we introduce, including growing our customer base and reorders of the PAD Systems from those customers. We may not be able to generate, sustain or increase revenues on a quarterly or annual basis. If we cannot achieve or sustain revenue growth for an extended period, our financial results will be adversely affected and our stock price may decline.

Economic conditions may adversely affect our business.

Adverse worldwide economic conditions may have adverse implications on our business. For example, our customers' ability to borrow money from their existing lenders or to obtain credit from other sources to fund operations may be impaired resulting in a decrease in sales. Although we review our customers' financial condition and ability to pay on an ongoing basis and we maintain allowances for doubtful accounts for estimated losses resulting from the inability of our customers to make required payments, we cannot guarantee that we will continue to experience the same loss rates that we have in the past. A significant change in the liquidity or financial condition of our customers could cause unfavorable trends in our receivable collections and additional allowances may be required, which could adversely affect our operating results. Adverse worldwide economic conditions may also adversely impact our suppliers' ability to provide us with materials and components, which could adversely affect our business and operating results. In addition, uncertainty about current global economic conditions could increase the volatility of our stock price.

We have a limited history selling the PAD Systems, which are currently our primary products, and our inability to market these products successfully would have a material adverse effect on our business and financial condition.

Although we also sell a variety of ancillary products, the PAD Systems are our primary products and we are largely dependent on them. We have limited experience in the commercial manufacturing and marketing of these products. Our ability to generate revenue will depend upon our ability to further successfully commercialize the PAD Systems and to develop, manufacture and receive required regulatory clearances and approvals and patient

Table of Contents

reimbursement for treatment with future versions of the PAD Systems. As we continue to commercialize the PAD Systems, we may need to expand our sales force to reach our target market. Developing a sales force is expensive and time consuming and could delay or limit the success of any product launch. Thus, we may not be able to expand our sales and marketing capabilities on a timely basis or at all. If we are unable to adequately increase these capabilities, we will need to contract with third parties to market and sell the PAD Systems and any other products that we may develop. To the extent that we enter into arrangements with third parties to perform sales, marketing and distribution services on our behalf, our product revenues could be lower than if we marketed and sold our products on a direct basis. Furthermore, any revenues resulting from co-promotion or other marketing and sales arrangements with other companies will depend on the skills and efforts of others, and we do not know whether these efforts will be successful. If we fail to successfully develop, commercialize and market the PAD Systems or any future versions of these products that we develop, our business will be materially adversely affected.

The PAD Systems and future products may never achieve broad market acceptance.

The PAD Systems and future products we may develop may never gain broad market acceptance among physicians, patients and the medical community. The degree of market acceptance of any of our products will depend on a number of factors, including:

the actual and perceived effectiveness and reliability of our products;

the prevalence and severity of any adverse patient events involving our products;

the results of any clinical trials relating to use of our products;

the availability, relative cost and perceived advantages and disadvantages of alternative technologies or treatment methods for conditions treated by our systems;

the degree to which treatments using our products are approved for reimbursement by public and private insurers;

the strength of our marketing and distribution infrastructure; and

the level of education and awareness among physicians and hospitals concerning our products.

Failure of the PAD Systems to significantly penetrate current or new markets would negatively impact our business, financial condition and results of operations.

If longer-term or more extensive clinical trials performed by us or others indicate that procedures using the PAD Systems or any future products are not safe, effective and long lasting, physicians may choose not to use our products. Furthermore, unsatisfactory patient outcomes or injuries could cause negative publicity for our products. Physicians may be slow to adopt our products if they perceive liability risks arising from the use of these products. It is also possible that as our products become more widely used, latent defects could be identified, creating negative publicity and liability problems for us, thereby adversely affecting demand for our products. If the PAD Systems and our future products do not achieve an adequate level of acceptance by physicians, patients and the medical community, our overall business and profitability would be harmed.

Our future growth depends on physician adoption of the PAD Systems, which requires physicians to change their screening and referral practices.

We believe that we must educate physicians to change their screening and referral practices. For example, although there is a significant correlation between PAD and coronary artery disease, or CAD, many physicians do not routinely screen for PAD while screening for CAD. We target our sales efforts to interventional cardiologists, vascular surgeons and interventional radiologists because they are often the primary care physicians diagnosing and treating both CAD and PAD. However, the initial point of contact for many patients may be general practitioners,

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

podiatrists, nephrologists and endocrinologists, each of whom commonly treats patients experiencing complications resulting from PAD. If referring physicians are not educated about PAD in general and the existence of the PAD Systems in particular, they may not refer patients to interventional

S-8

Table of Contents

cardiologists, vascular surgeons or interventional radiologists for the procedure using the PAD Systems, and those patients may instead be surgically treated or treated with an alternative interventional procedure. If we are not successful in educating physicians about screening for PAD or referral opportunities, our ability to increase our revenue may be impaired.

Our customers may not be able to achieve adequate reimbursement for using the PAD Systems, which could affect the acceptance of our products and cause our business to suffer.

The availability of insurance coverage and reimbursement for newly approved medical devices and procedures is uncertain. The commercial success of our products is substantially dependent on whether third-party insurance coverage and reimbursement for the use of such products and related services are available. We expect the PAD Systems to generally be purchased by hospitals and other providers who will then seek reimbursement from various public and private third-party payors, such as Medicare, Medicaid and private insurers, for the services provided to patients. We can give no assurance that these third-party payors will provide adequate reimbursement for use of the PAD Systems to permit hospitals and doctors to consider the products cost-effective for patients requiring PAD treatment, or that current reimbursement levels for the PAD Systems will continue. In addition, the overall amount of reimbursement available for PAD treatment could decrease in the future. Failure by hospitals and other users of our products to obtain sufficient reimbursement could cause our business to suffer.

Medicare, Medicaid, health maintenance organizations and other third-party payors are increasingly attempting to contain healthcare costs by limiting both coverage and the level of reimbursement, and, as a result, they may not cover or provide adequate payment for use of the PAD Systems. In order to position the PAD Systems for acceptance by third-party payors, we may have to agree to lower prices than we might otherwise charge.

Governmental and private sector payors have instituted initiatives to limit the growth of healthcare costs using, for example, price regulation or controls and competitive pricing programs. Some third-party payors also require demonstrated superiority, on the basis of randomized clinical trials, or pre-approval of coverage, for new or innovative devices or procedures before they will reimburse healthcare providers who use such devices or procedures. It is uncertain whether the PAD Systems or any future products we may develop will be viewed as sufficiently cost-effective to warrant adequate coverage and reimbursement levels.

If third-party coverage and reimbursement for the PAD Systems is limited or not available, the acceptance of the PAD Systems and, consequently, our business will be substantially harmed.

Healthcare reform legislation could adversely affect our operating results and financial condition.

There have been and continue to be proposals by the federal government, state governments, regulators and third-party payors to control healthcare costs and, more generally, to reform the U.S. healthcare system. Certain of these proposals could limit the prices we are able to charge for our products or the amounts of reimbursement available for our products and could limit the acceptance and availability of our products. The adoption of some or all of these proposals, including the recent federal legislation, could adversely affect our revenue and financial condition.

On March 23, 2010, President Obama signed the Patient Protection and Affordable Care Act, or the Patient Act. The impact on the healthcare industry of the Patient Act is extensive and includes, among other things, having the federal government assume a larger role in the healthcare system, expanding healthcare coverage of United States citizens and mandating basic healthcare benefits. Elements of this legislation, such as comparative effectiveness research, an independent payment advisory board, payment system reforms, including shared savings programs and other provisions, could meaningfully change the way healthcare is developed and delivered, and may materially impact numerous aspects of our business. These changes may impact reimbursement for health care services, including reimbursement to hospitals and physicians. States may also enact further legislation that impacts Medicaid payments to hospitals and physicians. In addition, the Centers for Medicare & Medicaid Services, the Federal agency responsible for administering the Medicare program, may establish new payment levels for hospitals and physicians in line with the new legislation, which could increase or decrease payment to such entities. The healthcare reform legislation and any future legislative and regulatory

Table of Contents

initiatives could adversely affect demand for our products and have a material adverse impact on our operating results. Any healthcare reforms enacted in the future may, like the Patient Act, be phased in over a number of years but, if enacted, could reduce our revenues, increase our costs, or require us to revise the ways in which we conduct business or put us at risk for loss of business. Our results of operations, financial position and cash flows could be materially adversely affected by changes under the Patient Act and changes under any federal or state legislation adopted in the future.

The Patient Act also imposes significant new taxes on medical device makers. These taxes will result in a significant increase in the tax burden on our industry, which could have a material, negative impact on our results of operations, financial position and cash flows. As rules and regulations are developed under the new law, there may be exemptions created for certain types or classes of products. We may find, however, that there are no exemptions applicable to our products. This tax will impact our cost of doing business and may ultimately lower our profit margins. Additionally, the increased cost of business caused by this tax may hinder our ability to spend money on research and development of our products. We may be required to increase the prices of our devices to offset the additional cost of the tax. Medicaid and health insurance providers may place a cap on the reimbursement for purchases of our devices that will not allow us to offset the cost of the tax. We may ultimately lose customers who are unwilling or unable to pay the increased costs, which could adversely affect our business and operating results.

We have limited data and experience regarding the safety and efficacy of the PAD Systems. Any long-term data that is generated may not be positive or consistent with our limited short-term data, which would affect market acceptance of these products.

Our success depends on the acceptance of the PAD Systems by the medical community as safe and effective. Because our technology is relatively new in the treatment of PAD, we have performed clinical trials only with limited patient populations. The long-term effects of using the PAD Systems in a large number of patients are not known and the results of short-term clinical use of the PAD Systems do not necessarily predict long-term clinical benefit or reveal long-term adverse effects. If the results obtained from any future clinical trials or clinical or commercial experience indicate that the PAD Systems are not as safe or effective as other treatment options or as current short-term data would suggest, adoption of these products may suffer and our business would be harmed.

Even if we believe that the data collected from clinical trials or clinical experience indicate positive results, each physician's actual experience with our device will vary. Clinical trials conducted with the PAD Systems have involved procedures performed by physicians who are very technically proficient. Consequently, both short and long-term results reported in these studies may be significantly more favorable than typical results achieved by physicians, which could negatively impact market acceptance of the PAD Systems.

We face significant competition and may be unable to sell the PAD Systems at profitable levels.

We compete against very large and well-known stent and balloon angioplasty device manufacturers, including Abbott Laboratories, Boston Scientific, Cook Medical, Johnson & Johnson and Medtronic. We may have difficulty competing effectively with these competitors because of their well-established positions in the marketplace, significant financial and human capital resources, established reputations and worldwide distribution channels. We also compete against manufacturers of atherectomy catheters including, among others, Covidien, Spectranetics, Boston Scientific and MEDRAD, as well as other manufacturers that may enter the market due to the increasing demand for treatment of vascular disease. Several other companies provide products used by surgeons in peripheral bypass procedures. Other competitors include pharmaceutical companies that manufacture drugs for the treatment of mild to moderate PAD and companies that provide products used by surgeons in peripheral bypass procedures.

Our competitors may:

develop and patent processes or products earlier than we will;

obtain regulatory clearances or approvals for competing medical device products more rapidly than we will;

Table of Contents

market their products more effectively than we will; or

develop more effective or less expensive products or technologies that render our technology or products obsolete or non-competitive. We have encountered and expect to continue to encounter potential customers who, due to existing relationships with our competitors, are committed to or prefer the products offered by these competitors. If we are unable to compete successfully, our revenue will suffer. Increased competition might lead to price reductions and other concessions that might adversely affect our operating results. Competitive pressures may decrease the demand for our products and could adversely affect our financial results.

Our ability to compete depends on our ability to innovate successfully. If our competitors demonstrate the increased safety or efficacy of their products as compared to ours, our revenue may decline.

The market for medical devices is highly competitive, dynamic and marked by rapid and substantial technological development and product innovations. Our ability to compete depends on our ability to innovate successfully, and there are few barriers that would prevent new entrants or existing competitors from developing products that compete directly with our products. Demand for the PAD Systems could be diminished by equivalent or superior products and technologies offered by competitors. Our competitors may produce more advanced products than ours or demonstrate superior safety and efficacy of their products. If we are unable to innovate successfully, the PAD Systems could become obsolete and our revenue would decline as our customers purchase competitor products.

We have limited commercial manufacturing experience and could experience difficulty in producing the PAD Systems or will need to depend on third parties to manufacture the products.

We have limited experience in commercially manufacturing the PAD Systems and have no experience manufacturing these products in the volume that we anticipate will be required if we achieve planned levels of commercial sales. As a result, we may not be able to develop and implement efficient, low-cost manufacturing capabilities and processes that will enable us to manufacture the PAD Systems or future products in significant volumes, while meeting the legal, regulatory, quality, price, durability, engineering, design and production standards required to market our products successfully. If we fail to develop and implement these manufacturing capabilities and processes, we may be unable to profitably commercialize the PAD Systems and any future products we may develop because the per unit cost of our products is highly dependent upon production volumes and the level of automation in our manufacturing processes. There are technical challenges to increasing manufacturing capacity, including equipment design and automation capabilities, material procurement, problems with production yields and quality control and assurance. Increasing our manufacturing capacity may require that we invest substantial additional funds and hire and retain additional management and technical personnel who have the necessary manufacturing experience. We may not successfully complete any required increase in manufacturing capacity in a timely manner or at all. If we are unable to manufacture a sufficient supply of our products, maintain control over expenses or otherwise adapt to anticipated growth, or if we underestimate growth, we may not have the capability to satisfy market demand and our business will suffer.

The forecasts of demand we use to determine order quantities and lead times for components purchased from outside suppliers may be incorrect. Failure to obtain required components or subassemblies when needed and at a reasonable cost would adversely affect our business.

In addition, we may in the future need to depend upon third parties to manufacture the PAD Systems and future products. We also cannot assure you that any third-party contract manufacturers will have the ability to produce the quantities of our products needed for development or commercial sales or will be willing to do so at prices that allow the products to compete successfully in the market. Additionally, we can give no assurance that even if we do contract with third-party manufacturers for production that these manufacturers will not experience manufacturing difficulties or experience quality or regulatory issues. Any difficulties in locating and hiring third-party manufacturers, or in the ability of third-party manufacturers to supply quantities of our products at the times and in the quantities we need, could have a material adverse effect on our business.

Table of Contents

We depend upon third-party suppliers, including single source suppliers to us and our customers, making us vulnerable to supply problems and price fluctuations.

We rely on third-party suppliers to provide us with certain components of our products and to provide key components or supplies to our customers for use with our products. We rely on single source suppliers for the components of the PAD Systems. We purchase components from these suppliers on a purchase order basis and carry only limited levels of inventory for these components. If we underestimate our requirements, we may not have an adequate supply, which could interrupt manufacturing of our products and result in delays in shipments and loss of revenue. Conversely, an overestimation of our requirements will reduce our cash available for operations and may result in excess or obsolete materials.

We depend on our suppliers to provide us and our customers with materials in a timely manner that meet our and their quality, quantity and cost requirements. These suppliers may encounter problems during manufacturing for a variety of reasons, any of which could delay or impede their ability to meet our demand and our customers' demand. Our reliance on these outside suppliers also subjects us to other risks that could harm our business, including:

interruption of supply resulting from modifications to, or discontinuation of, a supplier's operations;

delays in product shipments;

price fluctuations;

our suppliers may make errors in manufacturing components;

our suppliers may discontinue production of components;

we and our customers may not be able to obtain adequate supplies in a timely manner or on commercially acceptable terms;

we and our customers may have difficulty locating and qualifying alternative suppliers for our and their sole-source supplies;

switching components may require product redesign and new regulatory submissions;

we may experience production delays related to the evaluation and testing of products from alternative suppliers and corresponding regulatory qualifications;

our suppliers manufacture products for a range of customers, and fluctuations in demand for the products these suppliers manufacture for others may affect their ability to deliver components to us or our customers in a timely manner; and

our suppliers may encounter financial hardships unrelated to us or our customers' demand for components or other products. Any supply interruption from our suppliers or failure to obtain additional suppliers for any of the components used in our products would limit our ability to manufacture our products and could have a material adverse effect on our business, financial condition and results of operations. If we lost one of these suppliers and were unable to obtain an alternate source on a timely basis or on terms acceptable to us, our production schedules could be delayed, our margins could be negatively impacted, and we could fail to meet our customers' demand. Our customers rely

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

upon our ability to meet committed delivery dates and any disruption in the supply of key components would adversely affect our ability to meet these dates and could result in legal action by our customers, cause us to lose customers or harm our ability to attract new customers, any of which could decrease our revenue and negatively impact our growth. In addition, to the extent that our suppliers use technology or manufacturing processes that are proprietary, we may be unable to obtain comparable materials or components from alternative sources.

We may be faced with a supplier's decision to discontinue manufacturing a component, which may force us or our customers to make last time purchases, qualify a substitute part, or make a design change which may divert engineering time away from the development of new products.

S-12

Table of Contents

Consolidation in the healthcare industry could lead to demands for price concessions or the exclusion of some suppliers from our market segment, which could have an adverse effect on our business, financial condition or results of operations.

The cost of healthcare has risen significantly over the past decade and numerous initiatives and reforms by legislators, regulators and third-party payors to curb these costs have resulted in a consolidation trend in the healthcare industry. This in turn has resulted in greater pricing pressures and the exclusion of certain suppliers from important market segments as group purchasing organizations, independent delivery networks and large single accounts continue to consolidate purchasing decisions for some of our hospital customers. We expect that market demand, government regulation, third-party reimbursement policies, government contracting requirements, and societal pressures will continue to change the worldwide healthcare industry, resulting in further business consolidations and alliances among our customers and competitors, which may reduce competition, exert downward pressure on the prices of our products and adversely impact our business, financial condition or results of operations.

We may need to increase the size of our organization and we may experience difficulties managing growth. If we are unable to manage the anticipated growth of our business, our future revenue and operating results may be adversely affected.

The growth we may experience in the future may provide challenges to our organization, requiring us to rapidly expand our sales and marketing personnel and manufacturing operations. Our sales and marketing force has increased from six full-time employees on January 1, 2007 to 161 full-time employees on March 31, 2012, and we expect to continue to grow our sales and marketing force in the future. We also expect to significantly expand our manufacturing operations to meet anticipated growth in demand for our products. Rapid expansion in personnel may result in less experienced people producing and selling our product, which could result in unanticipated costs and disruptions to our operations. If we cannot scale and manage our business appropriately, our anticipated growth may be impaired and our financial results will suffer.

We may require additional financing, and our failure to obtain additional financing when needed could force us to delay, reduce or eliminate our product development programs or commercialization efforts.

We may be dependent on additional financing to execute our business plan. We may require additional capital in order to continue to conduct the research and development and obtain regulatory clearances and approvals necessary to bring any future products to market and to establish effective marketing and sales capabilities for existing and future products. Our operating plan may change, and we may need additional funds sooner than anticipated to meet our operational needs and capital requirements for product development, clinical trials and commercialization. Additional funds may not be available when we need them on terms that are acceptable to us, or at all. If adequate funds are not available on a timely basis, we may terminate or delay the development of one or more of our products, or delay establishment of sales and marketing capabilities or other activities necessary to commercialize our products.

Our future capital requirements will depend on many factors, including:

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

the degree of success we experience in commercializing the PAD Systems;

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

the costs, timing and outcomes of regulatory reviews associated with our future product candidates;

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

the extent and scope of our general and administrative expenses.

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

Disruptions in the global financial markets, including the bankruptcy, failure, collapse or sale of various financial institutions and an unprecedented level of intervention from the United States and other governments

S-13

Table of Contents

and the related liquidity crisis, considerably disrupted the credit and capital markets at the end of 2008 and markets have not fully recovered since then. In the event we need or desire additional financing, we may be unable to obtain it by borrowing money in the credit markets or raising money in the capital markets.

We face a risk of non-compliance with the financial covenants in our loan and security agreements with Silicon Valley Bank and Partners for Growth.

We are party to loan and security agreements with Silicon Valley Bank and Partners for Growth. These agreements require us to maintain, among other things, a monthly specified liquidity ratio and a monthly adjusted earnings before interest, taxes, depreciation and amortization, or EBITDA, level. The agreements contain customary events of default, including, among others, the failure to comply with certain covenants or other agreements. Upon the occurrence and during the continuation of an event of default, amounts due under the agreements may be accelerated by Silicon Valley Bank or Partners for Growth. We were not in compliance with some of the financial covenants contained in our prior loan agreement with Silicon Valley Bank during certain months in the year ended June 30, 2010, which Silicon Valley Bank waived and these covenants were subsequently changed in our amended and restated loan and security agreement with Silicon Valley Bank. If we are unable to meet the financial or other covenants under the current loan and security agreements or negotiate future waivers or amendments of such covenants, events of default could occur under the agreements. Upon the occurrence and during the continuance of an event of default under the agreements, Silicon Valley Bank and Partners for Growth have available a range of remedies customary in these circumstances, including declaring all outstanding debt, together with accrued and unpaid interest thereon, to be due and payable, foreclosing on the assets securing the agreements and/or ceasing to provide additional loans, which could have a material adverse effect on us.

The restrictive covenants in our loan and security agreements could limit our ability to conduct our business and respond to changing economic and business conditions and may place us at a competitive disadvantage relative to other companies that are subject to fewer restrictions.

Our loan and security agreements with Silicon Valley Bank and Partners for Growth limit our ability to, among other things:

transfer all or any part of our business or properties;

permit or suffer a change in control;

merge or consolidate, or acquire any entity;

incur additional indebtedness or liens with respect to any of their properties;

pay dividends or make any other distribution on or purchase of, any of our capital stock;

make investments in other companies; or

engage in related party transactions.

The restrictive covenants under these agreements could limit our ability to obtain future financing, withstand a future downturn in our business or the economy in general or otherwise conduct necessary corporate activities. The financial and restrictive covenants contained in the agreements could also adversely affect our ability to respond to changing economic and business conditions and place us at a competitive disadvantage relative to other companies that may be subject to fewer restrictions. Transactions that we may view as important opportunities, such as acquisitions, may be subject to the consent of Silicon Valley Bank and Partners for Growth, which consents may be withheld or granted subject to conditions specified at the time that may affect the attractiveness or viability of the transaction.

We do not intend to market the PAD Systems internationally in the near future, which will limit our potential revenue from these products.

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

While we plan to continue to evaluate the financial viability of marketing the PAD Systems internationally and may use proceeds from this offering to commence international efforts, we currently do not intend to market

S-14

Table of Contents

the PAD Systems internationally in the near future in order to focus our resources and efforts on the U.S. market, as international efforts would require substantial additional sales and marketing, regulatory and personnel expenses. Our decision to market these products only in the United States will limit our ability to reach all of our potential markets and will limit our potential sources of revenue. In addition, our competitors will have an opportunity to further penetrate and achieve market share abroad until such time, if ever, that we market the PAD Systems or other products internationally.

We are dependent on our senior management team and highly skilled personnel, and our business could be harmed if we are unable to attract and retain personnel necessary for our success.

We are highly dependent on our senior management, especially David L. Martin, our President and Chief Executive Officer. Our success will depend on our ability to retain senior management and to attract and retain qualified personnel in the future, including scientists, clinicians, engineers and other highly skilled personnel and to integrate current and additional personnel in all departments. Competition for senior management personnel, as well as scientists, clinical and regulatory specialists, engineers and sales personnel, is intense and we may not be able to retain our personnel. The loss of members of our senior management, scientists, clinical and regulatory specialists, engineers and sales personnel could prevent us from achieving our objectives of continuing to grow the company. The loss of a member of our senior management or professional staff would require the remaining senior executive officers to divert immediate and substantial attention to seeking a replacement. In particular, we expect to substantially increase the size of our sales force, which will require management's attention. We do not carry key person life insurance on any of our employees.

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

Under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended, if a corporation undergoes an ownership change, the corporation's ability to use its pre-change net operating loss carryforwards and other pre-change tax attributes, such as research tax credits, to offset its post-change income may be limited. In general, an ownership change will occur if there is a cumulative change in our ownership by 5-percent shareholders that exceeds 50 percentage points over a rolling three-year period. Similar rules may apply under state tax laws. We may have experienced an ownership change in the past and we may also experience ownership changes in the future as a result of this issuance or future transactions in our stock, some of which may be outside our control. As a result, if we earn net taxable income, our ability to use our pre-change net operating loss carryforwards or other pre-change tax attributes to offset United States federal and state taxable income may be subject to limitations.

Risks Related to Government Regulation

Our ability to market the PAD Systems in the United States is limited to use as a therapy in patients with PAD, and if we want to expand our marketing claims, we will need to file for additional FDA clearances or approvals and conduct further clinical trials, which would be expensive and time-consuming and may not be successful.

The PAD Systems received FDA 510(k) clearances in the United States for use as a therapy in patients with PAD. This general clearance restricts our ability to market or advertise the PAD Systems beyond this use and could affect our growth. While off-label uses of medical devices are common and the FDA does not regulate physicians' choice of treatments, the FDA does restrict a manufacturer's communications regarding such off-label use. We are not permitted to actively promote or advertise the PAD Systems for off-label uses. In addition, we cannot make comparative claims regarding the use of the PAD Systems against any alternative treatments without conducting head-to-head comparative clinical trials, which would be expensive and time consuming. If our promotional activities fail to comply with the FDA's regulations or guidelines, we may be subject to FDA warnings or enforcement action.

If we determine to market the PAD Systems in the United States for other uses, for instance, use in the coronary arteries, we would need to conduct further clinical trials and obtain premarket approval from the FDA. In 2008, we completed the ORBIT I trial, a 50-patient study in India which investigated the safety of the

Table of Contents

Diamondback 360° in treating calcified coronary artery lesions, and results successfully met both safety and efficacy endpoints. In May 2011, we received approval from the FDA to complete enrollment of 429 patients in our ORBIT II clinical trial for a coronary application for the Diamondback 360°, which followed the FDA's review of data from the first 50 cases in the ORBIT II trial. As of May 2, 2012, patient enrollment in the ORBIT II trial was over 65% complete. Clinical trials are complex, expensive, time consuming, uncertain and subject to substantial and unanticipated delays. Clinical trials generally involve a substantial number of patients in one or more multi-year studies. We may encounter problems with our clinical trials, and any of those problems could cause us or the FDA to suspend those trials, or delay the analysis of the data derived from them.

A number of events or factors, including any of the following, could delay the completion of our clinical trials in the future and negatively impact our ability to obtain FDA clearance or approval for, and to introduce, a particular future product:

delays in obtaining or maintaining required approvals from institutional review boards or other reviewing entities at clinical sites selected for participation in our clinical trials;

insufficient supply of our future product candidates or other materials necessary to conduct our clinical trials;

difficulties in enrolling patients in our clinical trials;

negative or inconclusive results from clinical trials, results that are inconsistent with earlier results, or the likelihood that the part of the human anatomy involved is more prone to serious adverse events, necessitating additional clinical trials;

serious or unexpected side effects experienced by patients who use our future product candidates; or

failure by any of our third-party contractors or investigators to comply with regulatory requirements or meet other contractual obligations in a timely manner.

Our clinical trials may not begin as planned, may need to be redesigned, and may not be completed on schedule, if at all. Delays in our clinical trials may result in increased development costs for our future product candidates, which could limit our ability to obtain additional financing. In addition, if one or more of our clinical trials is delayed, competitors may be able to bring products to market before we do, and the commercial viability of our future product candidates could be significantly reduced.

We may become subject to regulatory actions if we are found to have promoted the PAD Systems for unapproved uses.

If the FDA determines that our promotional materials, training or other activities constitute promotion of our products for unapproved uses, it could request that we cease use of or modify our training or promotional materials or subject us to regulatory enforcement actions, including the issuance of an untitled or warning letter, injunction, seizure, civil fine and criminal penalties. It is also possible that other federal, state or foreign enforcement authorities might take action if they consider promotional, training or other materials to constitute promotion of our products for an unapproved or uncleared use, which could result in significant fines or penalties under other statutory authorities, such as laws prohibiting false claims for reimbursement.

The PAD Systems may in the future be subject to product recalls that could harm our reputation.

The FDA and similar governmental authorities in other countries have the authority to require the recall of commercialized products in the event of material regulatory deficiencies or defects in design or manufacture. A government mandated or voluntary recall by us could occur as a result of component failures, manufacturing errors or design or labeling defects. During the time of commercialization, we have had two minor instances of recall, involving a single lot of Diamondback 360° devices (eight units), and two boxes of ViperWires (ten wires), related to Use By date labeling issues. In addition, a third recall, initiated in 2009 and completed in 2010, involved the ViperSheath, which is owned and manufactured by Thomas Medical Products. As the distributor for the ViperSheath, we were required to recall all unused units from our

customers and return them to Thomas Medical Products. Any additional recalls of our products or products that we distribute would divert

S-16

Table of Contents

managerial and financial resources, harm our reputation with customers and have an adverse effect on our financial condition and results of operations.

If we or our suppliers fail to comply with ongoing regulatory requirements, or if we experience unanticipated problems, our products could be subject to restrictions or withdrawal from the market.

The PAD Systems and related manufacturing processes, clinical data, adverse events, recalls or corrections and promotional activities, are subject to extensive regulation by the FDA and other regulatory bodies. In particular, we are required to comply with the FDA's Quality System Regulation, or QSR, and other regulations, which cover the methods and documentation of the design, testing, production, control, quality assurance, labeling, packaging, storage and shipping of any product for which we obtain marketing clearance or approval. We are also responsible for the quality of components received by our suppliers. Failure to comply with the QSR requirements or other statutes and regulations administered by the FDA and other regulatory bodies, or failure to adequately respond to any observations, could result in, among other things:

warning or other letters from the FDA;

finances, injunctions and civil penalties;

product recall or seizure;

unanticipated expenditures;

delays in clearing or approving or refusal to clear or approve products;

withdrawal or suspension of approval or clearance by the FDA or other regulatory bodies;

orders for physician notification or device repair, replacement or refund;

operating restrictions, partial suspension or total shutdown of production or clinical trials; and

criminal prosecution.

If any of these actions were to occur, it would harm our reputation and cause our product sales to suffer.

Furthermore, any modification to a device that has received FDA clearance or approval that could significantly affect its safety or efficacy, or that would constitute a major change in its intended use, design or manufacture, requires a new clearance or approval from the FDA. If the FDA disagrees with any determination by us that new clearance or approval is not required, we may be required to cease marketing or to recall the modified product until we obtain clearance or approval. In addition, we could be subject to significant regulatory fines or penalties.

Regulatory clearance or approval of a product may also require costly post-marketing testing or surveillance to monitor the safety or efficacy of the product. Later discovery of previously unknown problems with our products, including unanticipated adverse events or adverse events of unanticipated severity or frequency, manufacturing problems, or failure to comply with regulatory requirements such as the QSR, may result in restrictions on such products or manufacturing processes, withdrawal of the products from the market, voluntary or mandatory recalls, fines, suspension of regulatory approvals, product seizures, injunctions or the imposition of civil or criminal penalties.

The use, misuse or off-label use of the PAD Systems may increase the risk of injury, which could result in product liability claims and damage to our business.

The use, misuse or off-label use of the PAD Systems may result in injuries that lead to product liability suits, which could be costly to our business. The PAD Systems are not FDA-cleared or approved for treatment of the carotid arteries, the coronary arteries, within bypass grafts or stents, of thrombus or where the lesion cannot be crossed with a guidewire or a significant dissection is present at the lesion site. We cannot prevent a physician from using the PAD Systems for off-label applications. The off-label use of the PAD Systems may be more likely to result in complications that have serious consequences, including, in certain circumstances, death.

S-17

Table of Contents

We may face risks related to product liability claims, which could exceed the limits of available insurance coverage.

If the PAD Systems are defectively designed, manufactured or labeled, contain defective components or are misused, we may become subject to costly litigation by our customers or their patients. The medical device industry is subject to substantial litigation, and we face an inherent risk of exposure to product liability claims in the event that the use of our products results or is alleged to have resulted in adverse effects to a patient. In most jurisdictions, producers of medical products are strictly liable for personal injuries caused by medical devices. We may be subject in the future to claims for personal injuries arising out of the use of our products. Product liability claims could divert management's attention from our core business, be expensive to defend and result in sizable damage awards against us. A product liability claim against us, even if ultimately unsuccessful, could have a material adverse effect on our financial condition, results of operations, and reputation. While we have product liability insurance coverage for our products and intend to maintain such insurance coverage in the future, there can be no assurance that we will be adequately protected from the claims that will be brought against us.

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

Our operations are subject to regulatory requirements relating to the environment, waste management and health and safety matters, including measures relating to the release, use, storage, treatment, transportation, discharge, disposal and remediation of hazardous substances. Although we are currently classified as a Very Small Quantity Hazardous Waste Generator within Ramsey County, Minnesota, we cannot ensure that we will maintain our licensed status as such, nor can we ensure that we will not incur material costs or liability in connection with our operations, or that our past or future operations will not result in claims or injury by employees or the public. Environmental laws and regulations could also become more stringent over time, imposing greater compliance costs and increasing risks and penalties associated with violations.

We and our distributors must comply with various federal and state anti-kickback, self-referral, false claims and similar laws, any breach of which could cause a material adverse effect on our business, financial condition and results of operations.

Our relationships with physicians, hospitals and the marketers of our products are subject to scrutiny under various federal anti-kickback, self-referral, false claims and similar laws, often referred to collectively as healthcare fraud and abuse laws.

Healthcare fraud and abuse laws are complex, and even minor, inadvertent violations can give rise to claims that the relevant law has been violated. If our operations are found to be in violation of these laws, we, as well as our employees, may be subject to penalties, including monetary fines, civil and criminal penalties, exclusion from federal and state healthcare programs, including Medicare, Medicaid, Veterans Administration health programs, workers' compensation programs and TRICARE (the healthcare system administered by or on behalf of the U.S. Department of Defense for uniformed services beneficiaries, including active duty and their dependents, retirees and their dependents), and forfeiture of amounts collected in violation of such prohibitions. Individual employees may need to defend such suits on behalf of us or themselves, which could lead to significant disruption in our present and future operations. Certain states in which we intend to market our products have similar fraud and abuse laws, imposing substantial penalties for violations. Any government investigation or a finding of a violation of these laws would likely have a material adverse effect on our business, financial condition and results of operations.

Anti-kickback laws and regulations prohibit any knowing and willful offer, payment, solicitation or receipt of any form of remuneration in return for the referral of an individual or the ordering or recommending of the use of a product or service for which payment may be made by Medicare, Medicaid or other government-sponsored healthcare programs. In addition, the cost of non-compliance with these laws could be substantial, since we could be subject to monetary fines and civil or criminal penalties, and we could also be excluded from federally funded healthcare programs for non-compliance.

Table of Contents

We have entered into consulting agreements with physicians, including some who may make referrals to us or order our products. One of these physicians was one of 20 principal investigators in our OASIS clinical trial at the same time he was acting as a paid consultant for us. In addition, prior to our merger with Replidyne, some of these physicians purchased our stock in arm's-length transactions on terms identical to those offered to non-physicians or received stock options from us as consideration for consulting services performed by them. We believe that these consulting agreements and equity investments by physicians are common practice in our industry, and while these transactions were structured with the intention of complying with all applicable laws, including the federal ban on physician self-referrals, commonly known as the Stark Law, state anti-referral laws and other applicable anti-kickback laws, it is possible that regulatory or enforcement agencies or courts may in the future view these transactions as prohibited arrangements that must be restructured or for which we would be subject to other significant civil or criminal penalties, or prohibit us from accepting referrals from these physicians. Because our strategy relies on the involvement of physicians who consult with us on the design of our product, we could be materially impacted if regulatory or enforcement agencies or courts interpret our financial relationships with our physician advisors who refer or order our products to be in violation of applicable laws and determine that we would be unable to achieve compliance with such applicable laws. This could harm our reputation and the reputations of our clinical advisors.

The scope and enforcement of all of these laws is uncertain and subject to rapid change. There can be no assurance that federal or state regulatory or enforcement authorities will not investigate or challenge our current or future activities under these laws. Any investigation or challenge could have a material adverse effect on our business, financial condition and results of operations. Any state or federal regulatory or enforcement review of us, regardless of the outcome, would be costly and time consuming. Additionally, we cannot predict the impact of any changes in these laws, whether these changes are retroactive or will have effect on a going-forward basis only.

We incur significant costs as a result of operating as a public company, and our management is required to devote substantial time to compliance initiatives.

As a public company, we incur significant legal, accounting and other expenses. In addition, the Sarbanes-Oxley Act, as well as rules subsequently implemented by the SEC and the Nasdaq Global Market, have imposed various requirements on public companies, including requiring the establishment and maintenance of effective disclosure and financial controls and changes in corporate governance practices. Our management and other personnel devote a substantial amount of time to these compliance initiatives. Moreover, these rules and regulations increase our legal and compliance costs and make some activities more time consuming and costly. We cannot ensure that our corporate compliance program is in compliance with or will continue to comply with all potentially applicable regulations.

The Sarbanes-Oxley Act requires, among other things, that we maintain effective internal controls for financial reporting and disclosure controls and procedures. In particular, we must perform system and process evaluation and testing of our internal controls over financial reporting to allow management and our independent registered public accounting firm to report on the effectiveness of our internal controls over financial reporting. Our testing, or the subsequent testing by our independent registered public accounting firm, may reveal deficiencies in our internal controls over financial reporting that are deemed to be material weaknesses. Moreover, if we are not able to comply with these requirements in a timely manner, or if we or our independent registered public accounting firm identifies deficiencies in our internal controls over financial reporting that are deemed to be material weaknesses, the market price of our stock could decline and we could be subject to sanctions or investigations by Nasdaq, the SEC or other regulatory authorities, which would require additional financial and management resources.

These obligations divert management's time and attention away from our business. Our management may not be able to effectively and timely implement controls and procedures that adequately respond to the increased regulatory compliance and reporting requirements that are applicable. If we fail to staff our accounting and finance function adequately or maintain internal controls adequate to meet the demands that are placed upon us as a public company, including the requirements of the Sarbanes-Oxley Act, we may be unable to report our financial results accurately or in a timely manner, and our business and stock price may suffer. The costs of being

Table of Contents

a public company, as well as diversion of management's time and attention, may have a material adverse effect on our business, financial condition and results of operations.

Additionally, these laws and regulations could make it more difficult or more costly for us to obtain certain types of insurance, including director and officer liability insurance, and we may be forced to accept reduced policy limits and coverage or incur substantially higher costs to obtain the same or similar coverage. The impact of these events could also make it more difficult for us to attract and retain qualified persons to serve on our board of directors, board committees or as executive officers.

Risks Relating to Our Intellectual Property

Our inability to adequately protect our intellectual property could allow our competitors and others to produce products based on our technology, which could substantially impair our ability to compete.

Our success and ability to compete depends, in part, upon our ability to maintain the proprietary nature of our technologies. We rely on a combination of patents, copyrights and trademarks, as well as trade secrets and nondisclosure agreements, to protect our intellectual property. As of March 31, 2012, we had a portfolio of 22 issued U.S. patents, 31 pending U.S. patent applications, 64 issued or granted non-U.S. patents, and 115 pending non-U.S. patent applications covering aspects of our core technology, which expire between 2012 and 2027. However, our issued patents and related intellectual property may not be adequate to protect us or permit us to gain or maintain a competitive advantage. The issuance of a patent is not conclusive as to its scope, validity or enforceability. The scope, validity or enforceability of our issued patents can be challenged in litigation or proceedings before the U.S. Patent and Trademark Office, or the USPTO. In addition, our pending patent applications include claims to numerous important aspects of our products under development that are not currently protected by any of our issued patents. We cannot assure you that any of our pending patent applications will result in the issuance of patents to us. The USPTO may deny or require significant narrowing of claims in our pending patent applications. Even if any patents are issued as a result of pending patent applications, they may not provide us with significant commercial protection or be issued in a form that is advantageous to us. Proceedings before the USPTO could result in adverse decisions as to the priority of our inventions and the narrowing or invalidation of claims in issued patents. Further, if any patents we obtain or license are deemed invalid and unenforceable, or have their scope narrowed, it could impact our ability to commercialize or license our technology.

Changes in either the patent laws or in interpretations of patent laws in the United States and other countries may diminish the value of our intellectual property. For instance, the U.S. Supreme Court has recently modified some tests used by the USPTO in granting patents during the past 20 years, which may decrease the likelihood that we will be able to obtain patents and increase the likelihood of challenge of any patents we obtain or license. In addition, the United States has recently enacted patent reform legislation that will transition the U.S. to a first to file system and alter the processes for challenging issued patents. These reforms could increase the uncertainties surrounding the prosecution of our patent applications and the enforcement of our issued patents. The laws of some foreign countries may not protect our intellectual property rights to the same extent as the laws of the United States, if at all.

We may, in the future, need to assert claims of infringement against third parties to protect our intellectual property. The outcome of litigation to enforce our intellectual property rights in patents, copyrights, trade secrets or trademarks is highly unpredictable, could result in substantial costs and diversion of resources, and could have a material adverse effect on our financial condition, reputation and results of operations regardless of the final outcome of such litigation. In the event of an adverse judgment, a court could hold that some or all of our asserted intellectual property rights are not infringed, invalid or unenforceable, and could order us to pay third-party attorneys' fees.

Despite our efforts to safeguard our unpatented and unregistered intellectual property rights, we may not be successful in doing so or the steps taken by us in this regard may not be adequate to detect or deter misappropriation of our technology or to prevent an unauthorized third party from copying or otherwise obtaining and using our products, technology or other information that we regard as proprietary. In addition, we may not have sufficient resources to litigate, enforce or defend our intellectual property rights. Additionally, third parties may be able to design around our patents.

Table of Contents

We also rely on trade secrets, technical know-how and continuing innovation to develop and maintain our competitive position. In this regard, we seek to protect our proprietary information and other intellectual property by having a policy that our employees, consultants, contractors, outside scientific collaborators and other advisors execute non-disclosure and assignment of invention agreements on commencement of their employment or engagement. Agreements with our employees also forbid them from bringing the proprietary rights of third parties to us. We also require confidentiality or material transfer agreements from third parties that receive our confidential data or materials. However, trade secrets are difficult to protect. We cannot provide any assurance that employees and third parties will abide by the confidentiality or assignment terms of these agreements, or that we will be effective securing necessary assignments from these third parties. Despite measures taken to protect our intellectual property, unauthorized parties might copy aspects of our products or obtain and use information that we regard as proprietary. Enforcing a claim that a third party illegally obtained and is using any of our trade secrets is expensive and time consuming, and the outcome is unpredictable. In addition, courts outside the United States are sometimes less willing to protect trade secrets. Finally, others may independently discover trade secrets and proprietary information, and this would prevent us from asserting any such trade secret rights against these parties.

Claims of infringement or misappropriation of the intellectual property rights of others could prohibit us from commercializing products, require us to obtain licenses from third parties or require us to develop non-infringing alternatives, and subject us to substantial monetary damages and injunctive relief.

The medical technology industry is characterized by extensive litigation and administrative proceedings over patent and other intellectual property rights. The likelihood that patent infringement or misappropriation claims may be brought against us increases as we achieve more visibility in the marketplace and introduce products to market. All issued patents are entitled to a presumption of validity under the laws of the United States. Whether a product infringes a patent involves complex legal and factual issues, the determination of which is often uncertain. Therefore, we cannot be certain that we have not infringed the intellectual property rights of such third parties or others. Our competitors may assert that our products are covered by U.S. or foreign patents held by them. We are aware of numerous patents issued to third parties that relate to the manufacture and use of medical devices for interventional cardiology. The owners of each of these patents could assert that the manufacture, use or sale of our products infringes one or more claims of their patents. Because patent applications may take years to issue, there may be applications now pending of which we are unaware that may later result in issued patents that we infringe. If another party has filed a U.S. patent application on inventions similar to ours, we may have to participate in an interference proceeding declared by the USPTO to determine priority of invention in the United States. The costs of these proceedings can be substantial, and it is possible that such efforts would be unsuccessful if unbeknownst to us, the other party had independently arrived at the same or similar invention prior to our own invention, resulting in a loss of our U.S. patent position with respect to such inventions. There could also be existing patents of which we are unaware that one or more aspects of our technology may inadvertently infringe. In some cases, litigation may be threatened or brought by a patent-holding company or other adverse patent owner who has no relevant product revenues and against whom our patents may provide little or no deterrence.

Any infringement or misappropriation claim could cause us to incur significant costs, place significant strain on our financial resources, divert management's attention from our business and harm our reputation. Some of our competitors may be able to sustain the costs of complex patent litigation more effectively than we can because they have substantially greater resources. In addition, any uncertainties resulting from the initiation and continuation of any litigation could have a material adverse effect on our ability to raise the funds necessary to continue our operations. Although patent and intellectual property disputes in the medical device area have often been settled through licensing or similar arrangements, costs associated with such arrangements may be substantial and could include ongoing royalties. If the relevant patents were upheld in litigation as valid and enforceable and we were found to infringe, we could be prohibited from commercializing any infringing products unless we could obtain licenses to use the technology covered by the patent or are able to design around the patent. We may be unable to obtain a license on terms acceptable to us, if at all, and we may not be able to redesign any infringing products to avoid infringement. Further, any redesign may not receive FDA clearance or approval or may not receive such clearance or approval in a timely manner. Any such license could impair

Table of Contents

operating margins on future product revenue. A court could also order us to pay compensatory damages for such infringement, and potentially treble damages, plus prejudgment interest and third-party attorneys' fees. These damages could be substantial and could harm our reputation, business, financial condition and operating results. A court also could enter orders that temporarily, preliminarily or permanently enjoin us and our customers from making, using, selling, offering to sell or importing infringing products, or could enter an order mandating that we undertake certain remedial activities. Depending on the nature of the relief ordered by the court, we could become liable for additional damages to third parties. Adverse determinations in a judicial or administrative proceeding or failure to obtain necessary licenses could prevent us from manufacturing and selling our products, which would have a significant adverse impact on our business.

Risks Relating to this Offering and Ownership of Our Common Stock

Future sales and issuances of our common stock could cause our stock price to fall.

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

To the extent we raise additional capital by issuing additional shares of our common stock, or securities convertible into or exchangeable or exercisable for common stock, our existing stockholders may experience substantial dilution. In addition, future investors could gain rights superior to existing stockholders, such as liquidation and other preferences. We have stock options and warrants outstanding to purchase shares of our capital stock. Our stockholders may incur dilution upon exercise of any outstanding stock options or warrants.

We have broad discretion in the use of the proceeds of this offering and may apply the proceeds in ways with which you do not agree.

Our net proceeds from this offering will be used primarily for working capital and general corporate purposes, which may include, but not be limited to, the funding of clinical trials and studies, expanding our sales and marketing organization, physician education and awareness programs, development of new products, and repayment of indebtedness. We may also use a portion of the proceeds for the potential acquisition of businesses, technologies and products, although we have no current understandings, commitments or agreements to do so. Our management will have broad discretion over the use and investment of these net proceeds, and, accordingly, you will have to rely upon the judgment of our management with respect to our use of these net proceeds, with only limited information concerning management's specific intentions. You will not have the opportunity, as part of your investment decision, to assess whether we used the net proceeds from this offering appropriately. We may place the net proceeds in investments that do not produce income or that lose value, which may cause our stock price to decline.

Our directors and executive officers will continue to have substantial control over us after this offering and could limit your ability to influence the outcome of key transactions, including changes of control.

We anticipate that our executive officers and directors and entities affiliated with them will, in the aggregate, beneficially own 12.6% of our outstanding common stock following the completion of this offering. Our executive officers, directors and affiliated entities, if acting together, would be able to control or significantly influence all matters requiring approval by our stockholders, including the election of directors and the approval of mergers or other significant corporate transactions. These stockholders may have interests that differ from yours, and they may vote in a way with which you disagree and that may be adverse to your interests. The concentration of ownership of our common stock may have the effect of delaying, preventing or deterring a change of 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 may affect the market price of our common stock. This concentration of ownership of our common stock may also have the effect of influencing the completion of a change in control that may not necessarily be in the best interests of all of our stockholders.

Table of Contents

Our stock price is volatile and you may not be able to resell your shares at or above the price at which you purchased your shares.

The market price of our common stock could be subject to significant fluctuations. Market prices for securities of early-stage pharmaceutical, medical device, biotechnology and other life sciences companies have historically been particularly volatile. Our common stock traded as low as \$7.26 and as high as \$16.25 per share during the nine-month period ended March 31, 2012. In addition to the risk factors described in this section, factors that may cause the market price of our common stock to fluctuate include, but are not limited to:

announcements of technological or medical innovations for the treatment of vascular disease;

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

failure to meet estimates or recommendations by securities analysts who cover our stock;

accusations that we have violated a law or regulation;

sales of large blocks of our common stock, including sales by our executive officers, directors and significant stockholders;

changes in accounting principles; and

general market conditions and other factors, including factors unrelated to our operating performance or the operating performance of our competitors.

In addition, if securities class action litigation is initiated against us, we would incur substantial costs and our management's attention would be diverted from operations. All of these factors could cause the price of our stock to decline, and you may lose some or all of your investment.

Moreover, the stock markets in general have experienced substantial volatility that has often been unrelated to the operating performance of individual companies. These broad market fluctuations may also adversely affect the trading price of our common stock.

In the past, following periods of volatility in the market price of a company's securities, stockholders have often instituted class action securities litigation against such company. Such litigation, if instituted, could result in substantial costs and diversion of management attention and resources, which could significantly harm our profitability and reputation.

We do not expect to pay cash dividends for the foreseeable future, and accordingly, stockholders must rely on stock appreciation for any return on their investment in the company.

We anticipate that we will retain our earnings, if any, for future growth and therefore do not anticipate that we will pay cash dividends for the foreseeable future. As a result, appreciation of the price of our common stock is the only potential source of return to stockholders. Investors seeking cash dividends should not invest in our common stock.

If equity research analysts cease to publish research or reports about our business or if they issue unfavorable research or downgrade our common stock, the price of our common stock could decline.

Investors look to reports of equity research analysts for additional information regarding our industry and operations and rely in part on the research and reports that equity research analysts publish about us and our business. We do not control these analysts. Equity research analysts may elect to cease research coverage of our common stock, which may adversely affect the market price of our common stock. The price of our common stock could decline if one or more of these analysts downgrade the common stock or if they issue other unfavorable commentary about us or our business.

Table of Contents

Some provisions of our charter documents and Delaware law may have anti-takeover effects that could discourage an acquisition of us by others, even if an acquisition would be beneficial to our stockholders.

Provisions in our restated certificate of incorporation and bylaws, as well as provisions of Delaware law, could make it more difficult for a third party to acquire us, even if doing so would benefit our stockholders. These provisions include:

providing that special meetings of stockholders may be called only by the Chairman of the Board, the Chief Executive Officer, or by a majority of our board of directors;

requiring a classified board of directors, with three separate classes of directors each serving a three-year term;

requiring that only business brought before an annual meeting by our board of directors or by a stockholder who complies with the procedures set forth in the bylaws may be transacted at an annual meeting of stockholders;

requiring advance notice of specified stockholder actions, such as the nomination of directors and stockholder proposals; and

authorizing the issuance of, without stockholder approval, up to 5,000,000 shares of preferred stock that could adversely affect the rights and powers of the holders of our common stock.

In addition, we are subject to Section 203 of the Delaware General Corporation Law, which generally prohibits a Delaware corporation from engaging in any of a broad range of business combinations with an interested stockholder for a period of three years following the date on which the stockholder became an interested stockholder, unless such transactions are approved by such corporation's board of directors. This provision could have the effect of delaying or preventing a change of control, whether or not it is desired by or beneficial to our stockholders.

Special Note Regarding Forward-Looking Statements

This prospectus supplement and the accompanying prospectus contain and incorporate by reference forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended (the Exchange Act), which are subject to the safe harbor created by those sections. Forward-looking statements are based on our management's beliefs and assumptions and on information currently available to our management. In some cases, you can identify forward-looking statements by terms such as may, will, should, could, would, expect, plans, anticipates, believes, estimates, projects, predicts, potential, or similar expressions intended to identify forward-looking statements. Examples of these statements include, but are not limited to, any statements regarding our future financial performance, product development and product sales distribution, clinical trial expectations, dividend expectations, use of proceeds, results of operations or sufficiency of capital resources to fund our operating requirements, and other statements that are other than statements of historical fact. Our actual results could differ materially from those discussed in these forward-looking statements due to a number of factors, including the risks and uncertainties described more fully by us in the section entitled Risk Factors above and in our other filings with the SEC. You should not place undue reliance on these forward-looking statements, which apply only as of the date of this prospectus supplement.

You should read this prospectus supplement, the accompanying prospectus and the documents that we incorporate by reference herein and therein completely and with the understanding that our actual future results may be materially different from what we expect. You should assume that the information appearing in this prospectus supplement and the accompanying prospectus is accurate as of the date on the front cover of this prospectus supplement and the accompanying prospectus, respectively, only. Except as required by law, we assume no obligation to update these forward-looking statements publicly, or to update the reasons actual results could differ materially from those anticipated in these forward-looking statements, even if new information becomes available in the future. We qualify all of the information presented in this prospectus supplement and the accompanying prospectus, and particularly our forward-looking statements, by these cautionary statements.

Table of Contents

Use of Proceeds

We estimate that the net proceeds to us from this offering will be approximately \$15.0 million, after deducting underwriting discounts and commissions and estimated offering expenses payable by us.

We intend to use the net proceeds from this offering for working capital and general corporate purposes, which may include, but not be limited to:

the funding of clinical trials and studies;

expanding our sales and marketing organization;

physician education and awareness programs;

development of new products; and

repayment of indebtedness with Silicon Valley Bank and Partners for Growth described below.

As of the date of this prospectus supplement, we cannot specify with certainty all of the particular uses for the net proceeds to us from this offering. Accordingly, we will retain broad discretion over the use of these proceeds. Pending these uses, we intend to invest the net proceeds in investment-grade, interest-bearing securities.

Description of Indebtedness Outstanding

Loan and Security Agreement with Silicon Valley Bank

On March 29, 2010, we entered into an amended and restated loan and security agreement with Silicon Valley Bank, which has been subsequently amended. The agreement, as amended, includes a \$12.0 million term loan and a \$15.0 million line of credit. The \$12.0 million term loan has an initial interest rate of 8.0%, which can be reduced to 7.0% based on the achievement of positive EBITDA for the trailing six month period. The term loan has a 36 month maturity, with repayment terms that include interest only payments during the first six months, followed by 30 equal principal payments of \$400,000 plus interest, and a final payment of \$100,000 due at maturity. The \$15.0 million line of credit expires on March 31, 2014 and has a floating interest rate equal to Silicon Valley Bank's prime rate, plus 2.0%, with an interest rate floor of 6.0%. Interest on borrowings is due monthly and the principal balance is due at maturity. The amounts we have borrowed under the agreement were used for working capital and general corporate purposes.

Loan and Security Agreement with Partners for Growth

On April 14, 2010, we entered into a loan and security agreement with Partners for Growth III, L.P. (PFG), which has been subsequently amended. The agreement, as amended, provides that PFG will make loans to us up to \$5.0 million. The agreement has a maturity date of April 14, 2015. The loans bear interest at a floating per annum rate equal to 2.75% above Silicon Valley Bank's prime rate, and such interest is payable monthly. The principal balance of and any accrued and unpaid interest on any notes are due on the maturity date and may not be prepaid by us at any time in whole or in part. The amounts we have borrowed under the agreement were used for working capital and general corporate purposes.

Dividend Policy

We have never declared or paid any cash dividends on our common stock and currently do not anticipate paying any cash dividends for the foreseeable future. We have historically retained earnings, and expect to continue to retain future earnings, to finance the operation and expansion of our business. Any future determination relating to dividend policy will be made at the discretion of our board of directors and will

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

depend on our future earnings, capital requirements, financial condition, future prospects, applicable law and other factors that our board of directors deems relevant. In addition, we are restricted from paying dividends under our loan and security agreements with Silicon Valley Bank and Partners for Growth.

S-25

Table of Contents**Price Range of Common Stock**

Our common stock is publicly traded on the Nasdaq Global Market under the symbol CSII. The table below sets forth, for the periods indicated, the high and low closing sales prices per share of our common stock as reported on the Nasdaq Global Market.

| | Low | High |
|---------------------------------------|------------|-------------|
| Fiscal 2010 | | |
| First Quarter | \$ 7.04 | \$ 10.30 |
| Second Quarter | 3.84 | 7.11 |
| Third Quarter | 4.15 | 5.58 |
| Fourth Quarter | 4.37 | 5.53 |
| Fiscal 2011 | | |
| First Quarter | 3.85 | 5.46 |
| Second Quarter | 5.06 | 11.75 |
| Third Quarter | 8.90 | 13.28 |
| Fourth Quarter | 10.59 | 15.43 |
| Fiscal 2012 | | |
| First Quarter | 11.10 | 16.25 |
| Second Quarter | 7.26 | 11.39 |
| Third Quarter | 8.54 | 10.55 |
| Fourth Quarter (through May 21, 2012) | 8.28 | 10.20 |

Table of Contents**Capitalization**

The following table sets forth our cash and cash equivalents and capitalization as of March 31, 2012 on:

an actual basis; and

an as adjusted basis to reflect the receipt of the estimated net proceeds from the sale of 1,780,000 shares of common stock in this offering at the offering price of \$9.00 per share, after deducting underwriting discounts and commissions and estimated offering expenses payable by us.

You should read this capitalization table together with our consolidated financial statements and the related notes included in our third quarter 2012 Form 10-Q and 2011 Form 10-K, as well as Management's Discussion and Analysis of Financial Condition and Results of Operations and other financial information set forth in our third quarter 2012 Form 10-Q and 2011 Form 10-K and incorporated by reference into this prospectus supplement, and other reports we have filed with the SEC.

| | As of March 31, 2012 | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|--------------------|
| | Actual | As Adjusted |
| | (In thousands, except share and per share data) | |
| Cash and cash equivalents | \$ 22,455 | \$ 37,414 |
| Long-term debt, net of current maturities | 14,063 | 14,063 |
| Stockholders' equity: | | |
| Common stock, \$0.001 par value; 100,000,000 authorized, 17,981,924 issued and outstanding, actual; 100,000,000 authorized, 19,761,924 issued and outstanding, as adjusted | 18 | 20 |
| Additional paid in capital | 184,464 | 199,421 |
| Common stock warrants | 9,489 | 9,489 |
| Accumulated deficit | (174,632) | (174,632) |
| Total stockholders' equity | 19,339 | 34,298 |
| Total capitalization | \$ 33,402 | \$ 48,361 |

The outstanding shares set forth in the table above excludes, as of March 31, 2012:

2,427,810 shares of our common stock issuable upon the exercise of stock options outstanding as of March 31, 2012, at a weighted average exercise price of \$10.25 per share, all of which were then exercisable;

790,780 shares of our common stock reserved for future grants of stock options (or other similar equity instruments) under our Amended and Restated 2007 Equity Incentive Plan, as of March 31, 2012;

90,709 shares of our common stock reserved for purchase under our Amended and Restated 2006 Employee Stock Purchase Plan, as of March 31, 2012;

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

2,438,784 shares of our common stock issuable upon the exercise of warrants outstanding as of March 31, 2012, at a weighted average exercise price of \$9.00 per share, all of which were then exercisable;

335,954 shares of our common stock issuable upon the conversion of senior convertible promissory notes outstanding as of March 31, 2012, at a weighted average conversion price of \$14.88 per share; and

1,702,785 shares of our common stock available for issuance as of March 31, 2012 upon the conversion of senior convertible promissory notes that may be issued under our Loan and Security Agreement with Partners for Growth III, L.P., dated April 14, 2010, as amended.

Shares available for future issuance under our Amended and Restated 2007 Equity Incentive Plan and Amended and Restated 2006 Employee Stock Purchase Plan do not include shares that may become available for issuance pursuant to provisions in these plans that provide for the automatic annual increase in the number of shares reserved thereunder and the re-issuance of shares that are cancelled or forfeited in accordance with such plans.

S-27

Table of Contents

Description of Common Stock

The following summary of the terms of our common stock is subject to and qualified in its entirety by reference to our Restated Certificate of Incorporation, as amended, and Amended and Restated Bylaws, copies of which are on file with the SEC as exhibits to previous SEC filings. Please refer to [Where You Can Find More Information](#) below for directions on obtaining these documents.

As of March 31, 2012, we are authorized to issue 100,000,000 shares of common stock, par value \$0.001 per share. As of March 31, 2012, we had 17,981,924 shares of common stock outstanding.

General

The holders of our common stock are entitled to one vote for each share on all matters voted on by stockholders, including elections of directors, and, except as otherwise required by law or provided in any resolution adopted by our board with respect to any series of preferred stock, the holders of such shares possess all voting power. Our certificate of incorporation does not provide for cumulative voting in the election of directors. No cash dividends have been previously paid on our common stock and none are anticipated during fiscal year 2012. We are restricted from paying dividends under our loan and security agreements with Silicon Valley Bank and Partners for Growth. Our common stock is not redeemable.

The holders of our common stock have no preemptive rights. The rights, preferences and privileges of holders of common stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of preferred stock which we may designate and issue in the future.

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is American Stock Transfer & Trust Company.

Nasdaq Global Market

Our common stock is listed for quotation on the Nasdaq Global Market under the symbol CSII.

Anti-Takeover Effect of Delaware Law and Certain Charter and Bylaw Provisions

Our certificate of incorporation and bylaws contain provisions that could have the effect of discouraging potential acquisition proposals or tender offers or delaying or preventing a change of control of our company. These provisions are as follows:

they provide that special meetings of stockholders may be called only by the Chairman of the Board, the Chief Executive Officer, or by a majority of our board of directors;

they provide for a classified board of directors, with three separate classes of directors each serving a three-year term;

they provide that only business brought before an annual meeting by our board of directors or by a stockholder who complies with the procedures set forth in the bylaws may be transacted at an annual meeting of stockholders;

they provide for advance notice of specified stockholder actions, such as the nomination of directors and stockholder proposals; and

they allow us to issue, without stockholder approval, up to 5,000,000 shares of preferred stock that could adversely affect the rights and powers of the holders of our common stock.

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

We are subject to the provisions of Section 203 of the General Corporation Law of the State of Delaware, an anti-takeover law. In general, Section 203 prohibits a publicly held Delaware corporation from engaging in a business combination with an interested stockholder for a period of three years after the date of the transaction in which the person became an interested stockholder, unless the business combination is approved in a prescribed manner. For purposes of Section 203, a business combination includes a merger, asset sale or other transaction resulting in a financial benefit to the interested stockholder, and an interested stockholder is a

S-28

Table of Contents

person who, together with affiliates and associates, owns, or within three years prior did own, 15% or more of the voting stock of a corporation.

Indemnification of Directors and Officers

Section 145 of the Delaware General Corporation Law provides that a corporation may indemnify any person who was or is a party or is threatened to be made a party to any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative, other than an action by or in the right of the corporation, by reason of the fact that the person is or was a director, officer, employee or agent of the corporation or is or was serving at the corporation's request as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise, against expenses, including attorneys' fees, judgments, fines and amounts paid in settlement actually and reasonably incurred by the person in connection with the action, suit or proceeding if the person acted in good faith and in a manner the person reasonably believed to be in or not opposed to the best interests of the corporation, and, with respect to any criminal action or proceeding, had no reasonable cause to believe the person's conduct was unlawful. The power to indemnify applies to actions brought by or in the right of the corporation as well, but only to the extent of expenses, including attorneys' fees but excluding judgments, fines and amounts paid in settlement, actually and reasonably incurred by the person in connection with the defense or settlement of the action or suit if the person acted in good faith and in a manner the person reasonably believed to be in or not opposed to the best interests of the corporation and except that no indemnification shall be made in respect of any claim, issue or matter as to which such person shall have been adjudged to be liable to the corporation unless and only to the extent that a court of competent jurisdiction shall determine that such indemnity is proper.

Section 145(g) of the Delaware General Corporation Law provides that a corporation shall have the power to purchase and maintain insurance on behalf of its officers, directors, employees and agents, against any liability asserted against and incurred by such persons in any such capacity.

Section 102(b)(7) of the General Corporation Law of the State of Delaware provides that a corporation may eliminate or limit the personal liability of a director to the corporation or its stockholders for monetary damages for breach of fiduciary duty as a director, provided that such provision shall not eliminate or limit the liability of a director (i) for any breach of the director's duty of loyalty to the corporation or its stockholders, (ii) for acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law, (iii) under Section 174 of the General Corporation Law of the State of Delaware, or (iv) for any transaction from which the director derived an improper personal benefit. No such provision shall eliminate or limit the liability of a director for any act or omission occurring prior to the date when such provision becomes effective.

Our Amended and Restated Bylaws provide that we shall indemnify our directors and officers to the fullest extent permitted by the laws of the State of Delaware or any other applicable law. As permitted by our Amended and Restated Bylaws, we have additionally entered into indemnification agreements with each of our non-employee directors that provide for indemnification and expense advancement to the fullest extent permitted by the laws of the State of Delaware.

Our Amended and Restated Bylaws provide that we may purchase and maintain insurance policies on behalf of our directors and officers against specified liabilities for actions taken in their capacities as such, including liabilities under the Securities Act. We have obtained directors and officers' liability insurance to cover liabilities our directors and officers may incur in connection with their services to the Registrant.

Our Restated Certificate of Incorporation, as amended, provides that the liability of our directors for monetary damages shall be eliminated to the fullest extent under applicable law.

SEC Position on Indemnification for Securities Act Liabilities

Insofar as indemnification for liabilities arising under the Securities Act may be permitted for directors, officers and persons controlling our company, we understand that it is the SEC's opinion that such indemnification is against public policy as expressed in the Securities Act and may therefore be unenforceable.

Table of Contents**Underwriting**

Subject to the terms and conditions set forth in an underwriting agreement between us and the underwriters named below, for whom Leerink Swann LLC is acting as representative, we have agreed to sell to the underwriters, and the underwriters have severally agreed to purchase from us the number of shares of common stock listed next to its name in the following table:

| Name | Number of Shares |
|--------------------|---------------------|
| Leerink Swann LLC | 1,513,000 |
| JMP Securities LLC | 267,000 |
| Total | 1,780,000 |

The underwriters are committed to purchase all the shares of common stock offered by us if they purchase any shares. The underwriting agreement also provides that if an underwriter defaults, the purchase commitments of non-defaulting underwriters may also be increased or the offering may be terminated.

The underwriters are offering the shares, subject to prior sale, when, as and if issued to and accepted by them, subject to approval of legal matters by their counsel, and other conditions contained in the underwriting agreement, such as the receipt by the underwriters of officers certificates and legal opinions. The underwriters reserve the right to withdraw, cancel or modify offers to the public and to reject orders in whole or in part.

Commissions and Discounts

The underwriters propose initially to offer the shares to the public at the public offering price set forth on the cover page of this prospectus supplement and to dealers at that price less a concession not in excess of \$0.324 per share. After the public offering, the public offering price, concession and discount may be changed.

The following table shows the public offering price, underwriting discount and proceeds before expenses to us.

| | Per Share | Total |
|----------------------------------|-----------|---------------|
| Public offering price | \$ 9.00 | \$ 16,020,000 |
| Underwriting discount | \$ 0.54 | \$ 961,200 |
| Proceeds, before expenses, to us | \$ 8.46 | \$ 15,058,800 |

The total expenses of the offering, including registration, filing and listing fees, printing fees and our legal and accounting expenses, but excluding the underwriting discount, are estimated at approximately \$100,000 and are payable by us.

No Sales of Similar Securities

We and each of our executive officers and directors have agreed that, subject to certain exceptions, without the prior written consent of Leerink Swann LLC, we and such executive officers and directors will not, during the period ending 90 days after the date of this prospectus supplement:

offer, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase, lend, or otherwise transfer or dispose of, directly or indirectly, any shares of common stock or securities convertible into or exercisable or exchangeable for common stock; or

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

enter into any swap or other arrangement that transfers to another, in whole or in part, any of the economic consequences of ownership of the common stock;
whether any such transaction described above is to be settled by delivery of common stock or such other securities, in cash or otherwise.

S-30

Table of Contents

In addition, during such 90-day restricted period, we have agreed not to file a registration statement (other than registration statements on Form S-8 and registration statements filed upon the demand or request of certain stockholders pursuant to the Registration Rights Agreement dated March 16, 2009 entered into by us with such stockholders) with the Securities and Exchange Commission relating to the common stock.

The lock-up restrictions described in the immediately preceding paragraph do not apply to:

with respect to us:

the shares of our common stock to be sold in this offering;

the issuance of shares of common stock upon the exercise of outstanding stock options or warrants or grants of stock options or other stock-based awards under our equity plans, or the conversion of convertible promissory note issued to Partners for Growth III, L.P., or any security outstanding on the date of this prospectus supplement described in this prospectus supplement, the accompanying prospectus or the documents incorporated by reference herein or therein or of which the underwriters have been advised in writing, or the issuance of up to \$540,650 in shares of common stock upon the exercise of warrants to be granted to our lenders under our existing or future credit facilities, or

the establishment of a trading plan pursuant to Rule 10b5-1 under the Exchange Act, provided that such 10b5-1 plan does not provide for the transfer of common stock during the 90-day restricted period; or
with respect to our directors and executive officers:

transfers of shares of common stock or any security convertible into common stock as a bona fide gift;

distributions of shares of common stock to limited partners, members, stockholders or wholly-owned subsidiaries of the director or officer;

transfers of shares of common stock or any security convertible into common stock pursuant to any order or settlement agreement not involving any public sale of shares of common stock or other securities and approved by any court of competent jurisdiction;

sales of shares of common stock, transfers of shares of common stock to us, or withholding of shares of common stock by us, upon a vesting event of outstanding restricted stock awards to cover tax withholding obligations of the director or executive officer in connection with such vesting event; or

transfers of shares of common stock under a trading plan pursuant to Rule 10b5-1 under the Exchange Act existing on the date of this prospectus supplement.

provided that in the case of any transfer or distribution described above in the first, second and third bullets, (i) each donee, transferee or distributee agrees in writing to the same restrictions set forth above, and (ii) no filing under section 16(a) of the Exchange Act shall be required or shall be voluntarily made during the 90-day restricted period.

The 90-day restricted period in all of the agreements is subject to extension if (i) during the last 17 days of the restricted period we issue an earnings release or material news or a material event relating to us occurs or (ii) prior to the expiration of the restricted period, we announce that we will release earnings results during the 16-day period beginning on the last day of the lock-up period, in which case the restrictions imposed in these lock-up agreements shall continue to apply until the expiration of the 18-day period beginning on the issuance of the earnings release or the occurrence of the material news or material event.

Indemnification

We have agreed to indemnify the underwriters against certain liabilities, including liabilities under the Securities Act, and to contribute to payments that the underwriters may be required to make for these liabilities.

Price Stabilization, Short Positions and Penalty Bids

Until the distribution of the shares is completed, SEC rules may limit the underwriters from bidding for and purchasing our common stock. However, the underwriters may engage in transactions that stabilize the price of the common stock, such as bids or purchases to peg, fix or maintain that price.

Table of Contents

In connection with the offering, the underwriters may purchase and sell our common stock in the open market. These transactions may include short sales, purchases on the open market to cover positions created by short sales and stabilizing transactions. Short sales involve the sale by the underwriters of a greater number of shares than they are required to purchase in the offering. As the underwriters have no over-allotment option, any short sales will be naked short sales which the underwriters must close out by purchasing shares in the open market. A naked short position is more likely to be created if the underwriters are concerned that there may be downward pressure on the price of our common stock in the open market after pricing that could adversely affect investors who purchase in the offering. Stabilizing transactions consist of various bids for or purchases of shares of common stock made by the underwriters in the open market prior to the completion of the offering.

Similar to other purchase transactions, the underwriters' purchases to cover syndicate short sales may have the effect of raising or maintaining the market price of our common stock or preventing or retarding a decline in the market price of our common stock. As a result, the price of our common stock may be higher than the price that might otherwise exist in the open market.

The underwriters have advised us that, pursuant to Regulation M of the Securities Act, they may also engage in other activities that stabilize, maintain or otherwise affect the price of the common stock, including the imposition of penalty bids. This means that if the representative of the underwriters purchases common stock in the open market in stabilizing transactions or to cover short sales, the representative can require the underwriters that sold those shares as part of this offering to repay the underwriting discount received by them.

The underwriters make no representation or prediction as to the direction or magnitude of any effect that the transactions described above may have on the price of our common stock. In addition, neither we nor the underwriters make any representation that the representatives will engage in these transactions or that these transactions, once commenced, will not be discontinued without notice.

Passive Market Making

In connection with the offering, the underwriters may engage in passive market-making transactions in the common stock on the Nasdaq Global Market in accordance with Rule 103 of Regulation M under the Exchange Act during the period before the commencement of offers or sales of common stock and extending through the completion and distribution. A passive market-maker must display its bids at a price not in excess of the highest independent bid of the security. However, if all independent bids are lowered below the passive market-maker's bid, that bid must be lowered when specified purchase limits are exceeded.

Electronic Offer, Sale and Distribution of Shares

A prospectus supplement and prospectus in electronic format may be made available on the websites maintained by one or more underwriters or selling group members, if any, participating in the offering. The underwriters may agree to allocate a number of shares to underwriters and selling group members for sale to their online brokerage account holders. Internet distributions will be allocated by the representatives to underwriters and selling group members that may make Internet distributions on the same basis as other allocations. Other than the prospectus supplement and prospectus in electronic format, the information on the underwriters' websites and any information contained in any other website maintained by the underwriters is not part of this prospectus supplement and the accompanying prospectus or the registration statement of which they form a part.

Notice to Non-U.S. Investors

Each of the underwriters has represented that (i) it has only communicated or caused to be communicated and will only communicate or cause to be communicated any invitation or inducement to engage in investment activity (within the meaning of Section 21 of the Financial Services and Markets Act 2000 or FSMA) received by it in connection with the issue or sale of any common stock in circumstances in which Section 21(1) of the FSMA does not apply to us and (ii) it has complied and will comply with all applicable provisions of the FSMA with respect to anything done by it in relation to the shares in, from or otherwise involving the United Kingdom.

In relation to each Member State of the European Economic Area which has implemented the Prospectus Directive (each, a Relevant Member State), each underwriter has represented and agreed that with effect from

Table of Contents

and including the date on which the European Union Prospectus Directive (the "EU Prospectus Directive") is implemented in that Relevant Member State (the "Relevant Implementation Date") it has not made and will not make an offer of common stock to the public in that Relevant Member State prior to the publication of a prospectus in relation to the shares which has been approved by the competent authority in that Relevant Member State or, where appropriate, approved in another Relevant Member State and notified to the competent authority in that Relevant Member State, all in accordance with the EU Prospectus Directive, except that it may, with effect from and including the Relevant Implementation Date, make an offer of shares to the public in that Relevant Member State at any time:

to legal entities which are authorized or regulated to operate in the financial markets or, if not so authorized or regulated, whose corporate purpose is solely to invest in securities;

to any legal entity which has two or more of (1) an average of at least 250 employees during the last financial year; (2) a total balance sheet of more than \$43,000,000 and (3) an annual net turnover of more than \$50,000,000, as shown in its last annual or consolidated accounts;

to fewer than 100 natural or legal persons (other than qualified investors as defined in the EU Prospectus Directive) subject to obtaining the prior consent of the book-running managers for any such offer; or

in any other circumstances which do not require the publication of a prospectus pursuant to Article 3 of the Prospectus Directive. For the purposes of this provision, the expression "an offer of shares to the public" in relation to any shares in any Relevant Member State means the communication in any form and by any means of sufficient information on the terms of the offer and the shares to be offered so as to enable an investor to decide to purchase or subscribe for the shares, as the same may be varied in that Member State by any measure implementing the EU Prospectus Directive in that Member State and the expression "EU Prospectus Directive" means Directive 2003/71/EC and includes any relevant implementing measure in each Relevant Member State.

Other Relationships

In addition, certain of the underwriters and their affiliates have provided from time to time, and may provide in the future, investment and commercial banking and financial advisory services to us in the ordinary course of business, for which they have received and may continue to receive customary fees and commissions. In addition, from time to time, certain of the underwriters and their affiliates may effect transactions for their own account or the account of customers, and hold on behalf of themselves or their customers, long or short positions in our debt or equity securities or loans, and may do so in the future.

Legal Matters

The validity of the shares of common stock we are offering will be passed upon for us by Fredrikson & Byron, P.A., Minneapolis, Minnesota. Davis Polk & Wardwell LLP, Menlo Park, California, is counsel for the underwriters.

Experts

The financial statements and management's assessment of the effectiveness of internal control over financial reporting (which is included in Management's Annual Report on Internal Control Over Financial Reporting) incorporated in this prospectus by reference to the Annual Report on Form 10-K have been so incorporated in reliance on the report of PricewaterhouseCoopers LLP, an independent registered public accounting firm, given on the authority of said firm as experts in auditing and accounting.

Where You Can Find More Information

The SEC allows us to incorporate by reference into this prospectus supplement the information we file with it, which means that we can disclose important information to you by referring you to those documents. The information incorporated by reference is considered to be part of this prospectus supplement, and information in

Table of Contents

documents that we file later with the SEC will automatically update and supersede information in this prospectus supplement. We incorporate by reference into this prospectus supplement the documents listed below and any future filings made by us with the SEC under Section 13(a), 13(c), 14 or 15(d) of the Exchange Act until we close this offering, including all filings made after the date of the initial registration statement and prior to the effectiveness of the registration statement. We hereby incorporate by reference the following documents:

our Annual Report on Form 10-K for the year ended June 30, 2011;

our Quarterly Reports on Form 10-Q for the quarters ended September 30, 2011, December 31, 2011, and March 31, 2012;

our Current Reports on Form 8-K filed on July 1, 2011, July 22, 2011, August 10, 2011, August 29, 2011, October 7, 2011, October 27, 2011, December 1, 2011, December 12, 2011, January 3, 2012, March 13, 2012, and March 21, 2012 (excluding any information furnished in such reports under Item 2.02, Item 7.01 or Item 9.01);

the description of our common stock contained in our registration statement on Form 8-A filed June 26, 2006, under the Securities Act, including any amendment or report filed for the purpose of updating such description; and

the portions of our definitive Proxy Statement on Schedule 14A filed on September 12, 2011 incorporated by reference into our Annual Report on Form 10-K for the year ended June 30, 2011.

You may request a copy of these filings, at no cost, by writing or telephoning us at the following address:

Cardiovascular Systems, Inc.

651 Campus Drive

St. Paul, Minnesota 55112-3495

Attention: Investor Relations

Phone: (651) 259-1600

Copies of these filings are also available, without charge, through the Investors section of our website (www.csi360.com) as soon as reasonably practicable after they are filed electronically with the SEC. The information contained on or accessible through our website is not a part of this prospectus supplement.

Incorporation of Documents By Reference

We have filed a registration statement on Form S-3 with the SEC for the securities we are offering by this prospectus supplement. This prospectus supplement and the accompanying prospectus do not include all of the information contained in the registration statement. You should refer to the registration statement and its exhibits for additional information.

We are required to file annual and quarterly reports, special reports, proxy statements, and other information with the SEC. You can read our SEC filings, including the registration statement, on the SEC's website at <http://www.sec.gov>. You also may read and copy any document we file with the SEC at its public reference facility at:

Public Reference Room

100 F Street N.E.

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

Washington, DC 20549.

Please call the SEC at 1-800-732-0330 for further information on the operation of the public reference facilities.

S-34

Table of Contents

PROSPECTUS

CARDIOVASCULAR SYSTEMS, INC.

\$75,000,000

Common Stock

Preferred Stock

Warrants

Debt Securities

Units

The securities covered by this prospectus may include shares of our common stock; shares of preferred stock; warrants to purchase shares of our common stock, preferred stock and/or debt securities; debt securities consisting of debentures, notes or other evidences of indebtedness; or units consisting of any combination of such securities. We may offer the securities from time to time in one or more series or issuances directly to our stockholders or purchasers, or through agents, underwriters or dealers as designated from time to time.

This prospectus provides a general description of the securities we may offer. Each time we sell securities, we will provide specific terms of the securities offered in a supplement to this prospectus. Such a prospectus supplement may also add, update or change information contained in this prospectus. This prospectus may not be used to consummate a sale of securities unless accompanied by the applicable prospectus supplement. We will sell these securities directly to our stockholders or to purchasers or through agents on our behalf or through underwriters or dealers as designated from time to time. If any agents or underwriters are involved in the sale of any of these securities, the applicable prospectus supplement will provide the names of the agents or underwriters and any applicable fees, commissions or discounts.

Our common stock is traded on the Nasdaq Global Market under the symbol CSII. On May 31, 2011, the closing price of our common stock was \$14.83.

Investing in our securities involves risks. See Risk Factors on page 2. You should carefully read this prospectus, the documents incorporated herein, and the applicable prospectus supplement before making any investment decision.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or passed upon the adequacy or accuracy of this prospectus. Any representation to the contrary is a criminal offense.

The date of this prospectus is June 17, 2011

Table of Contents**TABLE OF CONTENTS**

| | Page |
|--------------------------------------------------------|-------------|
| <u>About this Prospectus</u> | i |
| <u>Our Company</u> | 1 |
| <u>Risk Factors</u> | 2 |
| <u>Forward-Looking Statements</u> | 2 |
| <u>Use of Proceeds</u> | 2 |
| <u>Plan of Distribution</u> | 3 |
| <u>Description of Common Stock</u> | 5 |
| <u>Description of Preferred Stock</u> | 7 |
| <u>Description of Warrants</u> | 8 |
| <u>Description of Debt Securities</u> | 9 |
| <u>Where You Can Find More Information</u> | 16 |
| <u>Incorporation of Certain Documents By Reference</u> | 16 |
| <u>Legal Matters</u> | 17 |
| <u>Experts</u> | 17 |

ABOUT THIS PROSPECTUS

The securities described in this prospectus are part of a registration statement that we filed with the Securities and Exchange Commission, or the SEC, using a shelf registration process. Under this shelf registration process, we may offer to sell any combination of the securities described in this prospectus in one or more offerings up to a total dollar amount of \$75,000,000.00. This prospectus provides you with a general description of the securities we may offer. Each time we sell securities under this shelf registration, we will provide a prospectus supplement that will contain specific information about the terms of such offering. The prospectus supplement may also add, update or change information contained in this prospectus. You should read both this prospectus and any applicable prospectus supplement, including all documents incorporated herein by reference, together with additional information described under Where You Can Find More Information below.

We have not authorized any dealer, agent or other person to give any information or to make any representation other than those contained or incorporated by reference in this prospectus and any accompanying prospectus supplement. You must not rely upon any information or representation not contained or incorporated by reference in this prospectus or an accompanying prospectus supplement. This prospectus and the accompanying prospectus supplement, if any, do not constitute an offer to sell or the solicitation of an offer to buy any securities other than the registered securities to which they relate, nor do this prospectus and any accompanying prospectus supplement constitute an offer to sell or the solicitation of an offer to buy securities in any jurisdiction to any person to whom it is unlawful to make such offer or solicitation in such jurisdiction. You should not assume that the information contained in this prospectus and any accompanying prospectus supplement, if any, is accurate on any date subsequent to the date set forth on the front of the document or that any information we have incorporated by reference is correct on any date subsequent to the date of the document incorporated by reference, even though this prospectus and any accompanying prospectus supplement is delivered or securities are sold on a later date.

Unless the context otherwise requires, CSI, the Company, we, us, our and similar names refer to Cardiovascular Systems, Inc.

Table of Contents

OUR COMPANY

We are a medical device company focused on developing and commercializing minimally invasive treatment solutions for vascular disease. Interventional endovascular treatment of peripheral artery disease, or PAD, was our initial area of focus. PAD is caused by the accumulation of plaque in peripheral arteries, most commonly occurring in the pelvis and legs. PAD is a progressive disease, and, if left untreated, can lead to limb amputation or death.

Our primary products, the Diamondback 360°[®] PAD System (Diamondback 360°), Diamondback Predator 360° PAD System (Predator 360°) and Stealth 360° Orbital PAD System (Stealth 360°), are catheter-based platforms capable of treating a broad range of plaque types in leg arteries both above and below the knee and address many of the limitations associated with existing treatment alternatives. We refer to the Diamondback 360° and the Predator 360° collectively in this prospectus as the Diamondback Systems. We commenced a limited commercial introduction of the Diamondback 360° in the United States in September 2007 and began a full commercial launch during the quarter ended March 31, 2008. We commenced commercial launch of the Predator 360° in April 2009. We received 510(k) marketing clearance from the U.S. Food and Drug Administration for the Stealth 360° in March 2011 and subsequently begun a limited market release of the Stealth 360°. As of May 31, 2010, the Diamondback Systems had been utilized in over 46,000 procedures. We intend to leverage the capabilities of the Diamondback Systems to expand into the interventional coronary market.

In addition to the Diamondback Systems and the Stealth 360°, we are expanding our product portfolio through internal product development and establishment of business relationships. We now offer multiple accessory products designed to complement the use of the Diamondback Systems, and we have entered into a distribution agreement with Asahi-Intecc, Ltd.

We were incorporated as Replidyne, Inc. in Delaware in 2000. On February 25, 2009, Replidyne, Inc. completed its business combination with Cardiovascular Systems, Inc., a Minnesota corporation (CSI-MN), in accordance with the terms of the Agreement and Plan of Merger and Reorganization, dated as of November 3, 2008, by and among Replidyne, Responder Merger Sub, Inc., a wholly-owned subsidiary of Replidyne (Merger Sub), and CSI-MN (the Merger Agreement). Pursuant to the Merger Agreement, Merger Sub merged with and into CSI-MN, with CSI-MN continuing after the merger as the surviving corporation and a wholly-owned subsidiary of Replidyne. At the effective time of the merger, Replidyne changed its name to Cardiovascular Systems, Inc. (CSI) and CSI-MN changed its name to CSI Minnesota, Inc. As of immediately following the effective time of the merger, former CSI-MN stockholders owned approximately 80.2% of the outstanding common stock of the combined company, and Replidyne stockholders owned approximately 19.8% of the outstanding common stock of the combined company. Following the merger of Merger Sub with CSI-MN, CSI-MN merged with and into CSI, with CSI continuing after the merger as the surviving corporation. These transactions are referred to herein as the merger. Unless the context otherwise requires, all references herein to the Company, CSI, we, us and our refer to CSI-MN prior to the completion of the merger and to CSI following the completion of the merger and name change, and all references to Replidyne refer to Replidyne prior to the completion of the merger and the name change.

Replidyne was a biopharmaceutical company focused on discovering, developing, in-licensing and commercializing anti-infective products.

CSI-MN was incorporated in Minnesota in 1989. From 1989 to 1997, we engaged in research and development on several different product concepts that were later abandoned. Since 1997, we have devoted substantially all of our resources to the development of the Diamondback Systems and our Viper line of ancillary products.

Our common stock is traded on the Nasdaq Global Market under the symbol CSII. On May 31, 2011, the closing price of our common stock was \$14.83. As of May 31, 2011, the aggregate market value of our outstanding common stock held by non-affiliates was approximately \$199,947,758, based on 16,350,698 shares of outstanding common stock, of which approximately 13,482,654 shares are held by non-affiliates, and a per share price of \$14.83 based on the closing sale price of our common stock on May 31, 2011.

Our principal executive office is located at 651 Campus Drive, St. Paul, Minnesota 55112. Our telephone number is (651) 259-1600, and our website is www.csi360.com. The information contained in or connected to our website is not incorporated by reference into, and should not be considered part of, this prospectus.

Table of Contents

RISK FACTORS

Investing in our securities involves risk. You should consider the risks, uncertainties and assumptions discussed under the heading "Risk Factors" in our Annual Report on Form 10-K for the fiscal year ended June 30, 2010 filed on September 28, 2010 with the Securities and Exchange Commission ("SEC"), which is incorporated herein by reference, and may be amended, supplemented or superseded from time to time by other reports we file with the SEC in the future. The risks and uncertainties we have described are not the only ones we face. Additional risks and uncertainties not presently known to us or that we currently deem immaterial may also affect our operations. If any of these risks were to occur, our business, financial condition, and results of operations could be severely harmed. This could cause the trading price of our common stock to decline, and you could lose all or part of your investment.

In addition, any prospectus supplement applicable to each offering of our securities will contain a discussion of the risks applicable to such an investment in us. Prior to making a decision about investing in our securities, you should carefully consider the specific factors discussed under the heading "Risk Factors" in the applicable prospectus supplement, together with all of the other information contained or incorporated by reference in such prospectus supplement or appearing or incorporated by reference in this prospectus.

FORWARD-LOOKING STATEMENTS

This prospectus, any prospectus supplement and the other documents we have filed with the SEC that are incorporated herein by reference contain forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995 that involve risks and uncertainties, as well as assumptions that, if they never materialize or prove incorrect, could cause the results of CSI to differ materially from those expressed or implied by such forward-looking statements. All statements other than statements of historical fact are statements that could be deemed forward-looking statements, including any projections of financing needs, revenue, expenses, earnings or losses from operations, or other financial items; any statements of the plans, strategies and objectives of management for future operations; any statements concerning product research, development and commercialization plans and timelines; any statements regarding safety and efficacy of product candidates; any statements of expectation or belief; and any statements of assumptions underlying any of the foregoing. In addition, forward-looking statements may contain the words "believe," "anticipate," "expect," "estimate," "intend," "plan," "project," "will be," "will continue," "will result," "might," or any variations of such words or other words with similar meanings.

Given these uncertainties, you should not place undue reliance on these forward-looking statements. You should read this prospectus, any supplements to this prospectus and the documents that we reference in this prospectus with the understanding that our actual future results may be materially different from what we expect. Except as required by law, we do not undertake any obligation to update or revise any forward-looking statements contained in this prospectus and any supplements to this prospectus, whether as a result of new information, future events or otherwise.

USE OF PROCEEDS

Except as otherwise provided in the applicable prospectus supplement, we intend to use the net proceeds from the sale of the securities covered by this prospectus for general corporate purposes, which may include working capital, capital expenditures, research and development expenditures, repayment of indebtedness with Silicon Valley Bank and Partners for Growth described below, clinical trial expenditures, commercial expenditures, acquisitions of new technologies or businesses, and investments. Additional information on the use of net proceeds from the sale of securities covered by this prospectus may be set forth in any prospectus supplement relating to the specific offering.

Description of Indebtedness Outstanding

Loan and Security Agreement with Silicon Valley Bank

On March 29, 2010, we entered into an amended and restated loan and security agreement with Silicon Valley Bank. The agreement includes a \$10,000,000 term loan and a \$15,000,000 line of credit. The \$10,000,000

Table of Contents

term loan has a fixed interest rate of 9.0% and a final payment amount equal to 1.0% of the loan amount due at maturity. This term loan has a 36 month maturity, with repayment terms that include interest only payments during the first six months followed by 30 equal principal and interest payments. The \$15,000,000 line of credit has a two year maturity and a floating interest rate equal to Silicon Valley Bank's prime rate, plus 2.0%, with an interest rate floor of 6.0%. Interest on borrowings is due monthly and the principal balance is due at maturity.

Loan and Security Agreement with Partners for Growth

On April 14, 2010, we entered into a loan and security agreement with Partners for Growth III, L.P. (PFG). The agreement provides that PFG will make loans to us up to \$4,000,000. The agreement has a maturity date of April 14, 2015. The loans bear interest at a floating per annum rate equal to 2.75% above Silicon Valley Bank's prime rate, and such interest is payable monthly.

PLAN OF DISTRIBUTION

We may sell the securities offered through this prospectus (1) to or through underwriters or dealers, (2) directly to purchasers, including our affiliates, (3) through agents, or (4) through a combination of any of these methods. The securities may be distributed at a fixed price or prices, which may be changed, market prices prevailing at the time of sale, prices related to the prevailing market prices, or negotiated prices. The prospectus supplement will include the following information:

the terms of the offering;

the names of any underwriters or agents;

the name or names of any managing underwriter or underwriters;

the purchase price of the securities;

the net proceeds from the sale of the securities;

any delayed delivery arrangements;

any underwriting discounts, commissions and other items constituting underwriters' compensation;

any initial public offering price;

any discounts or concessions allowed or reallowed or paid to dealers; and

any commissions paid to agents.

Sale through underwriters or dealers

If underwriters are used in the sale, the underwriters will acquire the securities for their own account, including through underwriting, purchase, security lending or repurchase agreements with us. The underwriters may resell the securities from time to time in one or more transactions, including negotiated transactions. Underwriters may sell the securities in order to facilitate transactions in any of our other securities (described

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

in this prospectus or otherwise), including other public or private transactions and short sales. Underwriters may offer securities to the public either through underwriting syndicates represented by one or more managing underwriters or directly by one or more firms acting as underwriters. Unless otherwise indicated in the prospectus supplement, the obligations of the underwriters to purchase the securities will be subject to certain conditions, and the underwriters will be obligated to purchase all the offered securities if they purchase any of them. The underwriters may change from time to time any initial public offering price and any discounts or concessions allowed or reallocated or paid to dealers. The prospectus supplement will include the names of the principal underwriters, the respective amount of securities underwritten, the nature of the obligation of the underwriters to take the securities and the nature of any material relationship between an underwriter and us.

If dealers are used in the sale of securities offered through this prospectus, we will sell the securities to them as principals. They may then resell those securities to the public at varying prices determined by the dealers at the time of resale. The prospectus supplement will include the names of the dealers and the terms of the transaction.

Table of Contents

Direct sales and sales through agents

We may sell the securities offered through this prospectus directly. In this case, no underwriters or agents would be involved. Such securities may also be sold through agents designated from time to time. The prospectus supplement will name any agent involved in the offer or sale of the offered securities and will describe any commissions payable to the agent by us. Unless otherwise indicated in the prospectus supplement, any agent will agree to use its reasonable best efforts to solicit purchases for the period of its appointment.

We may sell the securities directly to institutional investors or others who may be deemed to be underwriters within the meaning of the Securities Act with respect to any sale of those securities. The terms of any such sales will be described in the prospectus supplement.

Delayed delivery contracts

If the prospectus supplement indicates, we may authorize agents, underwriters or dealers to solicit offers from certain types of institutions to purchase securities at the public offering price under delayed delivery contracts. These contracts would provide for payment and delivery on a specified date in the future. The contracts would be subject only to those conditions described in the prospectus supplement. The applicable prospectus supplement will describe the commission payable for solicitation of those contracts.

Market making, stabilization and other transactions

Unless the applicable prospectus supplement states otherwise, each series of securities offered by us will be a new issue and will have no established trading market, other than our common stock, which is listed on the Nasdaq Global Market. We may elect to list any series of offered securities on an exchange. Any underwriters that we use in the sale of offered securities may make a market in such securities, but may discontinue such market making at any time without notice. Therefore, we cannot assure you that the securities will have a liquid trading market.

Any underwriter may also engage in stabilizing transactions, syndicate covering transactions and penalty bids in accordance with Rule 104 under the Securities Exchange Act of 1934, as amended. Stabilizing transactions involve bids to purchase the underlying security in the open market for the purpose of pegging, fixing or maintaining the price of the securities. Syndicate covering transactions involve purchases of the securities in the open market after the distribution has been completed in order to cover syndicate short positions.

Penalty bids permit the underwriters to reclaim a selling concession from a syndicate member when the securities originally sold by the syndicate member are purchased in a syndicate covering transaction to cover syndicate short positions. Stabilizing transactions, syndicate covering transactions and penalty bids may cause the price of the securities to be higher than it would be in the absence of the transactions. The underwriters may, if they commence these transactions, discontinue them at any time.

Derivative transactions and hedging

We, the underwriters or other agents may engage in derivative transactions involving the securities. These derivatives may consist of short sale transactions and other hedging activities. The underwriters or agents may acquire a long or short position in the securities, hold or resell securities acquired and purchase options or futures on the securities and other derivative instruments with returns linked to or related to changes in the price of the securities. In order to facilitate these derivative transactions, we may enter into security lending or repurchase agreements with the underwriters or agents. The underwriters or agents may effect the derivative transactions through sales of the securities to the public, including short sales, or by lending the securities in order to facilitate short sale transactions by others. The underwriters or agents may also use the securities purchased or borrowed from us or others (or, in the case of derivatives, securities received from us in settlement of those derivatives) to directly or indirectly settle sales of the securities or close out any related open borrowings of the securities.

Electronic auctions

We may also make sales through the Internet or through other electronic means. Since we may from time to time elect to offer securities directly to the public, with or without the involvement of agents, underwriters or

Table of Contents

dealers, utilizing the Internet or other forms of electronic bidding or ordering systems for the pricing and allocation of such securities, you should pay particular attention to the description of that system we will provide in a prospectus supplement.

Such electronic system may allow bidders to directly participate, through electronic access to an auction site, by submitting conditional offers to buy that are subject to acceptance by us, and which may directly affect the price or other terms and conditions at which such securities are sold. These bidding or ordering systems may present to each bidder, on a so-called "real-time" basis, relevant information to assist in making a bid, such as the clearing spread at which the offering would be sold, based on the bids submitted, and whether a bidder's individual bids would be accepted, prorated or rejected. For example, in the case of a debt security, the clearing spread could be indicated as a number of "basis points" above an index treasury note. Of course, many pricing methods can and may also be used.

Upon completion of such an electronic auction process, securities will be allocated based on prices bid, terms of bid or other factors. The final offering price at which securities would be sold and the allocation of securities among bidders would be based in whole or in part on the results of the Internet or other electronic bidding process or auction.

General information

Agents, underwriters, and dealers may be entitled, under agreements entered into with us, to indemnification by us against certain liabilities, including liabilities under the Securities Act.

DESCRIPTION OF COMMON STOCK

The following summary of the terms of our common stock is subject to and qualified in its entirety by reference to our Restated Certificate of Incorporation, as amended, and Amended and Restated Bylaws, copies of which are on file with the SEC as exhibits to previous SEC filings. Please refer to "Where You Can Find More Information" below for directions on obtaining these documents.

As of May 31, 2011, we are authorized to issue 100,000,000 shares of common stock, par value \$0.001 per share. As of May 31, 2011, we had 16,350,698 shares of common stock outstanding.

General

The holders of our common stock are entitled to one vote for each share on all matters voted on by stockholders, including elections of directors, and, except as otherwise required by law or provided in any resolution adopted by our board with respect to any series of preferred stock, the holders of such shares possess all voting power. Our certificate of incorporation does not provide for cumulative voting in the election of directors. No cash dividends have been previously paid on our common stock and none are anticipated during fiscal year 2011. We are restricted from paying dividends under our Loan and Security Agreements with Silicon Valley Bank and Partners for Growth. Our common stock is not redeemable.

The holders of our common stock have no preemptive rights. The rights, preferences and privileges of holders of common stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of preferred stock which we may designate and issue in the future.

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is American Stock Transfer & Trust Company.

Nasdaq Global Market

Our common stock is listed for quotation on the Nasdaq Global Market under the symbol "CSII".

Table of Contents

Anti-Takeover Effect of Delaware Law and Certain Charter and Bylaw Provisions

Our certificate of incorporation and bylaws contain provisions that could have the effect of discouraging potential acquisition proposals or tender offers or delaying or preventing a change of control of our company. These provisions are as follows:

they provide that special meetings of stockholders may be called only by the Chairman of the Board, the Chief Executive Officer, or by a majority of our board of directors;

they provide for a classified board of directors, with three separate classes of directors each serving a three-year term;

they provide that only business brought before an annual meeting by our board of directors or by a stockholder who complies with the procedures set forth in the bylaws may be transacted at an annual meeting of stockholders;

they provide for advance notice of specified stockholder actions, such as the nomination of directors and stockholder proposals; and

they allow us to issue, without stockholder approval, up to 5,000,000 shares of preferred stock that could adversely affect the rights and powers of the holders of our common stock.

We are subject to the provisions of Section 203 of the General Corporation Law of the State of Delaware, an anti-takeover law. In general, Section 203 prohibits a publicly held Delaware corporation from engaging in a business combination with an interested stockholder for a period of three years after the date of the transaction in which the person became an interested stockholder, unless the business combination is approved in a prescribed manner. For purposes of Section 203, a business combination includes a merger, asset sale or other transaction resulting in a financial benefit to the interested stockholder, and an interested stockholder is a person who, together with affiliates and associates, owns, or within three years prior did own, 15% or more of the voting stock of a corporation.

Indemnification of Directors and Officers

Section 145 of the Delaware General Corporation Law provides that a corporation may indemnify any person who was or is a party or is threatened to be made a party to any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative, other than an action by or in the right of the corporation, by reason of the fact that the person is or was a director, officer, employee or agent of the corporation or is or was serving at the corporation's request as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise, against expenses, including attorneys' fees, judgments, fines and amounts paid in settlement actually and reasonably incurred by the person in connection with the action, suit or proceeding if the person acted in good faith and in a manner the person reasonably believed to be in or not opposed to the best interests of the corporation, and, with respect to any criminal action or proceeding, had no reasonable cause to believe the person's conduct was unlawful. The power to indemnify applies to actions brought by or in the right of the corporation as well, but only to the extent of expenses, including attorneys' fees but excluding judgments, fines and amounts paid in settlement, actually and reasonably incurred by the person in connection with the defense or settlement of the action or suit if the person acted in good faith and in a manner the person reasonably believed to be in or not opposed to the best interests of the corporation and except that no indemnification shall be made in respect of any claim, issue or matter as to which such person shall have been adjudged to be liable to the corporation unless and only to the extent that a court of competent jurisdiction shall determine that such indemnity is proper.

Section 145(g) of the Delaware General Corporation Law provides that a corporation shall have the power to purchase and maintain insurance on behalf of its officers, directors, employees and agents, against any liability asserted against and incurred by such persons in any such capacity.

Section 102(b)(7) of the General Corporation Law of the State of Delaware provides that a corporation may eliminate or limit the personal liability of a director to the corporation or its stockholders for monetary damages for breach of fiduciary duty as a director, provided that such provision shall not eliminate or limit the liability of

Table of Contents

a director (i) for any breach of the director's duty of loyalty to the corporation or its stockholders, (ii) for acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law, (iii) under Section 174 of the General Corporation Law of the State of Delaware, or (iv) for any transaction from which the director derived an improper personal benefit. No such provision shall eliminate or limit the liability of a director for any act or omission occurring prior to the date when such provision becomes effective.

Our Amended and Restated Bylaws provide that we shall indemnify our directors and officers to the fullest extent permitted by the laws of the State of Delaware or any other applicable law. As permitted by our Amended and Restated Bylaws, we have additionally entered into indemnification agreements with each of our non-employee directors that provide for indemnification and expense advancement to the fullest extent permitted by the laws of the State of Delaware.

Our Amended and Restated Bylaws provide that we may purchase and maintain insurance policies on behalf of our directors and officers against specified liabilities for actions taken in their capacities as such, including liabilities under the Securities Act. We have obtained directors and officers' liability insurance to cover liabilities our directors and officers may incur in connection with their services to the Registrant.

Our Restated Certificate of Incorporation, as amended, provides that the liability of our directors for monetary damages shall be eliminated to the fullest extent under applicable law.

SEC Position on Indemnification for Securities Act Liabilities

Insofar as indemnification for liabilities arising under the Securities Act may be permitted for directors, officers and persons controlling our company, we understand that it is the SEC's opinion that such indemnification is against public policy as expressed in the Securities Act and may therefore be unenforceable.

DESCRIPTION OF PREFERRED STOCK

We are authorized to issue up to 5,000,000 shares of preferred stock, par value \$0.001 per share. Our board is authorized to provide for the issue of all or any of the shares of the preferred stock in one or more series, and to fix the number of shares and to determine or alter for each such series, such voting powers, full or limited, or no voting powers, and such designation, preferences, and relative, participating, optional, or other rights and such qualifications, limitations, or restrictions thereof, as stated in our board's resolutions. Our board is also authorized to increase or decrease the number of shares of any series subsequent to the issuance of shares of that series, but not below the number of shares of such series then outstanding. The number of authorized shares of preferred stock may be increased or decreased (but not below the number of shares thereof then outstanding) by the affirmative vote of the holders of a majority of the common stock, without a vote of the holders of the preferred stock, or of any series thereof, unless a vote of any such holders is required pursuant to the terms of any certificate of designation filed with respect to any series of preferred stock.

The authority possessed by our board to issue preferred stock could potentially be used to discourage attempts by third parties to obtain control of us through a merger, tender offer, proxy contest or otherwise by making such attempts more difficult or more costly. Our board may issue preferred stock with voting rights or conversion rights that, if exercised, could adversely affect the voting power of the holders of common stock. There are no current agreements or understandings with respect to the issuance of preferred stock.

If we offer a specific class or series of preferred stock under this prospectus, we will describe the terms of the preferred stock in the prospectus supplement for such offering and will file a copy of the certificate establishing the terms of the preferred stock with the SEC. To the extent required and applicable, this description will include:

the title and stated value;

the number of shares offered, the liquidation preference per share and the purchase price;

the dividend rate(s), period(s) and/or payment date(s), or method(s) of calculation for such dividends;

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

whether dividends will be cumulative or non-cumulative and, if cumulative, the date from which dividends will accumulate;

Table of Contents

the procedures for any auction and remarketing, if any;

the provisions for a sinking fund, if any;

the provisions for redemption, if applicable;

any listing of the preferred stock on any securities exchange or market;

whether the preferred stock will be convertible into our common stock, and, if applicable, the conversion price (or how it will be calculated) and conversion period;

whether the preferred stock will be exchangeable into debt securities, and, if applicable, the exchange price (or how it will be calculated) and exchange period;

voting rights, if any, of the preferred stock;

a discussion of any material U.S. federal income tax considerations applicable to the preferred stock;

the relative ranking and preferences of the preferred stock as to dividend rights and rights upon liquidation, dissolution or winding up of the affairs of our company; and

any material limitations on issuance of any class or series of preferred stock ranking senior to or on a parity with the series of preferred stock as to dividend rights and rights upon liquidation, dissolution or winding up of our company.

The preferred stock offered by this prospectus, when issued, will not have, or be subject to, any preemptive or similar rights.

Transfer Agent and Registrar

The transfer agent and registrar for any series or class of preferred stock will be set forth in each applicable prospectus supplement.

DESCRIPTION OF WARRANTS

As of May 31, 2011, we had warrants outstanding to purchase 3,107,469 shares of our common stock. We may issue warrants to purchase shares of our common stock, preferred stock and/or debt securities in one or more series together with other securities or separately, as described in each applicable prospectus supplement. Below is a description of certain general terms and provisions of the warrants that we may offer. Particular terms of the warrants will be described in the applicable warrant agreements and the applicable prospectus supplement for the warrants.

The applicable prospectus supplement will contain, where applicable, the following terms of and other information relating to the warrants:

the specific designation and aggregate number of, and the price at which we will issue, the warrants;

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

the currency or currency units in which the offering price, if any, and the exercise price are payable;

the designation, amount and terms of the securities purchasable upon exercise of the warrants;

if applicable, the exercise price for shares of our common stock and the number of shares of common stock to be received upon exercise of the warrants;

if applicable, the exercise price for shares of our preferred stock, the number of shares of preferred stock to be received upon exercise, and a description of that class or series of our preferred stock;

if applicable, the exercise price for our debt securities, the amount of our debt securities to be received upon exercise, and a description of that series of debt securities;

the date on which the right to exercise the warrants will begin and the date on which that right will expire or, if the warrants may not be continuously exercised throughout that period, the specific date or dates on which the warrants may be exercised;

Table of Contents

whether the warrants will be issued in fully registered form or bearer form, in definitive or global form or in any combination of these forms, although, in any case, the form of a warrant included in a unit will correspond to the form of the unit and of any security included in that unit;

any applicable material U.S. federal income tax consequences;

the identity of the warrant agent for the warrants and of any other depositaries, execution or paying agents, transfer agents, registrars or other agents;

the proposed listing, if any, of the warrants or any securities purchasable upon exercise of the warrants on any securities exchange;

if applicable, the date from and after which the warrants and the common stock, preferred stock and/or debt securities will be separately transferable;

if applicable, the minimum or maximum amount of the warrants that may be exercised at any one time;

information with respect to book-entry procedures, if any;

the anti-dilution provisions of the warrants, if any;

any redemption or call provisions;

whether the warrants are to be sold separately or with other securities as parts of units; and

any additional terms of the warrants, including terms, procedures and limitations relating to the exchange and exercise of the warrants.

Transfer Agent and Registrar

The transfer agent and registrar for any warrants will be set forth in the applicable prospectus supplement.

DESCRIPTION OF DEBT SECURITIES

We will issue the debt securities offered by this prospectus and any accompanying prospectus supplement under an indenture to be entered into between us and the trustee identified in the applicable prospectus supplement. The terms of the debt securities will include those stated in the indenture and those made part of the indenture by reference to the Trust Indenture Act of 1939, as in effect on the date of the indenture. We have filed a copy of the form of indenture as an exhibit to the registration statement in which this prospectus is included. The indenture will be subject to and governed by the terms of the Trust Indenture Act of 1939.

We may offer under this prospectus up to an aggregate principal amount of \$75,000,000 in debt securities, or if debt securities are issued at a discount, or in a foreign currency, foreign currency units or composite currency, the principal amount as may be sold for an initial public offering price of up to \$75,000,000. Unless otherwise specified in the applicable prospectus supplement, the debt securities will represent our direct, unsecured obligations and will rank equally with all of our other unsecured indebtedness.

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

The following statements relating to the debt securities and the indenture are summaries, qualified in their entirety by reference to the detailed provisions of the debt securities we issue and the indenture we enter into with the trustee.

General

We may issue the debt securities in one or more series with the same or various maturities, at par, at a premium, or at a discount. We will describe the particular terms of each series of debt securities in a prospectus supplement relating to that series, which we will file with the SEC.

The prospectus supplement will set forth, to the extent required and applicable, the following terms of the debt securities in respect of which the prospectus supplement is delivered:

the title of the series;

the aggregate principal amount, and, if a series, the total amount authorized and the total amount outstanding;

Table of Contents

the issue price or prices, expressed as a percentage of the aggregate principal amount of the debt securities;

any limit on the aggregate principal amount;

the date or dates on which principal is payable;

the interest rate or rates (which may be fixed or variable) or, if applicable, the method used to determine such rate or rates;

the date or dates from which interest, if any, will be payable and any regular record date for the interest payable;

the place or places where principal and, if applicable, premium and interest, is payable;

the terms and conditions upon which we may, or the holders may require us to, redeem or repurchase the debt securities;

the denominations in which such debt securities may be issuable, if other than denominations of \$1,000 or any integral multiple of that number;

whether the debt securities are to be issuable in the form of certificated securities (as described below) or global securities (as described below);

the portion of principal amount that will be payable upon declaration of acceleration of the maturity date if other than the principal amount of the debt securities;

the currency of denomination;

the designation of the currency, currencies or currency units in which payment of principal and, if applicable, premium and interest, will be made;

if payments of principal and, if applicable, premium or interest, on the debt securities are to be made in one or more currencies or currency units other than the currency of denomination, the manner in which the exchange rate with respect to such payments will be determined;

if amounts of principal and, if applicable, premium and interest may be determined by reference to an index based on a currency or currencies or by reference to a commodity, commodity index, stock exchange index or financial index, then the manner in which such amounts will be determined;

the provisions, if any, relating to any collateral provided for such debt securities;

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

any addition to or change in the covenants and/or the acceleration provisions described in this prospectus or in the indenture;

any events of default, if not otherwise described below under Events of Default ;

the terms and conditions, if any, for conversion into or exchange for shares of our common stock or preferred stock;

any depositaries, interest rate calculation agents, exchange rate calculation agents or other agents; and

the terms and conditions, if any, upon which the debt securities shall be subordinated in right of payment to our other indebtedness.

We may issue discount debt securities that provide for an amount less than the stated principal amount to be due and payable upon acceleration of the maturity of such debt securities in accordance with the terms of the indenture. We may also issue debt securities in bearer form, with or without coupons. If we issue discount debt securities or debt securities in bearer form, we will describe material U.S. federal income tax considerations and other material special considerations which apply to these debt securities in the applicable prospectus supplement.

We may issue debt securities denominated in or payable in a foreign currency or currencies or a foreign currency unit or units. If we do, we will describe the restrictions, elections, and general tax considerations

Table of Contents

relating to the debt securities and the foreign currency or currencies or foreign currency unit or units in the applicable prospectus supplement.

Debt securities offered under this prospectus and any prospectus supplement will be subordinated in right of payment to certain of our outstanding senior indebtedness, including our credit facilities. In addition, we will seek the consent of the holders of any such senior indebtedness prior to issuing any debt securities under this prospectus to the extent required by the agreements evidencing such senior indebtedness.

Exchange and/or Conversion Rights

We may issue debt securities that can be exchanged for or converted into shares of our common stock or preferred stock. If we do, we will describe the terms of exchange or conversion in the prospectus supplement relating to these debt securities.

Transfer and Exchange

We may issue debt securities that will be represented by either:

book-entry securities, which means that there will be one or more global securities registered in the name of a depository or a nominee of a depository; or

certificated securities, which means that they will be represented by a certificate issued in definitive registered form.

We will specify in the prospectus supplement applicable to a particular offering whether the debt securities offered will be book-entry or certificated securities.

Certificated Debt Securities

If you hold certificated debt securities, you may transfer or exchange such debt securities at the trustee's office or at the paying agent's office or agency in accordance with the terms of the indenture. You will not be charged a service charge for any transfer or exchange of certificated debt securities but may be required to pay an amount sufficient to cover any tax or other governmental charge payable in connection with such transfer or exchange.

You may effect the transfer of certificated debt securities and of the right to receive the principal of, premium, and/or interest, if any, on the certificated debt securities only by surrendering the certificate representing the certificated debt securities and having us or the trustee issue a new certificate to the new holder.

Global Securities

If we decide to issue debt securities in the form of one or more global securities, then we will register the global securities in the name of the depository for the global securities or the nominee of the depository, and the global securities will be delivered by the trustee to the depository for credit to the accounts of the holders of beneficial interests in the debt securities.

The prospectus supplement will describe the specific terms of the depository arrangement for debt securities of a series that are issued in global form. None of us, the trustee, any payment agent or the security registrar will have any responsibility or liability for any aspect of the records relating to or payments made on account of beneficial ownership interests in a global debt security or for maintaining, supervising or reviewing any records relating to these beneficial ownership interests.

No Protection in the Event of Change of Control

The indenture does not have any covenants or other provisions providing for a put or increased interest or otherwise that would afford holders of our debt securities additional protection in the event of a recapitalization transaction, a change of control, or a highly leveraged transaction. If we offer any covenants or provisions of this type with respect to any debt securities covered by this prospectus, we will describe them in the applicable prospectus supplement.

Table of Contents

Covenants

Unless otherwise indicated in this prospectus or the applicable prospectus supplement, our debt securities will not have the benefit of any covenants that limit or restrict our business or operations, the pledging of our assets or the incurrence by us of indebtedness. We will describe in the applicable prospectus supplement any material covenants in respect of a series of debt securities.

Consolidation, Merger and Sale of Assets

The form of indenture provides that we will not consolidate with or merge into any other person or convey, transfer, sell or lease our properties and assets substantially as an entirety to any person, unless:

the person formed by the consolidation or into or with which we are merged or the person to which our properties and assets are conveyed, transferred, sold or leased, is a corporation organized and existing under the laws of the U.S., any state or the District of Columbia or a corporation or comparable legal entity organized under the laws of a foreign jurisdiction and, if we are not the surviving person, the surviving person has expressly assumed all of our obligations, including the payment of the principal of and, premium, if any, and interest on the debt securities and the performance of the other covenants under the indenture; and

immediately before and immediately after giving effect to the transaction, no event of default, and no event which, after notice or lapse of time or both, would become an event of default, has occurred and is continuing under the indenture.

Events of Default

Unless otherwise specified in the applicable prospectus supplement, the following events will be events of default under the indenture with respect to debt securities of any series:

we fail to pay any principal or premium, if any, when it becomes due;

we fail to pay any interest within 30 days after it becomes due;

we fail to observe or perform any other covenant in the debt securities or the indenture for 60 days after written notice specifying the failure from the trustee or the holders of not less than 25% in aggregate principal amount of the outstanding debt securities of that series; and

certain events involving bankruptcy, insolvency or reorganization of us or any of our significant subsidiaries.

The trustee may withhold notice to the holders of the debt securities of any series of any default, except in payment of principal of or premium, if any, or interest on the debt securities of a series, if the trustee considers it to be in the best interest of the holders of the debt securities of that series to do so.

If an event of default (other than an event of default resulting from certain events of bankruptcy, insolvency or reorganization) occurs, and is continuing, then the trustee or the holders of not less than 25% in aggregate principal amount of the outstanding debt securities of any series may accelerate the maturity of the debt securities. If this happens, the entire principal amount, plus the premium, if any, of all the outstanding debt securities of the affected series plus accrued interest to the date of acceleration will be immediately due and payable. At any time after the acceleration, but before a judgment or decree based on such acceleration is obtained by the trustee, the holders of a majority in aggregate principal amount of outstanding debt securities of such series may rescind and annul such acceleration if:

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

all events of default (other than nonpayment of accelerated principal, premium or interest) have been cured or waived;

all lawful interest on overdue interest and overdue principal has been paid; and

the rescission would not conflict with any judgment or decree.

Table of Contents

In addition, if the acceleration occurs at any time when we have outstanding indebtedness that is senior to the debt securities, the payment of the principal amount of outstanding debt securities may be subordinated in right of payment to the prior payment of any amounts due under the senior indebtedness, in which case the holders of debt securities will be entitled to payment under the terms prescribed in the instruments evidencing the senior indebtedness and the indenture.

If an event of default resulting from certain events of bankruptcy, insolvency or reorganization occurs, the principal, premium and interest amount with respect to all of the debt securities of any series will be due and payable immediately without any declaration or other act on the part of the trustee or the holders of the debt securities of that series.

The holders of a majority in principal amount of the outstanding debt securities of a series will have the right to waive any existing default or compliance with any provision of the indenture or the debt securities of that series and to direct the time, method and place of conducting any proceeding for any remedy available to the trustee, subject to certain limitations specified in the indenture.

No holder of any debt security of a series will have any right to institute any proceeding with respect to the indenture or for any remedy under the indenture, unless:

the holder gives to the trustee written notice of a continuing event of default;

the holders of at least 25% in aggregate principal amount of the outstanding debt securities of the affected series make a written request and offer reasonable indemnity to the trustee to institute a proceeding as trustee;

the trustee fails to institute a proceeding within 60 days after such request; and

the holders of a majority in aggregate principal amount of the outstanding debt securities of the affected series do not give the trustee a direction inconsistent with such request during such 60-day period.

These limitations do not, however, apply to a suit instituted for payment on debt securities of any series on or after the due dates expressed in the debt securities.

We will periodically deliver certificates to the trustee regarding our compliance with our obligations under the indenture.

Modification and Waiver

From time to time, we and the trustee may, without the consent of holders of the debt securities of one or more series, amend the indenture or the debt securities of one or more series, or supplement the indenture, for certain specified purposes, including:

to provide that the surviving entity following a change of control permitted under the indenture will assume all of our obligations under the indenture and debt securities;

to provide for certificated debt securities in addition to uncertificated debt securities;

to comply with any requirements of the SEC under the Trust Indenture Act of 1939;

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

to provide for the issuance of and establish the form and terms and conditions of debt securities of any series as permitted by the indenture;

to cure any ambiguity, defect or inconsistency, or make any other change that does not materially and adversely affect the rights of any holder; and

to appoint a successor trustee under the indenture with respect to one or more series.

From time to time we and the trustee may, with the consent of holders of at least a majority in principal amount of an outstanding series of debt securities, amend or supplement the indenture or the debt securities series, or waive compliance in a particular instance by us with any provision of the indenture or the debt securities. We may not, however, without the consent of each holder affected by such action, modify or

Table of Contents

supplement the indenture or the debt securities or waive compliance with any provision of the indenture or the debt securities in order to:

reduce the amount of debt securities whose holders must consent to an amendment, supplement, or waiver to the indenture or such debt security;

reduce the rate of or change the time for payment of interest or reduce the amount of or postpone the date for payment of sinking fund or analogous obligations;

reduce the principal of or change the stated maturity of the debt securities;

make any debt security payable in money other than that stated in the debt security;

change the amount or time of any payment required or reduce the premium payable upon any redemption, or change the time before which no such redemption may be made;

wave a default in the payment of the principal of, premium, if any, or interest on the debt securities or a redemption payment;

wave a redemption payment with respect to any debt securities or change any provision with respect to redemption of debt securities; or

take any other action otherwise prohibited by the indenture to be taken without the consent of each holder affected by the action.

Defeasance of Debt Securities and Certain Covenants in Certain Circumstances

The indenture permits us, at any time, to elect to discharge our obligations with respect to one or more series of debt securities by following certain procedures described in the indenture. These procedures will allow us either:

to defease and be discharged from any and all of our obligations with respect to any debt securities except for the following obligations (which discharge is referred to as "legal defeasance"):

- (1) to register the transfer or exchange of such debt securities;
- (2) to replace temporary or mutilated, destroyed, lost or stolen debt securities;
- (3) to compensate and indemnify the trustee; or
- (4) to maintain an office or agency in respect of the debt securities and to hold monies for payment in trust; or

to be released from our obligations with respect to the debt securities under certain covenants contained in the indenture, as well as any additional covenants which may be contained in the applicable supplemental indenture (which release is referred to as "covenant defeasance").

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

In order to exercise either defeasance option, we must deposit with the trustee or other qualifying trustee, in trust for that purpose:

money;

U.S. Government Obligations (as described below) or Foreign Government Obligations (as described below) that through the scheduled payment of principal and interest in accordance with their terms will provide money; or

a combination of money and/or U.S. Government Obligations and/or Foreign Government Obligations sufficient in the written opinion of a nationally-recognized firm of independent accountants to provide money; that, in each case specified above, provides a sufficient amount to pay the principal of, premium, if any, and interest, if any, on the debt securities of the series, on the scheduled due dates or on a selected date of redemption in accordance with the terms of the indenture.

Table of Contents

In addition, defeasance may be effected only if, among other things:

in the case of either legal or covenant defeasance, we deliver to the trustee an opinion of counsel, as specified in the indenture, stating that as a result of the defeasance neither the trust nor the trustee will be required to register as an investment company under the Investment Company Act of 1940;

in the case of legal defeasance, we deliver to the trustee an opinion of counsel stating that we have received from, or there has been published by, the Internal Revenue Service a ruling to the effect that, or there has been a change in any applicable federal income tax law with the effect that (and the opinion shall confirm that), the holders of outstanding debt securities will not recognize income, gain or loss for U.S. federal income tax purposes solely as a result of such legal defeasance and will be subject to U.S. federal income tax on the same amounts, in the same manner, including as a result of prepayment, and at the same times as would have been the case if legal defeasance had not occurred;

in the case of covenant defeasance, we deliver to the trustee an opinion of counsel to the effect that the holders of the outstanding debt securities will not recognize income, gain or loss for U.S. federal income tax purposes as a result of covenant defeasance and will be subject to U.S. federal income tax on the same amounts, in the same manner and at the same times as would have been the case if covenant defeasance had not occurred; and

certain other conditions described in the indenture are satisfied.

If we fail to comply with our remaining obligations under the indenture and applicable supplemental indenture after a covenant defeasance of the indenture and applicable supplemental indenture, and the debt securities are declared due and payable because of the occurrence of any undefeasable event of default, the amount of money and/or U.S. Government Obligations and/or Foreign Government Obligations on deposit with the trustee could be insufficient to pay amounts due under the debt securities of the affected series at the time of acceleration. We will, however, remain liable in respect of these payments.

The term "U.S. Government Obligations" as used in the above discussion means securities that are direct obligations of or non-callable obligations guaranteed by the United States of America for the payment of which obligation or guarantee the full faith and credit of the United States of America is pledged.

The term "Foreign Government Obligations" as used in the above discussion means, with respect to debt securities of any series that are denominated in a currency other than U.S. dollars, (1) direct obligations of the government that issued or caused to be issued such currency for the payment of which obligations its full faith and credit is pledged or (2) obligations of a person controlled or supervised by or acting as an agent or instrumentality of such government the timely payment of which is unconditionally guaranteed as a full faith and credit obligation by that government, which in either case under clauses (1) or (2), are not callable or redeemable at the option of the issuer.

Regarding the Trustee

We will identify the trustee with respect to any series of debt securities in the prospectus supplement relating to the applicable debt securities. You should note that if the trustee becomes a creditor of ours, the indenture and the Trust Indenture Act of 1939 limit the rights of the trustee to obtain payment of claims in certain cases, or to realize on certain property received in respect of any such claim, as security or otherwise. The trustee and its affiliates may engage in, and will be permitted to continue to engage in, other transactions with us and our affiliates. If, however, the trustee acquires any conflicting interest within the meaning of the Trust Indenture Act of 1939, it must eliminate such conflict or resign.

The holders of a majority in principal amount of the then outstanding debt securities of any series may direct the time, method and place of conducting any proceeding for exercising any remedy available to the trustee. If an event of default occurs and is continuing, the trustee, in the exercise of its rights and powers, must use the degree of care and skill of a prudent person in the conduct of his or her own affairs. Subject to that provision, the trustee will be under no obligation to exercise any of its rights or powers under the indenture at the request of any of the holders of the debt securities, unless they have offered to the trustee reasonable indemnity or security.

Table of Contents

WHERE YOU CAN FIND MORE INFORMATION

We have filed a registration statement on Form S-3 with the SEC for the securities we are offering by this prospectus. This prospectus does not include all of the information contained in the registration statement. You should refer to the registration statement and its exhibits for additional information.

We are required to file annual and quarterly reports, special reports, proxy statements, and other information with the SEC. We make these documents publicly available, free of charge, on our website at www.csi360.com as soon as reasonably practicable after filing such documents with the SEC. You can read our SEC filings, including the registration statement, on the SEC's website at <http://www.sec.gov>. You also may read and copy any document we file with the SEC at its public reference facility at:

Public Reference Room

100 F Street N.E.

Washington, DC 20549.

Please call the SEC at 1-800-732-0330 for further information on the operation of the public reference facilities.

INCORPORATION OF CERTAIN DOCUMENTS BY REFERENCE

The SEC allows us to incorporate by reference into this prospectus the information we file with it, which means that we can disclose important information to you by referring you to those documents. The information incorporated by reference is considered to be part of this prospectus, and information in documents that we file later with the SEC will automatically update and supersede information in this prospectus. We incorporate by reference into this prospectus the documents listed below and any future filings made by us with the SEC under Section 13(a), 13(c), 14 or 15(d) of the Exchange Act until we close this offering, including all filings made after the date of the initial registration statement and prior to the effectiveness of the registration statement. We hereby incorporate by reference the following documents:

our Annual Report on Form 10-K for the year ended June 30, 2010;

our Quarterly Reports on Form 10-Q for the quarters ended September 30, 2010, December 31, 2010 and March 31, 2011;

our Current Reports on Form 8-K filed on July 2, 2010, September 1, 2010, September 9, 2010, October 8, 2010, November 3, 2010, November 23, 2010, February 22, 2011, March 3, 2011 and April 5, 2011 (excluding any information furnished in such reports under Item 2.02, Item 7.01 or Item 9.01);

the description of our common stock contained in our registration statement on Form 8-A filed June 26, 2006, under the Securities Act, including any amendment or report filed for the purpose of updating such description; and

our definitive Proxy Statement on Schedule 14A filed on October 5, 2010.

You may request a copy of these filings, at no cost, by writing or telephoning us at the following address:

Cardiovascular Systems, Inc.

651 Campus Drive

St. Paul, Minnesota 55112-3495

Edgar Filing: Cardiovascular Systems Inc - Form 424B5

Attention: Investor Relations

Phone: (651) 259-1600

Copies of these filings are also available, without charge, through the Investors section of our website (www.csi360.com) as soon as reasonably practicable after they are filed electronically with the SEC. The information contained on our website is not a part of this prospectus.

Table of Contents

LEGAL MATTERS

The validity of the issuance of the securities offered hereby will be passed upon for us by Fredrikson & Byron, P.A., Minneapolis, Minnesota. The validity of any securities will be passed upon for any underwriters or agents by counsel that we will name in the applicable prospectus supplement.

EXPERTS

The financial statements incorporated in this Prospectus by reference to the Annual Report on Form 10-K for the year ended June 30, 2010 have been so incorporated in reliance on the report of PricewaterhouseCoopers LLP, an independent registered public accounting firm, given on the authority of said firm as experts in auditing and accounting.

Table of Contents

1,780,000 Shares

Common Stock

Leerink Swann

JMP Securities