UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, DC 20549

FORM 10-Q

(Mark One)

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

For the quarterly period ended March 31, 2022

OR

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

For the transition period from _____to _____

Commission File Number: 001-38829

Shockwave Medical, Inc.
(Exact Name of Registrant as Specified in its Charter)

Delaware	**27-0494101**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
5403 Betsy Ross Drive Santa Clara, California	**95054**
(Address of principal executive offices)	**(Zip Code)**

Registrant's telephone number, including area code: (510) 279-4262

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

Title of each class of securities	Trading symbol(s)	Name of each national exchange and principal U.S. market for the securities
Shockwave Medical, Inc., common stock, par value $0.001 per share	SWAV	The Nasdaq Stock Market LLC (Nasdaq Global Select Market)

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

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

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

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

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

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

As of May 3, 2022, the registrant had 35,791,917 shares of common stock, $0.001 par value per share, outstanding.

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SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Quarterly Report on Form 10-Q contains statements relating to our expectations, projections, beliefs, and prospects, which are forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. In some cases, you can identify these statements by forward-looking words such as "believe," "will," "may," "estimate," "continue," "anticipate," "intend," "should," "might," "plan," "expect," "predict," "could," "potentially" or the negative of these terms or similar expressions. You should read these statements carefully because they may relate to future expectations around growth, strategy, and anticipated trends in our business, contain projections of future results of operations or financial condition, or state other "forward-looking" information. These statements are only predictions based on our current expectations, estimates, assumptions, and projections about future events and are applicable only as of the dates of such statements. These forward-looking statements are subject to certain risks and uncertainties that could cause our actual results, level of activity, performance or achievements to differ materially from the results, level of activity, performance or achievements expressed or implied by the forward-looking statements. Forward-looking statements contained in this Quarterly Report on Form 10-Q include, but are not limited to, statements about:

- the impact of the COVID-19 pandemic on our operations, financial results, and liquidity and capital resources, including due to the pandemic's impact on our sales, expenses, supply chain, manufacturing, research and development activities, clinical trials, and employees;
- our ability to design, develop, manufacture and market innovative products to treat patients with challenging medical conditions, particularly in peripheral artery disease, coronary artery disease and aortic stenosis;
- our expected future growth, including growth in international sales;
- the size and growth potential of the markets for our products, and our ability to serve those markets;
- the rate and degree of market acceptance of our products;
- coverage and reimbursement for procedures performed using our products;
- the performance of third parties in connection with the development of our products, including third-party suppliers;
- the impact of government laws and regulatory developments in the United States and foreign countries;
- our ability to obtain and maintain regulatory approval or clearance of our products on expected timelines;
- our plans and the expected timing to research, develop and commercialize our products and any other approved or cleared product;
- our ability to scale our organizational culture of cooperative product development and commercial execution;
- the development, regulatory approval, efficacy and commercialization of competing products;
- our ability to develop and maintain our corporate infrastructure, including our internal controls;
- our estimates regarding expenses, future financial performance and capital requirements; and
- our expectations regarding our ability to obtain and maintain intellectual property protection for our products, as well as our ability to operate our business without infringing the intellectual property rights of others.

We caution you that the foregoing list may not contain all of the forward-looking statements made in this Quarterly Report on Form 10-Q. We have based these forward-looking statements on our current expectations and projections about future events and trends that we believe may affect our financial condition, results of operations, business strategy, short-term and long-term business operations and objectives, and financial needs. These forward-looking statements are subject to a number of risks, uncertainties, and assumptions and other factors that could cause our actual results, level of activity, performance, or achievements to differ materially from the results, level of activity, performance or achievements expressed or implied by the forward-looking statements, including those described in the sections titled "Risk Factors" of our Annual Report on Form 10-K for the year ended December 31, 2021, together with any updates in the section entitled "Risk Factors" in this Quarterly Report on Form 10-Q, and "Management's Discussion and Analysis of Financial Condition and Results of Operations". There may also be additional risks of which we are not presently aware or that we currently believe are immaterial which could have an adverse impact on our business. Although we believe the expectations reflected in the forward-looking statements are reasonable, we cannot guarantee future results, level of activity, performance or achievements. Except to the extent required by law, we undertake no obligation to update any of these forward-looking statements after the date of this Quarterly Report on Form 10-Q to conform our prior statements to actual results or revised expectations.

PART I—FINANCIAL INFORMATION

Item 1. Financial Statements.

SHOCKWAVE MEDICAL, INC.
Condensed Consolidated Balance Sheets
(*Unaudited*)
(in thousands)

	March 31, 2022	December 31, 2021
		(1)
ASSETS		
CURRENT ASSETS:		
Cash and cash equivalents	$ 66,252	$ 89,209
Short-term investments	134,875	111,772
Accounts receivable, net	47,842	37,435
Inventory	53,369	42,978
Prepaid expenses and other current assets	7,572	4,508
Total current assets	309,910	285,902
Operating lease right-of-use assets	26,729	27,496
Property and equipment, net	27,886	24,361
Equity method investment	5,940	5,987
Other assets	2,055	1,936
TOTAL ASSETS	$ 372,520	$ 345,682
LIABILITIES AND STOCKHOLDERS' EQUITY		
CURRENT LIABILITIES:		
Accounts payable	$ 8,467	$ 3,520
Term notes, current portion	8,250	5,500
Accrued liabilities	33,019	40,870
Lease liability, current portion	1,294	1,738
Total current liabilities	51,030	51,628
Lease liability, noncurrent portion	32,361	28,321
Term notes, noncurrent portion	9,033	11,630
Related party contract liability, noncurrent portion	12,273	12,273
TOTAL LIABILITIES	104,697	103,852
STOCKHOLDERS' EQUITY:		
Preferred stock	—	—
Common stock	36	35
Additional paid-in capital	507,092	494,806
Accumulated other comprehensive loss	(1,017)	(202)
Accumulated deficit	(238,288)	(252,809)
TOTAL STOCKHOLDERS' EQUITY	267,823	241,830
TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	$ 372,520	$ 345,682

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

(1) The condensed consolidated balance sheet as of December 31, 2021 is derived from the audited consolidated financial statements as of that date.

SHOCKWAVE MEDICAL, INC.
Condensed Consolidated Statements of Operations and Comprehensive Income (Loss)
(Unaudited)
(in thousands, except share and per share data)

	Three Months Ended March 31,	
	2022	**2021**
Revenue:		
Product revenue	$ 93,631	$ 31,900
Cost of revenue:		
Cost of product revenue	12,890	7,892
Gross profit	80,741	24,008
Operating expenses:		
Research and development	17,019	10,277
Sales and marketing	35,961	23,992
General and administrative	12,389	7,226
Total operating expenses	65,369	41,495
Income (loss) from operations	15,372	(17,487)
Share in net loss of equity method investment	(47)	(5,523)
Interest expense	(297)	(312)
Other expense, net	(310)	(235)
Net income (loss) before taxes	14,718	(23,557)
Income tax provision	197	44
Net income (loss)	$ 14,521	$ (23,601)
Unrealized gain (loss) on available-for-sale securities	(815)	7
Total comprehensive income (loss)	$ 13,706	$ (23,594)
Net income (loss) per share		
Basic	$ 0.41	$ (0.68)
Diluted	$ 0.39	$ (0.68)
Shares used in computing net income (loss) per share		
Basic	35,587,337	34,797,400
Diluted	37,623,477	34,797,400

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

SHOCKWAVE MEDICAL, INC.
Condensed Consolidated Statements of Stockholders' Equity
(Unaudited)
(in thousands, except share data)

	Common Stock		Additional Paid-In Capital	Accumulated Other Comprehensive Loss	Accumulated Deficit	Total Stockholders' Equity
	Shares	Amount				
Balance — December 31, 2021	35,444,472	$ 35	$ 494,806	$ (202)	$ (252,809)	$ 241,830
Exercise of stock options	54,913	1	390	—	—	391
Unrealized loss on available-for-sale securities	—	—	—	(815)	—	(815)
Issuance of common stock under employee stock purchase plan	14,172	—	2,135	—	—	2,135
Issuance of common stock in connection with vesting of restricted stock units	210,835	—	—	—	—	—
Taxes withheld on net settled vesting of restricted stock units	(31)	—	(6)	—	—	(6)
Stock-based compensation	—	—	9,767	—	—	9,767
Net income	—	—	—	—	14,521	14,521
Balance — March 31, 2022	35,724,361	$ 36	$ 507,092	$ (1,017)	$ (238,288)	$ 267,823

	Common Stock		Additional Paid-In Capital	Accumulated Other Comprehensive Income	Accumulated Deficit	Total Stockholders' Equity
	Shares	Amount				
Balance — December 31, 2020	34,684,337	$ 35	$ 469,283	$ 9	$ (243,673)	$ 225,654
Exercise of stock options	159,325	—	773	—	—	773
Unrealized gain on available-for-sale securities	—	—	—	7	—	7
Issuance of common stock under employee stock purchase plan	20,594	—	1,141	—	—	1,141
Issuance of common stock in connection with vesting of restricted stock units	107,237	—	—	—	—	—
Taxes withheld on net settled vesting of restricted stock units	(42,529)	—	(5,114)	—	—	(5,114)
Stock-based compensation	—	—	5,394	—	—	5,394
Net loss	—	—	—	—	(23,601)	(23,601)
Balance — March 31, 2021	34,928,964	$ 35	$ 471,477	$ 16	$ (267,274)	$ 204,254

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

SHOCKWAVE MEDICAL, INC.
Condensed Consolidated Statements of Cash Flows
(Unaudited)
(in thousands)

	Three Months Ended March 31,	
	2022	**2021**
CASH FLOWS FROM OPERATING ACTIVITIES:		
Net income (loss)	$ 14,521	$ (23,601)
Adjustments to reconcile net income (loss) to net cash used in operating activities:		
Depreciation and amortization	953	721
Share in net loss of equity method investment	47	5,523
Stock-based compensation	9,510	5,139
Amortization of right-of-use assets	767	405
Accretion of discount on available-for-sale securities	210	379
Amortization of debt issuance costs	153	167
Changes in operating assets and liabilities:		
Accounts receivable	(10,407)	(7,924)
Inventory	(10,090)	(3,308)
Prepaid expenses and other current assets	600	(135)
Other assets	(119)	48
Accounts payable	4,911	1,782
Accrued and other current liabilities	(9,051)	3,799
Lease liabilities	(68)	(298)
Net cash provided by (used in) operating activities	1,937	(17,303)
CASH FLOWS FROM INVESTING ACTIVITIES:		
Purchase of available-for-sale securities	(42,128)	(15,263)
Proceeds from maturities of available-for-sale securities	18,000	46,400
Purchase of property and equipment	(3,286)	(4,051)
Net cash (used in) provided by investing activities	(27,414)	27,086
CASH FLOWS FROM FINANCING ACTIVITIES:		
Payments of taxes withheld on net settled vesting of restricted stock units	(6)	(5,114)
Proceeds from stock option exercises	391	773
Proceeds from issuance of common stock under employee stock purchase plan	2,135	1,141
Net cash provided by (used in) financing activities	2,520	(3,200)
Net (decrease) increase in cash, cash equivalents and restricted cash	(22,957)	6,583
Cash, cash equivalents and restricted cash at beginning of period	90,874	51,873
Cash, cash equivalents and restricted cash equivalents at end of period	$ 67,917	$ 58,456
SUPPLEMENTAL DISCLOSURES OF CASH FLOW INFORMATION:		
Interest paid	$ 144	$ 144
Income tax paid	$ 78	$ 15
NON-CASH INVESTING AND FINANCING ACTIVITIES:		
Right-of-use asset obtained in exchange for lease liability	$ —	$ 48
Property and equipment purchases included in accounts payable and accrued liabilities	$ 3,159	$ 3,104
Equity method investment obtained in exchange for related party contract liability	$ —	$ 12,273
Transfer of fixed assets to inventory	$ 44	$ 116

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

1. Organization and Basis of Presentation

Shockwave Medical, Inc. (the "Company") was incorporated on June 17, 2009. The Company is primarily engaged in the development of Intravascular Lithotripsy ("IVL") technology for the treatment of calcified plaque in patients with peripheral vascular, coronary vascular and heart valve disease. Built on a balloon catheter platform, the IVL technology uses lithotripsy to disrupt both superficial and deep vascular calcium, while minimizing soft tissue injury, and an integrated angioplasty balloon to dilate blockages at low pressures, restoring blood flow.

In 2016, the Company began commercial and manufacturing operations, and began selling catheters based on the IVL technology. The Company's headquarters are in Santa Clara, California. The Company is located and operates primarily in the United States and has subsidiaries in Germany, the United Kingdom, Japan, France, Ireland and Costa Rica.

As of March 31, 2022, the Company had cash, cash equivalents and short-term investments of $201.1 million, which are available to fund future operations. The Company believes that its cash and cash equivalents as of March 31, 2022, will be sufficient for the Company to continue as a going concern for at least 12 months from the date the unaudited condensed consolidated financial statements are filed with the Securities and Exchange Commission ("SEC"). The Company's future capital requirements will depend on many factors, including its growth rate, the timing and extent of its spending to support research and development activities, the timing and cost of establishing additional sales and marketing capabilities and the scope, duration and continuing impact of the COVID-19 pandemic.

Risk and Uncertainties

The Company is subject to continuing risks and uncertainties as a result of the COVID-19 pandemic, and is closely monitoring the impact of the pandemic on all aspects of its business, including the impacts on its customers, patients, employees, suppliers, vendors, business partners and distribution channels. Specifically, the Company has recently seen some disruptions in the operations of certain of its third-party suppliers, resulting in increased lead-times, higher component costs and lower allocations for the Company's purchase of some components. In certain cases, this has resulted in the Company being required to procure materials from alternate suppliers or incur higher logistical expenses. The Company is continuing to work closely with its manufacturing partners and suppliers to enable the Company to source key components and maintain appropriate inventory levels to meet customer demand. The Company, however, has not experienced material disruptions in its supply chain to date. The Company's future results of operations and liquidity could be adversely impacted by a variety of factors related to the COVID-19 pandemic, including those discussed in the section entitled "Risk Factors" of the Company's Annual Report on Form 10-K for the year ended December 31, 2021. As of the date of issuance of these condensed consolidated financial statements, the extent to which the COVID-19 pandemic may materially impact the Company's financial condition, liquidity, or results of operations remains uncertain.

2. Summary of Significant Accounting Policies

Basis of Presentation

The accompanying unaudited condensed consolidated financial statements have been prepared in accordance with generally accepted accounting principles in the United States ("GAAP") and applicable rules and regulations of the SEC regarding interim financial reporting.

The unaudited interim condensed consolidated financial statements have been prepared on the same basis as the annual consolidated financial statements and, in the opinion of management, reflect all adjustments, which include only normal recurring adjustments, necessary to present fairly the Company's consolidated financial position, results of operations and cash flows. The results of operations for the three months ended March 31, 2022 are not necessarily indicative of the results to be expected for the year ending December 31, 2022 or for any other future annual or interim period. The condensed consolidated balance sheet as of December 31, 2021 included herein was derived from the audited financial statements as of that date. The unaudited condensed consolidated financial statements should be read in conjunction with the Company's audited consolidated financial statements and related notes included in the Company's Annual Report on Form 10-K for the year ended December 31, 2021, filed with the SEC on February 25, 2022.

Cash, Cash Equivalents, and Restricted Cash

The Company considers all highly liquid investments purchased with original maturities of three months or less from the purchase date to be cash equivalents. Cash equivalents consist primarily of amounts invested in money market accounts.

Restricted cash as of March 31, 2022 and December 31, 2021 relates to a letter of credit established for the Company's office leases and is recorded as other assets on the condensed consolidated balance sheets.

The following table provides a reconciliation of cash, cash equivalents, and restricted cash reported within the condensed consolidated balance sheets that sum to the total of the same amounts shown in the condensed consolidated statements of cash flows:

	March 31, 2022	December 31, 2021
	(in thousands)	
Cash and cash equivalents	$ 66,252	$ 89,209
Restricted cash	1,665	1,665
Total cash, cash equivalents, and restricted cash	$ 67,917	$ 90,874

Equity Method Investments

Entities which the Company has significant influence over activities of the entity, but does not control, are accounted for under the equity method of accounting in accordance with Topic 323, *Investments - Equity Method and Joint Ventures*. The Company's carrying value in the equity method investment is reported as equity method investment on the Company's consolidated balance sheet. The Company records its proportionate share of the underlying income or loss which is recognized in share in net loss of equity method investment. For the three months ended March 31, 2022, the Company's share in the losses incurred by the equity method investment was $47,000. The Company eliminates any intra-entity profits to the extent of the Company's beneficial interest.

The Company assesses its equity method investment for impairment when events or circumstances suggest that the carrying amount of the investment may be impaired. The Company considers all available evidence in assessing whether a decline in fair value is other than temporary. If the decline in fair value is determined to be other than temporary, the difference between the carrying amount of the investment and estimated fair value is recognized as an impairment charge.

Revenue

To determine revenue recognition for arrangements that an entity determines are within the scope of Topic 606, *Revenue from Contracts with Customers*, the Company performs the following five steps: (i) identify the contract(s) with a customer; (ii) identify the performance obligations in the contract; (iii) determine the transaction price; (iv) allocate the transaction price to the performance obligations in the contract; and (v) recognize revenue when (or as) the entity satisfies a performance obligation.

Product Revenue

The Company records product revenue primarily from the sale of its IVL catheters. The Company sells its products to hospitals, primarily through direct sales representatives, as well as through distributors in selected international markets. Additionally, a portion of the Company's revenue is generated through a consignment model under which inventory is maintained at hospitals.

Product revenue is recognized when a customer obtains control of promised goods or services, in an amount that reflects the consideration which the entity expects to receive in exchange for those goods or services.

For products sold through direct sales representatives, control is transferred upon delivery to customers. For products sold to distributors internationally and products sold to customers that utilize stocking orders, control is transferred upon shipment or delivery to the customer's named location, based on the contractual shipping terms. For consignment inventory, control is transferred at the time the IVL catheters are consumed in a procedure. The Company elected to

account for shipping and handling activities that occur after the customer has obtained control as a fulfillment activity, and not a separate performance obligation.

The Company may provide for the use of an IVL generator and connector cable under an agreement to customers at no charge to facilitate use of the IVL catheters. These agreements do not contain contractually enforceable minimum commitments and are generally cancellable by either party with 30 days notice.

License Revenue

For arrangements that contain a license of the Company's functional intellectual property with a customer, the Company considers whether the license grant is distinct from other performance obligations in the arrangement. A license grant of functional intellectual property is generally considered to be capable of being distinct if a customer can benefit from the license on its own or together with other readily available resources. License revenue for licenses of functional intellectual property is recognized at a point in time when the Company satisfies its performance obligation of transferring the license to the customer.

Consideration received in advance of the satisfaction of a performance obligation is recognized as a contract liability. No license revenues were recognized for the three months ended March 31, 2022.

Stock-Based Compensation

The Company accounts for share-based payments at fair value. The fair value of stock options is measured using the Black-Scholes option-pricing model. For share-based awards that vest subject to the satisfaction of a service requirement, the fair value measurement date for stock-based compensation awards is the date of grant and the expense is recognized on a straight-line basis, over the vesting period. For share-based awards that vest upon the satisfaction of a performance target, the related compensation cost is recognized over the requisite service period based on the expected achievement of the performance target. The Company accounts for forfeitures as they occur.

3. Financial Instruments and Fair Value Measurements

The following tables summarize the Company’s financial assets measured at fair value on a recurring basis by level within the fair value hierarchy:

	March 31, 2022			
	Level 1	Level 2	Level 3	Total
	(in thousands)			
Assets:				
U.S. Treasury securities	$ 109,486	$ —	$ —	$ 109,486
Money market funds	23,711	—	—	23,711
Commercial paper	—	16,483	—	16,483
Corporate bonds	—	8,906	—	8,906
Total assets	$ 133,197	$ 25,389	$ —	$ 158,586

	December 31, 2021			
	Level 1	Level 2	Level 3	Total
	(in thousands)			
Assets:				
U.S. Treasury securities	$ 80,155	$ —	$ —	$ 80,155
Money market funds	47,541	—	—	47,541
Commercial paper	—	20,472	—	20,472
Corporate bonds	—	11,145	—	11,145
Total assets	$ 127,696	$ 31,617	$ —	$ 159,313

4. Cash Equivalents and Short-Term Investments

The following is a summary of the Company's cash equivalents and short-term investments:

	March 31, 2022			
	Amortized Cost Basis	Unrealized Gains	Unrealized Losses	Fair Value
	(in thousands)			
U.S. Treasury securities	$ 110,452	$ —	$ (966)	$ 109,486
Money market funds	23,711	—	—	23,711
Commercial paper	16,483	—	—	16,483
Corporate bonds	8,957	—	(51)	8,906
Total	$ 159,603	$ —	$ (1,017)	$ 158,586
Reported as:				
Cash equivalents				$ 23,711
Short-term investments				134,875
Total				$ 158,586

	December 31, 2021			
	Amortized Cost Basis	Unrealized Gains	Unrealized Losses	Fair Value
	(in thousands)			
U.S. Treasury securities	$ 80,353	$ —	$ (198)	$ 80,155
Money market funds	47,541	—	—	47,541
Commercial paper	20,472	—	—	20,472
Corporate bonds	11,149	—	(4)	11,145
Total	$ 159,515	$ —	$ (202)	$ 159,313
Reported as:				
Cash equivalents				$ 47,541
Short-term investments				111,772
Total				$ 159,313

The Company recognized no material realized gains or losses on its cash equivalents and short-term investments in the periods presented.

The remaining contractual maturities for available-for-sale securities were as follows:

	March 31, 2022
	Fair Value
One year or less	$ 115,230
Greater than one year and less than two years	43,356
Total	$ 158,586

5. Balance Sheet Components

Inventory

Inventory consists of the following:

	March 31, 2022	December 31, 2021
	(in thousands)	
Raw material	$ 13,627	$ 7,685
Work in progress	12,049	13,315
Finished goods	26,327	20,326
Consigned inventory	1,366	1,652
Total inventory	$ 53,369	$ 42,978

Accrued Liabilities

Accrued liabilities consist of the following:

	March 31, 2022	December 31, 2021
	(in thousands)	
Accrued employee compensation	$ 19,545	$ 25,749
Accrued research and development costs	3,913	4,605
Accrued asset purchases	2,980	4,101
Accrued professional services	3,086	2,636
Other	3,495	3,779
Total accrued liabilities	$ 33,019	$ 40,870

6. Commitments and Contingencies

Operating Leases

The Company's operating leases consist of leased facilities for the Company's headquarter offices, laboratory, and manufacturing space. Also included in operating leases are leases for vehicles, for use by certain employees of the Company, which were not material for the periods presented.

The weighted average remaining lease term and discount rate used to measure the Company's operating lease liabilities were 9.7 years and 5.0%, respectively. The Company estimated the discount rate using the incremental borrowing rate as the rate implicit in the lease was not readily determinable.

Short-term leases are leases having a term of 12 months or less. The Company recognizes short-term leases on a straight-line basis and does not record a related lease asset or liability for such leases. As of March 31, 2022, the Company has no material finance leases. Operating lease cost was $1.2 million and $0.6 million, for the three months ended March 31, 2022 and 2021, respectively.

The following are minimum future rental payments owed under these agreements which have commenced as of March 31, 2022:

Year ending December 31,	(in thousands)
2022 (remainder)	$ 2,602
2023	4,194
2024	4,289
2025	4,415
2026	4,545
Thereafter	24,664
Total minimum lease payments	$ 44,709
Less: imputed interest and adjustments	(11,054)
Total lease liability	$ 33,655

The total minimum future rental payments owed for the 5403 Betsy Ross facility under the terms of the Lease Amendment which has not yet commenced as of March 31, 2022 is $10.8 million.

7. Term Notes

Loan and Security Agreement

In February 2020, the Company entered into a First Amendment to its Loan and Security Agreement with Silicon Valley Bank (the "Amended Credit Agreement") to, among other things, refinance its existing term loan, which is accounted for as a modification of the Loan and Security Agreement. The Amended Credit Agreement provides the Company with a supplemental term loan in the amount of $16.5 million. The principal amount outstanding under the supplemental term loan accrues interest at a floating per annum rate equal to the greater of (a) the Prime Rate minus 1.25% and (b) 3.5%. The interest rate was 3.5% as of March 31, 2022.

The supplemental term loan matures on December 1, 2023. The Amended Credit Agreement provides an interest-only payment period through June 30, 2022.

The additional final payment for the Amended Credit Agreement is $1.6 million, which will be accrued over the term of the supplemental term loan using an effective interest rate that reflects the revised cash flows of the modified term loan.

The supplemental term loan is secured by all of the Company's assets, excluding intellectual property and certain other assets. The loan contains customary affirmative and restrictive covenants, including with respect to the Company's ability to enter into fundamental transactions, incur additional indebtedness, grant liens, pay any dividend or make any distributions to its holders, make investments, merge or consolidate with any other person or engage in transactions with the Company's affiliates, but does not include any financial covenants.

Current and noncurrent debt and net discount or premium balances are as follows:

	March 31, 2022	December 31, 2021
	(in thousands)	
Principal amount of term note	$ 16,500	$ 16,500
Net premium associated with accretion of final payment, and other debt issuance costs	783	630
Term note, current and noncurrent	17,283	17,130
Less term note, current portion	(8,250)	(5,500)
Term note, noncurrent portion	$ 9,033	$ 11,630

8. Stock-Based Compensation

Total stock-based compensation was as follows:

	Three Months Ended March 31,	
	2022	2021
	(in thousands)	
Cost of product revenue	$ 653	$ 138
Research and development	2,238	1,167
Sales and marketing	3,932	2,057
General and administrative	2,687	1,777
Total stock-based compensation	$ 9,510	$ 5,139

Stock-based compensation of $0.3 million was capitalized into inventory for the three months ended March 31, 2022 and March 31, 2021. Stock-based compensation capitalized into inventory is recognized as cost of product revenue when the related product is sold.

2009 Equity Incentive Plan and 2019 Equity Incentive Plan

On June 17, 2009, the Company adopted the 2009 Equity Incentive Plan (the “2009 Plan”) under which the Company's Board of Directors (the "Board") had the authority to issue stock options to employees, directors and consultants.

In February 2019, the Company adopted the 2019 Equity Incentive Plan (the “2019 Plan”), which became effective in connection with the initial public offering (the “IPO”). As a result, effective as of March 6, 2019, the Company may not grant any additional awards under the 2009 Plan. The 2009 Plan will continue to govern outstanding equity awards granted thereunder. The Company initially reserved 2,000,430 shares of common stock for the issuance of a variety of awards under the 2019 Plan, including stock options, stock appreciation rights, awards of restricted stock and awards of restricted stock units ("RSUs"). In addition, the number of shares of common stock reserved for issuance under the 2019 Plan will automatically increase on the first day of January for a period of up to ten years, which commenced on January 1, 2020, in an amount equal to 3% of the total number of shares of the Company’s capital stock outstanding on the last day of the preceding year, or a lesser number of shares determined by the Board. As of March 31, 2022, there were 4,809,252 shares available for issuance under the 2019 Plan.

Stock Options

Option activity under the 2009 Plan and 2019 Plan is set forth below:

	Shares Available for Grant	Number of Shares	Weighted-Average Exercise Price Per Share	Weighted-Average Remaining Term	Aggregate Intrinsic Value
				(in years)	(in thousands)
Balance, December 31, 2021	3,745,216	1,524,985	$ 6.01	5.76	$ 262,793
Awards authorized	1,063,334	—			
Options exercised	—	(54,913)	7.10		
Options cancelled	702	(702)	13.19		
Balance, March 31, 2022	4,809,252	1,469,370	$ 5.96	5.40	$ 295,930
Vested and exercisable, March 31, 2022		1,325,201	$ 5.37	5.25	$ 267,682
Vested and expected to vest, March 31, 2022		1,469,370	$ 5.96	5.40	$ 295,930

Restricted Stock Units

RSUs are share awards that entitle the holder to receive freely tradable shares of the Company's common stock upon vesting. The RSUs cannot be transferred and the awards are subject to forfeiture if the holder's employment terminates prior to the release of the vesting restrictions. RSUs generally vest over a four-year period with straight-line annual vesting, provided the employee remains continuously employed with the Company. The fair value of RSUs is equal to the closing price of the Company's common stock on the grant date.

In February 2022, the Company granted performance-based restricted stock units ("PRSUs") to certain key executives. The vesting of these PRSUs is dependent on the achievement of certain performance targets related to the Company's compound annual growth rate of revenue over a two or three year performance period, provided the executives remain employed with the Company at the time of vesting. The number of PRSUs that vest will vary from 0% to 200% of the target which will be determined based on the level of performance attained for each performance period. The fair value of these PRSUs is equal to the closing price of the Company's common stock on the grant date. Compensation cost for PRSUs is recognized over the requisite service period based on the expected achievement of performance targets.

RSU and PRSU activity under the 2019 Plan is set forth below. Grant activity for all PRSUs are disclosed at target (100%):

	Restricted Stock Units		Performance-Based Restricted Stock Units	
	Number of Shares	Weighted-Average Grant Date Fair Value Per Share	Number of Shares	Weighted-Average Grant Date Fair Value Per Share
Balance, December 31, 2021	1,156,683	$ 93.27	—	$ —
RSUs granted	214,988	157.46	35,105	155.03
RSUs forfeited	(22,864)	146.73	—	—
RSUs vested	(210,835)	80.63	—	—
Balance, March 31, 2022	1,137,972	$ 106.67	35,105	$ 155.03

Employee Stock Purchase Plan

In February 2019, the Company adopted the 2019 Employee Stock Purchase Plan ("ESPP"), which became effective in connection with the IPO on March 6, 2019. The Company initially reserved 300,650 shares of common stock for purchase under the ESPP. Each offering under the ESPP to Company employees to purchase stock under the ESPP begins on each September 1 and March 1 and ends on the following February 28 or 29 and August 31, respectively. On each purchase date, which falls on the last date of each offering period, ESPP participants will purchase shares of common stock at a price per share equal to 85% of the lesser of (1) the fair market value per share of the common stock on the offering date or (2) the fair market value of the common stock on the purchase date. The occurrence and duration of offering periods under the ESPP are subject to the determinations of the Company's Compensation Committee of the Board, in its sole discretion.

The fair value of the ESPP shares is estimated using the Black-Scholes option pricing model. The Company recorded $0.4 million and $0.3 million of stock-based compensation expense related to the ESPP for the three months ended March 31, 2022 and 2021, respectively. At March 31, 2022, a total of 1,212,769 shares were available for issuance under the ESPP.

9. Net Income (Loss) Per Share

The components of basic and diluted net income (loss) per share are as follows (in thousands, except share and per share amounts):

	Three Months Ended March 31,	
	2022	2021
Numerator:		
Net income (loss)	$ 14,521	$ (23,601)
Denominator:		
Basic:		
Weighted average number of common shares outstanding - basic	35,587,337	34,797,400
Diluted:		
Weighted average number of common shares outstanding - basic	35,587,337	34,797,400
Dilutive effect of outstanding common stock options	1,437,748	—
Dilutive effect of restricted stock units	597,817	—
Dilutive effect of common stock pursuant to employee stock purchase plan	575	—
Weighted average number of common shares outstanding - diluted	37,623,477	34,797,400
Net income (loss) per share:		
Basic	$ 0.41	$ (0.68)
Diluted	$ 0.39	$ (0.68)

The following outstanding potentially dilutive common stock equivalents have been excluded from the calculation of diluted net income (loss) per share for the periods presented due to their anti-dilutive effect:

	Three Months Ended March 31,	
	2022	2021
Common stock options issued and outstanding	—	1,927,262
Restricted stock units	58,699	1,173,972
Employee stock purchase plan	4,385	2,951
Total	63,084	3,104,185

10. Revenue

The following table represents the Company's product revenue based on product line:

	Three Months Ended March 31,	
	2022	2021
	(in thousands)	
Coronary	$ 70,337	$ 15,308
Peripheral	22,852	16,141
Other	442	451
Product revenue	$ 93,631	$ 31,900

Coronary product revenue encompasses sales of the Company's C^2 catheters. Peripheral product revenue encompasses sales of the Company's M^5, $M^{5+}$and S^4 IVL catheters. Other product revenue encompasses sales of the Company's generators and related accessories.

The following table represents the Company's product revenue based on the location to which the product is shipped:

	Three Months Ended March 31,	
	2022	2021
	(in thousands)	
United States	$ 78,519	$ 21,045
Europe	12,067	8,222
All other countries	3,045	2,633
Product revenue	$ 93,631	$ 31,900

11. Equity Method Investments

Genesis Shockwave Private Limited

On March 19, 2021, the Company entered into the Joint Venture Deed (or "JV Agreement") with Genesis MedTech International Private Limited ("Genesis") to establish a long-term strategic partnership to develop, manufacture and commercialize certain of the Company's interventional products in the People's Republic of China, excluding the Special Administrative Regions of Hong Kong and Macau ("PRC"). Under the JV Agreement, Genesis Shockwave Private Ltd. (the "JV") was formed under the laws of Singapore to serve as a joint venture of Genesis and the Company for the purpose of establishing and managing the strategic partnership.

On the same date, Genesis and the Company entered into a Share Subscription Agreement pursuant to which, among other things, the JV issued (i) 54,900 ordinary shares which represents 55% of total equity of the JV, to Genesis in exchange for a cash contribution of $15.0 million, of which 50% was paid upon signing and the remaining 50% was due within one year of signing, and (ii) 45,000 ordinary shares which represents 45% of total equity, to the Company as consideration for the Shockwave License Agreement (or "License Agreement"). Under the License Agreement, the Company has agreed to contribute to the JV an exclusive license under certain of the Company's intellectual property rights to develop, manufacture, distribute and commercialize certain products in the PRC and is entitled to receive royalties on the sales of the licensed products in the PRC. Further, the Company entered into a Distribution Agreement, pursuant to which the Company has agreed to sell certain Company-manufactured products to the JV or a PRC subsidiary of the JV for commercialization and distribution in the PRC.

The Company has accounted for its investment in the JV under the equity method of accounting. As of March 31, 2022, the carrying value of the Company's investment in the JV was $5.9 million and the Company owned a 45% interest in the entity. The Company's share of losses generated by the JV for the three months ended March 31, 2022 was approximately $47,000, which was recorded in share in net loss of the equity method investment. The JV has not generated any revenues to date.

The following table summarizes the unaudited balance sheet for the JV:

	March 31, 2022
Balance sheet:	(in thousands)
Current assets	$ 14,722
Current liabilities	(1,585)
Net assets	$ 13,137

The following table summarizes the unaudited results of operations for the JV:

	Three Months Ended March 31, 2022
	(in thousands)
Revenues	$ —
Loss from operations	105
Net loss	$ 105

Upon execution of the License Agreement, on March 19, 2021, the Company received a 45% equity stake in the JV. The Company determined that the JV met the definition of a customer under Topic 606, and that the promised goods and services of the contribution of the license of intellectual property and associated manufacturing technology transfer to the JV were considered to be a single performance obligation. The transaction price of $12.3 million was estimated by reference to the cash value of the shares which were issued at the formation of the JV.

As of March 31, 2022, the associated manufacturing technology transfer to the JV has not yet been completed. The Company maintains a related party contract liability, noncurrent, of $12.3 million for the outstanding performance obligation. The Company will satisfy the outstanding performance obligation upon the completion of training provided by the Company to the JV, and successful regulatory approval from the China National Medical Products Administration.

12. Income Taxes

On a quarterly basis, the Company provides for income taxes based upon an estimated annual effective income tax rate, adjusted for discrete items. The Company recognized income tax expense of $197,000 and $44,000 for the three months ended March 31, 2022 and 2021, respectively. The income tax expense for the three months ended March 31, 2022, reflects the impact of a change in U.S. tax law effective January 1, 2022, which requires the capitalization and amortization of research and experimental expenditures incurred after December 31, 2021.

The Company’s effective tax rate may be subject to fluctuation due to several factors, including our ability to accurately predict the pre-tax earnings in the various jurisdictions, valuation allowances against deferred tax assets, the recognition or de-recognition of tax benefits related to uncertain tax positions and the effects of tax law changes.

While the Company has reported U.S. pre-tax income for the first quarter 2022, the Company has not yet been able to establish sufficient significant positive evidence to conclude that its U.S. deferred tax assets are more likely than not to be realized. Therefore, the Company continues to maintain a valuation allowance against most of its U.S. deferred tax assets. Once the Company establishes a sustained level of profitability and projects continued profitability, the Company may reverse a significant portion of its valuation allowance recorded against U.S. deferred tax assets, resulting in an income tax benefit.

Item 2. Management's Discussion and Analysis of Financial Condition and Results of Operations.

You should read the following discussion and analysis of our financial condition and results of operations together with our condensed financial statements and related notes included in this Quarterly Report on Form 10-Q and our audited consolidated financial statements and related notes thereto contained in our Annual Report on Form 10-K for the year ended December 31, 2021. Some of the information contained in this discussion and analysis or set forth elsewhere in this Quarterly Report on Form 10-Q, including information with respect to our plans and strategy for our business, includes forward-looking statements that involve risks and uncertainties. As a result of many important factors, including those set forth under "Special Note Regarding Forward-Looking Statements," in the "Risk Factors" section of this Quarterly Report on Form 10-Q and in the "Risk Factors" section of our Annual Report on Form 10-K for the year ended December 31, 2021, our actual results could differ materially from the results described in, or implied, by those forward-looking statements.

Overview

We are a medical device company focused on developing and commercializing products intended to transform the way calcified cardiovascular disease is treated. We aim to establish a new standard of care for medical device treatment of atherosclerotic cardiovascular disease through our differentiated and proprietary local delivery of sonic pressure waves for the treatment of calcified plaque, which we refer to as intravascular lithotripsy ("IVL"). Our IVL system (our "IVL System"), which leverages our IVL technology (our "IVL Technology"), is a minimally invasive, easy-to-use, and safe way to significantly improve patient outcomes. We are currently selling the following products in a number of countries around the world where we have applicable regulatory approvals:

Products for the Treatment of Peripheral Artery Disease ("PAD"):

- Our Shockwave M^5 IVL catheter (the "M^5 catheter") and M^{5+} IVL catheter ("M^{5+} catheter") are five-emitter catheters for use in our IVL System in "medium" vessels for the treatment of above-the-knee PAD. The M^5 catheter was CE-Marked in April 2018 and cleared by the U.S. Food and Drug Administration ("FDA") in July 2018. The M^{5+} catheter, for which we are currently initiating a limited market release in the United States and select international locations, was CE-Marked in November 2020 and cleared by the FDA in April 2021.
- Our Shockwave S^4 IVL catheter ("S^4 catheter") is a four-emitter catheter for use in our IVL System in small vessels for the treatment of below-the-knee PAD. The second version of our S^4 catheter was cleared by the FDA in August 2019 and accepted by our EU notified body in May 2020 for use in our IVL System.

Product for the Treatment of Coronary Artery Disease ("CAD"):

- Our Shockwave C^2 IVL catheter ("C^2 catheter") is a two-emitter catheter for use in our IVL System for the treatment of CAD. The C^2 catheter was CE-Marked in June 2018. In August 2019, we received the Breakthrough Device Designation from the FDA for our C^2 catheters using our IVL System for the treatment of CAD. In August 2020, we submitted an application to the FDA for U.S. pre-market approval of our C^2 catheters, which was approved by the FDA in February 2021. In March 2021, we submitted DISRUPT CAD III and DISRUPT CAD IV data to support our Shonin submission in Japan for our C^2 Catheters and received approval in March 2022.

Our differentiated range of M^5 and M^{5+} catheters, S^4 catheters and C^2 catheters enables delivery of IVL therapy of diseased vasculature throughout the body for calcium modification. Our IVL catheters resemble in form a standard balloon angioplasty catheter, the device most commonly used by interventionalists. This familiarity makes our IVL System easy to learn, adopt and use on a day-to-day basis.

Since inception, we have focused on generating clinical data to demonstrate the safety and effectiveness of our IVL Technology. These initial studies have consistently shown low rates of complications regardless of which vessel was being studied. In addition to gaining regulatory approvals or clearances, the data from our clinical studies strengthen our ability to drive adoption of IVL Technology across multiple therapies in existing and new market segments. Our past studies have also guided optimal IVL procedure technique and informed the design of our IVL System and future products in development. In addition, we also have ongoing clinical programs across several products and indications, which, if successful, will allow us to expand commercialization of our products into new geographies and indications.

The first two indications we are targeting with our IVL System are PAD, the narrowing or blockage of vessels that carry blood from the heart to the extremities, and CAD, the narrowing or blockage of the arteries that supply blood to the

heart. In the future, we see significant opportunity in the potential treatment of aortic stenosis, a condition where the heart's aortic valve becomes increasingly calcified with age, causing it to narrow and obstruct blood flow from the heart.

We have adapted the use of lithotripsy to the cardiovascular field with the aim of creating what we believe can become the safest, most effective means of addressing the growing challenge of cardiovascular calcification. Lithotripsy has been used to successfully treat kidney stones (deposits of hardened calcium) for over 30 years. By integrating lithotripsy into a device that resembles a standard balloon catheter, physicians can prepare, deliver, and treat calcified lesions using a familiar form factor, without disruption to their standard procedural workflow. Our differentiated IVL System works by delivering shockwaves through the entire depth of the artery wall, modifying calcium in the medial layer of the artery, not just at the superficial most intimal layer. The shockwaves crack this calcium and enable the stenotic artery to expand at low pressures, thereby minimizing complications inherent to traditional balloon dilations, such as dissections or tears. Preparing the vessel with IVL facilitates optimal outcomes with other therapies, including stents and drug-eluting technologies. Using IVL also avoids complications associated with atherectomy devices such as dissection, perforation, and embolism. When followed by an anti-proliferative therapy such as a drug-coated balloons or drug-eluting stents, the micro-fractures may enable better drug penetration into the arterial wall and improve drug uptake, thereby improving the effectiveness of the combination treatment.

We market our products to hospitals whose interventional cardiologists, vascular surgeons, and interventional radiologists treat patients with PAD and CAD. We have dedicated meaningful resources to establish a direct sales capability in the United States, Germany, Austria, Switzerland, France, and the United Kingdom, and we are working to build out our direct sales team in Japan in anticipation of the launch of our C^2 catheters, for which we received Japanese regulatory approval in March 2022. We have complemented our direct sales capability with distributors actively selling our products in over 50 countries in North and South America, Europe, the Middle East, Asia, Africa, and Australia/New Zealand. We are actively expanding our international field presence through new distributors, as well as additional sales and clinical personnel. In addition, we are continuing to add new U.S. sales territories.

For the three months ended March 31, 2022 and 2021, we generated product revenue of $93.6 million and $31.9 million, respectively, and income from operations of $15.4 million and a loss of operations of $17.5 million, respectively. For the three months ended March 31, 2022 and 2021, 16% and 34%, respectively, of our product revenue was generated from customers located outside of the United States.

Since inception, we have incurred significant net losses. Although we had positive net income for the quarter ended March 31, 2022, we had a net loss for the year ended December 31, 2021. We may continue to incur losses in the future, which may vary significantly from period to period. We expect to continue to incur significant expenses as we (i) expand our marketing efforts to increase adoption of our products, (ii) expand existing relationships with our customers, (iii) obtain regulatory clearances or approvals for our planned or future products, (iv) conduct clinical trials on our existing and planned or future products, and (v) develop new products or add new features to our existing products. We will need to continue to generate significant revenue in order to sustain profitability as we continue to grow our business. Even if we achieve profitability for any period, we cannot be sure that we will remain profitable for any substantial period of time.

To date, our principal sources of liquidity have been the net proceeds we received through the sale of our common stock in our public offerings, private sales of equity securities and payments received from customers using our products. As of March 31, 2022, we had $201.1 million in cash, cash equivalents and short-term investments and an accumulated deficit of $238.3 million.

Impact of the COVID-19 pandemic

The global COVID-19 pandemic presents significant risks to us and has had, and continues to have, far reaching impacts on our business, operations, and financial results and condition, directly and indirectly, including, without limitation, impacts on: the health of our management and employees; our manufacturing, distribution, marketing and sales operations; our research and development activities, including clinical activities; and customer and patient behaviors.

Access to many hospitals and other customer sites may be or may periodically be, depending on the current COVID-19 infection rates in the applicable location, restricted to essential personnel, which negatively impacts our ability to promote the use of our products with physicians. Additionally, many hospitals and other therapeutic centers have in the past suspended, and may suspend or continue to suspend in the future, many elective procedures, resulting in a reduced volume of procedures using our products. Our customer behavior is impacted by the prevalence of COVID-19 and changes in the infection rates in the locations where our customers are located.

Quarantines, shelter-in-place and similar government orders have also impacted and may continue to impact, our third-party manufacturers and suppliers, and could in turn adversely impact the availability or cost of materials, which could disrupt our supply chain.

In addition, we have recently seen some disruptions in the operations of certain of our third-party suppliers, resulting in increased lead-times, higher component costs and lower allocations for our purchase of some components. In certain cases, this has resulted in us being required to procure materials from alternate suppliers or incur higher logistical expenses. We are continuing to work closely with our manufacturing partners and suppliers to enable us to source key components and maintain appropriate inventory levels to meet customer demand. We, however, have not experienced material disruptions in our supply chain to date.

We have taken a variety of steps to address the impact of the COVID-19 pandemic, while attempting to minimize business disruption. Essential staff in manufacturing and limited support functions continued to work from our Santa Clara headquarters following appropriate hygiene and social distancing protocols. To reduce the risk to our other employees and their families from potential exposure to COVID-19, until recently all other staff in our Santa Clara headquarters were required to work from home. Certain of these other employees had begun to return to our headquarters full or part-time during the second quarter of 2021, although we continue to review the impact of the omicron variant of COVID-19 on employee safety. We continue to limit non-essential travel to protect the health and safety of our employees and customers.

We are continuing to monitor the impact of the COVID-19 pandemic on our employees and customers and on the markets in which we operate, and will take further actions that we consider prudent to address the COVID-19 pandemic, while ensuring that we can support our customers and continue to develop our products.

The ultimate extent of the impact of the COVID-19 pandemic on us remains highly uncertain and will depend on future developments and factors that continue to evolve, including the ability of various regions to effectively manage COVID-19, the extent of the continuing resurgence of COVID-19, the efficacy and extent of distribution of vaccines, and the impact of mutations of COVID-19, and the ability of various economies and supply-chains to recover from the COVID-19 pandemic. Most of these developments and factors are outside of our control and could exist for an extended period of time even after the pandemic might end.

Components of Our Results of Operations

Product revenue

Product revenue is primarily from the sale of our IVL catheters.

We sell our products to hospitals, primarily through direct sales representatives, as well as through distributors in selected international markets. For products sold through direct sales representatives, control is transferred upon delivery to customers. For products sold to distributors internationally and products sold to customers that utilize stocking orders, control is transferred upon shipment or delivery to the customer's named location, based on the contractual shipping terms. Additionally, a portion of our revenue is generated through a consignment model under which inventory is maintained at hospitals. For consignment inventory, control is transferred at the time the catheters are consumed in a procedure.

Cost of product revenue

Cost of product revenue consists primarily of costs of components for use in our products, the materials and labor that are used to produce our products, the manufacturing overhead that directly supports production and the depreciation relating to the equipment used in our IVL System to the extent that we loan generators to our hospital customers without charge to facilitate the use of our IVL catheters in their procedures. We depreciate equipment over a three-year period. We expect cost of product revenue to increase in absolute terms as our revenue grows.

Our gross margin has been and will continue to be affected by a variety of factors, primarily production volumes, the cost of direct materials, product mix, geographic mix, discounting practices, manufacturing costs, product yields, headcount and cost-reduction strategies. We expect our gross margin percentage to marginally increase over the long term to the extent we are successful in increasing our sales volume and are therefore able to leverage our fixed costs. We intend to use our design, engineering and manufacturing capabilities to further advance and improve the efficiency of our manufacturing processes, which, if successful, we believe will reduce costs and enable us to increase our gross margin percentage. While we expect gross margin percentage to increase over the long term, it will likely fluctuate from quarter to quarter as we continue to introduce new products and adopt new manufacturing processes and technologies.

Research and development expenses

Research and development ("R&D") expenses consist of applicable personnel, consulting, materials, and clinical trial expenses. R&D expenses include:

- certain personnel-related expenses, including salaries, benefits, bonus, travel, and stock-based compensation;
- cost of clinical studies to support new products and product enhancements, including expenses for clinical research organizations, and site payments;
- materials and supplies used for internal R&D and clinical activities;
- allocated overhead including facilities and information technology expenses; and
- cost of outside consultants who assist with technology development, regulatory affairs, clinical affairs and quality assurance.

R&D costs are expensed as incurred. In the future, we expect R&D expenses to increase in absolute dollars as we continue to develop new products, enhance existing products and technologies, and perform activities related to obtaining additional regulatory approvals.

Sales and marketing expenses

Sales and marketing expenses consist of personnel-related expenses, including salaries, benefits, sales commissions, travel, and stock-based compensation. Other sales and marketing expenses consist of marketing and promotional activities, including trade shows and market research. We expect to continue to grow our sales force and increase marketing efforts as we continue commercializing products based on our IVL Technology. As a result, we expect sales and marketing expenses to increase in absolute dollars over the long term.

General and administrative expenses

General and administrative expenses consist of personnel-related expenses, including salaries, benefits, bonus, travel, and stock-based compensation. Other general and administrative expenses consist of professional services fees, including legal, audit and tax fees, insurance costs, outside consultant fees and employee recruiting and training costs. Moreover, we expect to incur additional expenses associated with operating as a public company, including legal, accounting, insurance, exchange listing and Securities and Exchange Commission ("SEC") compliance and investor relations. As a result, we expect general and administrative expenses to increase in absolute dollars in future periods.

Share in net loss of equity method investment

Share in net loss of equity method investment, represents our proportionate share of the underlying income or loss incurred in connection with our joint venture with Genesis MedTech International Private Limited ("Genesis").

Interest expense

Consists of the interest and amortization expense related to our outstanding term loan which matures in December 2023.

Other income (expense), net

Other income (expense), net consists of interest earned on our cash equivalents and short-term investments and the net impact of foreign exchange gains and losses.

Results of Operations

Comparison of the Three Months Ended March 31, 2022 and 2021

The following table shows our results of operations for the three months ended March 31, 2022 and 2021:

	Three Months Ended March 31,		Change	Change
	2022	2021	$	%
	(in thousands, except percentages)			
Revenue:				
Product revenue	$ 93,631	$ 31,900	$ 61,731	194%
Cost of revenue:				
Cost of product revenue	12,890	7,892	4,998	63%
Gross profit	80,741	24,008	56,733	236%
Operating expenses:				
Research and development	17,019	10,277	6,742	66%
Sales and marketing	35,961	23,992	11,969	50%
General and administrative	12,389	7,226	5,163	71%
Total operating expenses	65,369	41,495	23,874	58%
Income (loss) from operations	15,372	(17,487)	32,859	188%
Share in net loss of equity method investment	(47)	(5,523)	(5,476)	(99)%
Interest expense	(297)	(312)	(15)	(5)%
Other expense, net	(310)	(235)	75	32%
Net income (loss) before taxes	14,718	(23,557)	38,275	162%
Income tax provision	197	44	153	348%
Net income (loss)	$ 14,521	$ (23,601)	$ 38,122	162%

Product revenue

Product revenue increased by $61.7 million, or 194%, from $31.9 million during the three months ended March 31, 2021 to $93.6 million during the three months ended March 31, 2022.

The following table represents our product revenue based on product line:

	Three Months Ended March 31,		Change	Change
	2022	2021	$	%
	(in thousands, except percentages)			
Coronary	$ 70,337	$ 15,308	$ 55,029	359%
Peripheral	22,852	16,141	6,711	42%
Other	442	451	(9)	(2)%
Product revenue	$ 93,631	$ 31,900	$ 61,731	194%

Coronary product revenue increased by $55.0 million, or 359%, from $15.3 million for the three months ended March 31, 2021 to $70.3 million for the three months ended March 31, 2022. In February 2021, we received U.S. FDA approval for our C^2 catheters. The increase in coronary product revenue was primarily due to the commencement of sales of our C^2 catheters in the United States, increased adoption of our products internationally, and continued recovery from the impact of the COVID-19 pandemic in the prior year.

Peripheral product revenue increased by $6.7 million, or 42%, from $16.1 million for the three months ended March 31, 2021 to $22.9 million for the three months ended March 31, 2022. The change was due to an increase in purchase volume of our M^5, M^{5+} and S^4 IVL catheters within the United States and internationally driven by increased adoption of our products and recovery from the impact of the COVID-19 pandemic in the prior year.

We sold to a greater number of customers in the United States and to a greater number of distributors internationally for the three months ended March 31, 2022 as compared to the three months ended March 31, 2021. Product revenue, classified by the major geographic areas in which our products are shipped, was $78.5 million within the United States and $15.1 million for all other countries in the three months ended March 31, 2022 compared to $21.0 million within the United States and $10.9 million for all other countries in the three months ended March 31, 2021.

Cost of product revenue, gross profit and gross margin percentage

Cost of product revenue increased by $5.0 million, or 63%, from $7.9 million during the three months ended March 31, 2021 to $12.9 million during the three months ended March 31, 2022. Gross margin percentage improved to 86% for the three months ended March 31, 2022, compared to 75% for the three months ended March 31, 2021. This change in gross margin percentage was primarily due to a higher average selling price and lower fixed costs per unit from increased sales volume of our IVL catheters and efficiencies from improvements to operations and production.

Research and development expenses

The following table summarizes our R&D expenses incurred during the periods presented:

	Three Months Ended March 31,		Change	Change
	2022	2021	$	%
	(in thousands)			
Compensation and personnel-related costs	$ 10,534	$ 6,098	$ 4,436	73%
Clinical-related costs	1,906	2,519	(613)	(24)%
Materials and supplies	1,055	27	1,028	3,807%
Facilities and other allocated costs	2,023	1,032	991	96%
Outside consultants	1,028	467	561	120%
Other research and development costs	473	134	339	253%
Total research and development expenses	$ 17,019	$ 10,277	$ 6,742	66%

R&D expenses increased by $6.7 million, or 66%, from $10.3 million during the three months ended March 31, 2021 to $17.0 million during the three months ended March 31, 2022. The change was primarily due to a $4.4 million increase in compensation and personnel-related costs due to an increase in headcount, a $1.0 million increase in materials and supplies, a $1.0 million increase in facilities and other allocated costs due to increased information technology, rent and building expenditures, a $0.6 million increase in outside consultants, and a $0.3 million increase in other research and development costs. This was partially offset by a decrease in clinical-related costs of $0.6 million due to completion of patient enrollment for the majority of clinical trials.

Sales and marketing expenses

Sales and marketing expenses increased by $12.0 million, or 50%, from $24.0 million during the three months ended March 31, 2021 to $36.0 million during the three months ended March 31, 2022. The change was primarily due to a $6.8 million increase in compensation and personnel-related costs, resulting from increased headcount and commissions driven by increased sales of our products. There was also a $2.9 million increase in travel related costs, a $0.9 million increase in marketing and promotional costs, a $1.1 million increase in facilities and other allocated costs, a $0.3 million increase in professional services and consulting costs, and a $0.2 million increase in general corporate costs. This was partially offset by a $0.2 million decrease in materials and supplies.

General and administrative expenses

General and administrative expenses increased by $5.2 million, or 71%, from $7.2 million during the three months ended March 31, 2021 to $12.4 million during the three months ended March 31, 2022. The change was primarily due to a $2.3 million increase in compensation and personnel-related costs, a $0.7 million increase in general corporate costs, a $1.4 million increase in professional services and consulting costs, a $0.4 million increase in facilities and other allocated costs, and a $0.4 million increase in travel related costs.

Share in net loss of equity method investment

The decrease in share in net loss of equity method investment of $5.5 million for the three months ended March 31, 2022 was due to in-process research and development costs expensed in the three months ended March 31, 2021.

Interest expense

Interest expense of $0.3 million for the three months ended March 31, 2022 was related to our outstanding term loan which matures in December 2023. The term loan requires monthly repayments of principal starting in July 2022.

Other expense, net

Other expense, net increased by $0.1 million, or 32%, from $0.2 million during the three months ended March 31, 2021 to $0.3 million during the three months ended March 31, 2022. The increase in other expense was primarily due to increased foreign exchange losses, partially offset by an increase in interest income due to the increased interest rate environment.

Liquidity and Capital Resources

To date, our principal sources of liquidity have been the net proceeds of $280.0 million that we received through the sales of our common stock in our public offerings, $10.0 million of private sales of our equity securities, payments received from customers using our products and to a lesser extent proceeds from our debt financings.

We have a number of ongoing clinical trials and expect to continue to make substantial investments in these trials and in additional clinical trials that are designed to provide clinical evidence of the safety and efficacy of our products. We intend to continue to make significant investments in our sales and marketing organization by increasing the number of U.S. sales representatives and expanding our international marketing programs to help facilitate further adoption among existing hospital accounts and physicians as well as broaden awareness of our products to new hospitals. We also expect to continue to make investments in R&D, regulatory affairs, and clinical studies to develop future generations of products based on our IVL Technology, support regulatory submissions, and demonstrate the clinical efficacy of our products. Moreover, we expect to continue to incur expenses associated with operating as a public company, including legal, accounting, insurance, exchange listing and SEC compliance, investor relations and other expenses. Because of these and other factors, although we had positive net income for the quarter ended March 31, 2022, we had a net loss for the year ended December 31, 2021 and we may incur net losses and have negative cash flows from operations in the future.

As of March 31, 2022, we had $201.1 million in cash, cash equivalents and short-term investments and an accumulated deficit of $238.3 million. In the short term, we believe that our cash, cash equivalents and short-term investments will be sufficient for at least the next 12 months to meet our requirements and plans for cash, including supporting working capital and capital expenditure requirements. In the long term, our ability to support our working capital and capital expenditure requirements will depend on many factors, including:

- the cost, timing and results of our clinical trials and regulatory reviews;
- the cost of our research and development activities for new and modified products;
- the cost and timing of establishing sales, marketing and distribution capabilities;
- the terms and timing of any other collaborative, licensing and other arrangements that we may establish including any contract manufacturing arrangements;
- the timing, receipt and amount of sales from our current and potential products;
- the degree of success we experience in commercializing our products;
- the emergence of competing or complementary technologies;

- the cost of preparing, filing, prosecuting, maintaining, defending and enforcing any patent claims and other intellectual property rights; and
- the extent to which we acquire or invest in businesses, products or technologies, although we currently have no commitments or agreements relating to any of these types of transactions.

To the extent that current and anticipated future sources of liquidity are insufficient to fund our future business activities and cash and other requirements, we may be required to seek additional equity or debt financing. The sale of additional equity would result in additional dilution to our stockholders. The incurrence of additional debt financing would result in debt service obligations and the instruments governing such debt could provide for operating and financing covenants that would restrict our operations. In the event that additional financing is required from outside sources, there is a possibility we may not be able to raise it on terms acceptable to us or at all. If we are unable to raise additional capital when desired, our business, operating results, and financial condition could be adversely affected.

Manufacturing Purchase Obligations

We have engaged a contract manufacturer to produce and supply us with certain products. We have fixed commitments of approximately $11.1 million within the next twelve months.

Operating Leases

Our operating lease commitments mostly consist of our lease obligations for our Santa Clara headquarter office spaces. Our total operating lease commitments as of March 31, 2022 are approximately $55.6 million, of which $4.3 million is expected to be paid within the next twelve months.

There were no other material changes during the three months ended March 31, 2022 to our contractual obligations as compared to those disclosed in "Management's Discussion and Analysis of Financial Condition and Results of Operations" included in our Annual Report on Form 10-K for the year ended December 31, 2021.

We did not have during the periods presented, and we do not currently have, any commitments or obligations, including contingent obligations, arising from arrangements with unconsolidated entities or persons that have or are reasonably likely to have a material current or future effect on our financial condition, changes in financial condition, revenues or expenses, results of operations, liquidity, cash requirements or capital resources.

Cash Flows

The following table summarizes our cash flows for the periods indicated:

	Three Months Ended March 31,	
	2022	2021
Net cash provided by (used in):	(in thousands)	
Operating activities	$ 1,937	$ (17,303)
Investing activities	(27,414)	27,086
Financing activities	2,520	(3,200)
Net increase (decrease) in cash, cash equivalents and restricted cash	$ (22,957)	$ 6,583

Operating activities

During the three months ended March 31, 2022, cash provided by operating activities was $1.9 million, attributable to a net income of $14.5 million, non-cash charges of $11.6 million, partially offset by a net change in our net operating assets and liabilities of $24.2 million. Non-cash charges of $11.6 million primarily consisted of $9.5 million in stock-based compensation, $1.0 million in depreciation and amortization, and $0.8 million in amortization of right-of-use assets. The change in our net operating assets and liabilities of $24.2 million was primarily due to a $10.4 million increase in accounts receivable due to an increase in sales, a $10.1 million increase in inventory driven by an increase in raw materials and finished goods inventory, and a $9.1 million decrease in accrued and other current liabilities resulting from payment of accrued bonuses and other compensation in the current quarter. These changes were partially offset by a $4.9 million increase in accounts payable due to the timing of vendor billings.

During the three months ended March 31, 2021, cash used in operating activities was $17.3 million, attributable to a net loss of $23.6 million and a net change in our net operating assets and liabilities of $6.0 million and non-cash charges of $12.3 million. Non-cash charges primarily consisted of $5.5 million in share of net loss of equity method investment, $5.1 million in stock-based compensation, $0.7 million in depreciation and amortization, $0.4 million in amortization of right-of-use assets, $0.4 million in accretion of discount on available-for-sale securities and $0.2 million in amortization of debt issuance costs. The change in our net operating assets and liabilities was primarily due to a $7.9 million increase in accounts receivable due to an increase in sales, $3.3 million increase in inventory, and a $0.1 million increase in other assets, prepaid and other current assets and a $0.3 million decrease in lease liabilities. These changes were partially offset by a $5.6 million increase in accrued and other current liabilities and accounts payable resulting primarily from increases in our operating activities and accrued employee compensation due to an increase in headcount.

Investing activities

During the three months ended March 31, 2022, cash used in investing activities was $27.4 million, attributable to purchases of available-for-sale investments of $42.1 million and purchases of property and equipment of $3.3 million, partially offset by proceeds from maturities of available-for-sale investments of $18.0 million.

During the three months ended March 31, 2021, cash provided by investing activities was $27.1 million, attributable to proceeds from maturities of available-for-sale investments of $46.4 million, partially offset by purchase of available-for-sale investments of $15.3 million and purchase of property and equipment of $4.1 million.

Financing activities

During the three months ended March 31, 2022, cash provided by financing activities was $2.5 million, attributable to proceeds of $2.1 million from the issuance of shares under our employee stock purchase plan and proceeds of $0.4 million from stock option exercises.

During the three months ended March 31, 2021, cash used by financing activities was $3.2 million, attributable to payment of taxes withheld on net settled vesting of restricted stock units of $5.1 million, partially offset by $1.1 million in proceeds from the issuance of common stock under employee stock purchase plan and $0.8 million in proceeds from stock option exercises.

Critical Accounting Policies and Estimates

Management's discussion and analysis of our financial condition and results of operations is based on our condensed consolidated financial statements, which have been prepared in accordance with U.S. generally accepted accounting principles ("GAAP"). The preparation of these consolidated financial statements requires us to make estimates and assumptions for the reported amounts of assets, liabilities, revenue, expenses and related disclosures. Our estimates are based on our historical experience and on various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying value of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions and any such differences may be material.

There have been no significant changes in our critical accounting policies and assumptions associated with the greatest potential impact on our consolidated financial statements as disclosed in our Annual Report on Form 10-K for the fiscal year ended December 31, 2021 in the section titled "Management's Discussion and Analysis of Financial Condition and Results of Operations."

Item 3. Quantitative and Qualitative Disclosures About Market Risk.

There have been no material changes to our quantitative and qualitative disclosures about market risk as compared to the quantitative and qualitative disclosures about market risk described in our Annual report on Form 10-K for the fiscal year ended December 31, 2021.

Item 4. Controls and Procedures.

Evaluation of disclosure controls and procedures

Our management, with the participation and supervision of our Chief Executive Officer and our Chief Financial Officer, have evaluated our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended (the "Exchange Act")) as of the end of the period covered by this Quarterly Report on Form 10-Q. Based on that evaluation, our Chief Executive Officer and Chief Financial Officer have concluded that, as of the end of the period covered by this Quarterly Report on Form 10-Q, our disclosure controls and procedures are effective to provide reasonable assurance that information we are required to disclose in reports that we file or submit under the Exchange Act is recorded, processed, summarized, and reported within the time periods specified in SEC rules and forms, and that such information is accumulated and communicated to our management, including our Chief Executive Officer and Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosure.

Changes in internal control over financial reporting

There was no change in our internal control over financial reporting identified in connection with the evaluation required by Rule 13a-15(d) and 15d-15(d) of the Exchange Act that occurred during the period covered by this Quarterly Report on Form 10-Q that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Inherent limitation on the effectiveness of internal control

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

PART II—OTHER INFORMATION

Item 1. Legal Proceedings.

Petitions for inter partes review ("IPR") of U.S. Pat. Nos. 9,642,673, 8,956,371 and 8,728,091, which are three of our issued U.S. patents that relate to our current IVL technology, were filed in December 2018 at the U.S. Patent and Trademark Office's (the "USPTO") Patent Trial and Appeal Board (the "PTAB") by Cardiovascular Systems, Inc. ("CSI"), one of our competitors. The PTAB instituted IPR proceedings for all three patents.

The PTAB held oral hearings on April 15-16, 2020. On July 8, 2020, the PTAB ruled that one claim ("Claim 5") in U.S. Pat No. 8,956,371 (the "'371 patent") is valid and ruled that all other claims in the '371 patent are invalid and that all claims of U.S. Pat No. 8,728,091 (the "'091 patent") are invalid. On July 20, 2020, the PTAB ruled that all claims of U.S. Pat. No. 9,642,673 (the "'673 patent") are invalid. On August 27, 2020, further briefing by the parties was requested by the PTAB judge in the '371 patent proceeding to assess whether recent guidance from the USPTO relating to "applicant admitted prior art" impacted the PTAB decision in the '371 patent proceeding. In addition, the PTAB judge reset the time for commencement of an appeal in the '371 patent proceeding pending the entry of a final decision after the requested briefing. On October 13, 2020, we submitted the last of the requested briefing, and the PTAB decision is pending. Subject to the final PTAB decision regarding the '371 patent proceeding, we anticipate appealing this ruling to the U.S. Court of Appeals for the Federal Circuit (the "Federal Circuit").

We appealed the rulings in the IPR proceedings for the '091 patent and the '673 patent to the Federal Circuit. On January 18, 2022, the Federal Circuit issued two short opinions affirming the decisions of the PTAB, finding that the claims of the '091 patent and the '673 patent are unpatentable (the "Rulings"). The Rulings conclude the IPR proceedings initiated by CSI for these two patents and resulted in the loss in scope of the '091 patent and the '673 patent, which may limit our ability to stop others from using or commercializing products and technology similar or identical to ours.

IPR proceedings relating to the '371 patent remain pending before the PTAB on rehearing and have not yet been addressed by the Federal Circuit. Claim 5 of the '371 patent was found to be valid, and all other claims remain valid and enforceable until a final decision is obtained from the PTAB, and any appeals have been exhausted. Upon the conclusion of such appeals, if we are unsuccessful in whole or in part, the '371 patent proceedings could result in the loss or narrowing in scope of the '371 patent, which could further limit our ability to stop others from using or commercializing products and technology similar or identical to ours. For more information regarding the risks presented by such proceedings, please see the section of our Annual Report on Form 10-K for the year ended December 31, 2021, titled "Risk Factors—Risks Related to Our Intellectual Property."

From time to time, we may become involved in various legal proceedings that arise in the ordinary course of our business. We have received, and may from time to time receive, letters from third parties alleging patent infringement, violation of employment practices or trademark infringement, and we may in the future participate in litigation to defend ourselves. We cannot predict the results of any such disputes, and despite the potential outcomes, the existence thereof may have an adverse material impact on us due to diversion of management time and attention as well as the financial costs related to resolving such disputes.

Item 1A. Risk Factors.

There have been no material changes from the risk factors disclosed in Part I, Item 1A. "Risk Factors" of our 2021 Annual Report on Form 10-K for the year ended December 31, 2021 (the "2021 Annual Report"), filed with the Securities and Exchange Commission on February 25, 2022. The risk factors described in our 2021 Annual Report, as well as other information set forth in this Quarterly Report on Form 10-Q, could materially adversely affect our business, financial condition, results of operations and prospects, and should be carefully considered. The risks and uncertainties that we face, however, are not limited to those described in the 2021 Annual Report. Additional risks and uncertainties not presently known to us or that we currently believe to be immaterial may also adversely affect our business and the trading price of our securities, particularly in light of the fast-changing nature of the COVID-19 pandemic, containment measures and the related impacts to economic and operating conditions.

Item 2. Unregistered Sales of Equity Securities and Use of Proceeds.

None.

Item 3. Defaults Upon Senior Securities.

None.

Item 4. Mine Safety Disclosures.

Not applicable.

Item 5. Other Information.

None.

Item 6. Exhibits.

Furnish the exhibits required by Item 601 of Regulation S-K (§ 229.601 of this chapter).

Exhibit Number	Description	Form	File No.	Exhibit(s)	Filing Date
10.1*†	Amended and Restated Separation Pay Agreement with Doug Godshall.				
10.2*†	Amended and Restated Form of Separation Pay Agreement for Executive Officers (Other than CEO).				
10.3*	Amended and Restated Non-Employee Director Compensation Policy.				
31.1*	Certification of Principal Executive Officer Pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.				
31.2*	Certification of Principal Financial Officer Pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.				
32.1*#	Certification of Principal Executive Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.				
32.2*#	Certification of Principal Financial Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.				
101.INS*	Inline XBRL Instance Document - the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.				
101.SCH*	Inline XBRL Taxonomy Extension Schema Document				
101.CAL*	Inline XBRL Taxonomy Extension Calculation Linkbase Document				
101.DEF*	Inline XBRL Taxonomy Extension Definition Linkbase Document				
101.LAB*	Inline XBRL Taxonomy Extension Label Linkbase Document				
101.PRE*	Inline Taxonomy Extension Presentation Linkbase Document				
104	The cover page from the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2022 has been formatted in Inline XBRL and contained in Exhibit 101				

* Filed herewith.

† Indicates a management or compensatory plan or arrangement in which directors or executive officers are eligible to participate.

This certification is deemed not filed for purposes of Section 18 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), or otherwise subject to the liability of that section, nor shall it be deemed incorporated by reference into any filing under the Securities Act of 1933, as amended, or the Exchange Act.

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

Shockwave Medical, Inc.

Date: May 9, 2022 By: /s/ Douglas Godshall

Douglas Godshall
President and Chief Executive Officer
(principal executive officer)

Date: May 9, 2022 By: /s/ Trinh Phung

Trinh Phung
Vice President of Finance
(principal accounting officer)

AMENDED AND RESTATED SEPARATION PAY AGREEMENT

This Separation Pay Agreement (the "**Agreement**") is made and entered into as of March 30, 2022, by and between Doug Godshall (the "**Executive**") and Shockwave Medical, Inc., a Delaware corporation (the "**Company**"), and amends and restates that certain Separation Pay Agreement entered into by and between the Executive and the Company, dated as of August 19, 2019.

WHEREAS, the Company desires to address and handle certain aspects of the employment the Executive on the terms and conditions set forth herein; and

WHEREAS, the Executive desires to have such aspects of his employment addressed and handled by the Company on such terms and conditions.

NOW, THEREFORE, in consideration of the mutual covenants, promises, and obligations set forth herein, the parties agree as follows:

1. Term. This Agreement shall be effective as of the date hereof (the "**Effective Date**") until such time as the Executive's employment is terminated pursuant to Section 2.6 below (such period, the "**Employment Term**").

2. Termination of Employment. The Employment Term and the Executive's employment hereunder may be terminated by either the Company or the Executive at any time and for any reason; provided that, unless otherwise provided herein, either party shall be required to give the other party at least thirty (30) days advance written notice of any termination of the Executive's employment. Upon termination of the Executive's employment during the Employment Term, the Executive shall be entitled to the compensation and benefits described in this Section 2 and shall have no further rights to any compensation or any other benefits from the Company or any of its affiliates.

2.1 *Termination for Cause or Resignation without Good Reason*.

(a) The Executive's employment hereunder may be terminated by the Company for Cause or by the Executive without Good Reason. If the Executive's employment is terminated, by the Company for Cause or by the Executive without Good Reason, the Executive shall be entitled to receive:

(i) any accrued but unpaid salary and accrued but unused vacation which shall be paid on the Termination Date in accordance with the Company's customary payroll procedures;

(ii) any earned but unpaid incentive under the Company's annual cash incentive plan (the "**Annual Incentive**") with respect to any completed calendar year immediately preceding the Termination Date, which shall be paid on the otherwise applicable payment date; provided that, if the Executive's employment is terminated by the Company for Cause, then any such accrued but unpaid Annual Incentive shall be forfeited;

(iii) reimbursement for unreimbursed business expenses properly incurred by the Executive, which shall be subject to and paid in accordance with the Company's expense reimbursement policy; and

(iv) such employee benefits (including equity compensation), if any, to which the Executive may be entitled under the Company's employee benefit plans as of the Termination Date; provided that, in no event shall the Executive be entitled to any payments in the nature of severance or termination payments except as specifically provided herein.

Items 2.1(a)(i) through 2.1(a)(iv) are referred to herein collectively as the "**Accrued Amounts**".

(b) For purposes of this Agreement, "**Cause**" shall mean:

(i) the Executive's willful failure to perform his duties (other than any such failure resulting from incapacity due to physical or mental illness);

(ii) the Executive's engagement in dishonesty, illegal conduct, or gross misconduct, which, in each case, poses a substantial risk of material injury to the Company or its affiliates;

(iii) the Executive's embezzlement, misappropriation, or fraud, whether or not related to the Executive's employment with the Company;

(iv) the Executive's conviction of or plea of guilty or nolo contendere to a crime that constitutes a felony (or state law equivalent) or a crime that constitutes a misdemeanor involving moral turpitude;

(v) the Executive's material breach of any material obligation under this Agreement or any other written agreement between the Executive and the Company; or

(vi) any material failure by the Executive to comply with the Company's written policies or rules, as they may be in effect from time to time during the Employment Term, if such failure poses a substantial risk of material reputational or financial harm to the Company.

For purposes of this provision, no act or failure to act on the part of the Executive shall be considered "willful" unless it is done, or omitted to be done, by the Executive in bad faith or without reasonable belief that the Executive's action or omission was in the best interests of the Company. Any act, or failure to act, based upon authority given pursuant to a resolution duly adopted by the Board or upon the advice of counsel for the Company shall be conclusively presumed to be done, or omitted to be done, by the Executive in good faith and in the best interests of the Company.

Termination of the Executive's employment shall not be deemed to be for Cause unless and until the Company delivers to the Executive a copy of a resolution duly adopted by the affirmative vote of not less than a majority of the Board, finding that the Executive has engaged in the conduct described in any of (i)-(vi) above. Except for a failure, breach, or refusal which, by its nature, cannot reasonably be expected to be cured, the Executive shall have ten (10) business days from the delivery of written notice by the Company within which to cure any acts constituting Cause; provided however, that, if the Company reasonably expects irreparable injury from a delay of ten (10) business days, the Company may give the Executive notice of such shorter period within which to cure as is reasonable under the circumstances, which may include the termination of the Executive's employment without notice and with immediate effect. The Company may place the Executive on paid leave for up to sixty (60) days while it is determining whether there is a basis to terminate the Executive's employment for Cause. Any such action by the Company will not constitute Good Reason.

(c) For purposes of this Agreement, "**Good Reason**" shall mean the occurrence of any of the following, in each case during the Employment Term without the Executive's written consent:

(i) a material reduction in the Executive's annual rate of base salary other than a general reduction that affects all similarly situated executives in substantially the same proportions;

(ii) a material reduction in the Executive's target incentive opportunity under the Annual Incentive;

(iii) a relocation of the Executive's principal place of employment by more than 30 miles;

(iv) any material breach by the Company of any material provision of this Agreement;

(v) the Company's failure to obtain an agreement from any successor to the Company to assume and agree to perform this Agreement in the same manner and to the same extent that the Company would be required to perform if no succession had taken place, except where such assumption occurs by operation of law;

(vi) the Company's failure to nominate the Executive for election to the Board and to use its best efforts to have him elected and re-elected, as applicable;

(vii) a material, adverse change in the Executive's title, authority, duties, or responsibilities (other than temporarily while the Executive is physically or mentally incapacitated or as required by applicable law); or

(viii) a material adverse change in the reporting structure applicable to the Executive.

The Executive cannot terminate his employment for Good Reason unless he has provided written notice to the Company of the existence of the circumstances providing grounds for termination for Good Reason within ninety (90) days of the initial existence of such grounds and the Company has had at least 30 days from the date on which such notice is provided to cure such circumstances. If the Executive does not terminate his employment for Good Reason within one hundred twenty (120) days after the first occurrence of the applicable grounds, then the Executive will be deemed to have waived his right to terminate for Good Reason with respect to such grounds.

2.2 *Termination without Cause or Resignation for Good Reason*. The Employment Term and the Executive's employment hereunder may be terminated by the Executive for Good Reason or by the Company without Cause. In the event of such termination, the Executive shall be entitled to receive the Accrued Amounts and subject to the Executive's execution of a release of claims in favor of the Company, its affiliates and their respective officers and directors in a form provided by the Company (the "**Release**") and such Release becoming effective within sixty (60) days following the Termination Date (such 60-day period, the "**Release Execution Period**"), the Executive shall be entitled to receive the following:

(a) equal installment payments payable in accordance with the Company's normal payroll practices, but no less frequently than monthly, which are in the aggregate equal to 1.5 times the sum of the Executive's annual rate of base salary for the year in which the Termination Date occurs, which shall begin within 60 days following the Termination Date; provided that, if the Release Execution Period begins in one taxable year and ends in another taxable year, payments shall not begin until the beginning of the second taxable year; provided further that, the first installment payment shall include all amounts that would otherwise have been paid to the Executive during the period beginning on the Termination Date and ending on the first payment date if no delay had been imposed;

(b) a payment equal to the product of (i) the Annual Incentive, if any, that the Executive would have earned for the calendar year in which the Termination Date (as determined in accordance with Section 2.6) occurs based on achievement of the applicable performance goals for such year and (ii) a fraction, the numerator of which is the number of days the Executive was employed by the Company during the year of termination and the denominator of which is the number of days in such year (the "**Pro-Rata Bonus**"). This amount shall be paid on the date that annual bonuses are paid to similarly situated executives, but in no event later than two-and-a-half (2 1/2) months following the end of the calendar year in which the Termination Date occurs;

(c) If the Executive timely and properly elects health continuation coverage under the Consolidated Omnibus Budget Reconciliation Act of 1985 ("**COBRA**"), the Company shall reimburse the Executive for the difference between the monthly COBRA premium paid by the Executive for himself and his dependents and the monthly premium amount paid by similarly situated active executives. Such reimbursement shall be paid to the Executive on the 15th day of the month immediately following the month in which the Executive timely remits the premium payment. The Executive shall be eligible to receive such reimbursement until the earliest of: (i) the eighteen-month anniversary of the Termination Date; (ii) the date the Executive is no longer eligible to receive COBRA continuation coverage; and (iii) the date on which the Executive becomes eligible to receive substantially similar coverage from another employer or other source. Notwithstanding the foregoing, if the Company's making payments under this Section 2.2(c) would violate the nondiscrimination rules applicable to non-grandfathered plans under the Affordable Care Act (the "**ACA**"), or result in the imposition of penalties under the ACA and the related regulations and guidance promulgated thereunder), the parties agree to reform this Section 2.2(c) in a manner as is necessary to comply with the ACA.

(d) The treatment of each outstanding equity award, if any, shall be determined in accordance with the terms of the applicable plan and award agreement.

2.3 *Death or Disability*.

(a) The Executive's employment hereunder shall terminate automatically upon the Executive's death during the Employment Term, and the Company may terminate the Executive's employment on account of the Executive's Disability.

(b) If the Executive's employment is terminated during the Employment Term on account of the Executive's death or Disability, the Executive (or the Executive's estate and/or beneficiaries, as the case may be) shall be entitled to receive the Accrued Amounts**.** Notwithstanding any other provision contained herein, all payments made in connection with the Executive's Disability shall be provided in a manner which is consistent with federal and state law.

(c) For purposes of this Agreement, "**Disability**" shall mean the Executive's inability, due to physical or mental incapacity, to perform the essential functions of his job, with or without reasonable accommodation, for one hundred eighty (180) days out of any three hundred sixty-five (365) day period or one hundred twenty (120) consecutive days, or the Executive's becoming entitled to receive long-term disability benefits under the Company's long-term disability plan.

2.4 *Change in Control Termination*.

(a) Notwithstanding any other provision contained herein, if the Executive's employment hereunder is terminated by the Executive for Good Reason or by the Company without Cause (other than on account of the Executive's death or Disability), in each case within three (3) months prior to or within twelve (12) months following a Change in Control, the Executive shall be entitled to receive the Accrued Amounts and, subject to the Executive's execution of a Release which becomes effective within sixty (60) days following the Termination Date, the Executive shall be entitled to receive the following:

(i) equal installment payments payable in accordance with the Company's normal payroll practices, but no less frequently than monthly, which are in the aggregate equal to 2.0 times the sum of the Executive's annual rate of base salary for the year in which the Termination Date occurs, which shall begin within sixty (60) days following the Termination Date; provided that, if the Release Execution Period begins in one taxable year and ends in another taxable year, payments shall not begin until the beginning of the second taxable year; provided further that, the first installment payment shall include all amounts that would otherwise have been paid to the Executive during the period beginning on the Termination Date and ending on the first payment date if no delay had been imposed;

(ii) a payment equal to the product of (i) the Annual Incentive, if any, that the Executive would have earned for the calendar year in which the Termination Date (as determined in accordance with Section 2.6) occurs based on achievement of the applicable performance goals for such year and (ii) a fraction, the numerator of which is the number of days the Executive was employed by the Company during the year of termination and the denominator of which is the number of days in such year (the "**Pro-Rata Bonus**"). This amount shall be paid on the date that annual bonuses are paid to similarly situated executives, but in no event later than two- and-a-half (2 1/2) months following the end of the calendar year in which the Termination Date occurs;

(iii) If the Executive timely and properly elects health continuation coverage under the Consolidated Omnibus Budget Reconciliation Act of 1985 ("**COBRA**"), the Company shall reimburse the Executive for the difference between the monthly COBRA premium paid by the Executive for himself and his dependents and the monthly premium amount paid by similarly situated active executives. Such reimbursement shall be paid to the Executive on the 15th day of the month immediately following the month in which the Executive timely remits the premium payment. The Executive shall be eligible to receive such reimbursement until the earliest of: (i) the eighteen-month anniversary of the Termination Date; (ii) the date the Executive is no longer eligible to receive COBRA continuation coverage; and (iii) the date on which the Executive becomes eligible to receive substantially similar coverage from another employer or other source. Notwithstanding the foregoing, if the Company's making payments under this Section 2.4(a)(iii) would violate the nondiscrimination rules applicable to non-grandfathered plans under the Affordable Care Act (the "**ACA**"), or result in the imposition of penalties under the ACA and the related regulations and guidance promulgated thereunder), the parties agree to reform this Section 2.4(a)(iii) in a manner as is necessary to comply with the ACA.

(iv) Notwithstanding the terms of any equity incentive plan or award agreements, as of the Termination Date, all unvested equity awards granted to the Executive that are then outstanding and unvested shall become fully vested and exercisable immediately thereon, and all stock options granted to the Executive that are then outstanding shall remain exercisable for a period of one year following the Termination Date, or, if shorter for a given stock option, for the remainder of that stock option's full term. For avoidance of doubt, this provision shall serve only to expand, and not to reduce the Executive's rights with respect to any equity award.

(b) For purposes of this Agreement, "**Beneficial Owner**" and "**Beneficial Ownership**" has the meaning assigned to such term in Rule 13d-3 and Rule 13d-5 under the Securities Exchange Act of 1934, as amended, except that in calculating the beneficial ownership of any particular person, such person shall be deemed to have beneficial ownership of all securities that such person has the right to acquire by conversion or exercise of other securities, whether such right is currently exercisable or is exercisable only after the passage of time.

(c) For purposes of this Agreement, "**Change in Control**" shall mean the occurrence of any of the following after the Effective Date:

(i) one person (or more than one person acting as a group) acquires ownership of stock of the Company that, together with the stock held by such person or group, constitutes more than 50% of the total fair market value or total voting power of the stock of such corporation; provided that, a Change in Control shall not occur if any person (or more than one person acting as a group) owns more than 50% of the total fair market value or total voting power of the Company's stock and acquires additional stock;

(ii) one person (or more than one person acting as a group) acquires (or has acquired during the twelve-month period ending on the date of the most recent acquisition) ownership of the Company's stock possessing 30% or more of the total voting power of the stock of such corporation;

(iii) a majority of the members of the Board are replaced during any twelve-month period by directors whose appointment or election is not endorsed by a majority of the Board before the date of appointment or election; or

(iv) the sale of all or substantially all of the Company's assets; or

(v) the consummation of a reorganization, merger, consolidation, statutory share exchange or similar form of corporate transaction involving the Company that requires the approval of the Company's shareholders, whether for such transaction or the issuance of securities in the transaction (a "**Business Combination**"), unless immediately following such Business Combination: (A) more than 50% of the total voting power of (1) the entity resulting from such Business Combination (the "**Surviving Company**"), or (2) if applicable, the ultimate parent entity that directly or indirectly has Beneficial Ownership of sufficient voting securities eligible to elect a majority of the members of the board of directors (or the analogous governing body) of the Surviving Company (the "**Parent Company**"), is represented by the outstanding voting securities of the Company entitled to vote generally in the election of directors (the "**Outstanding Company Voting Securities**") that were outstanding immediately prior to such Business Combination (or, if applicable, is represented by shares into which the Outstanding Company Voting Securities were converted pursuant to such Business Combination), and such voting power among the holders thereof is in substantially the same proportion as the voting power of the Outstanding Company Voting Securities among the holders thereof immediately prior to the Business Combination; (B) no Person (other than any employee benefit plan sponsored or maintained by the Surviving Company or the Parent Company) is or becomes the Beneficial Owner, directly or indirectly, of 50% or more of the total voting power of the outstanding voting securities eligible to elect members of the board of directors of the Parent Company (or the analogous governing body) (or, if there is no Parent Company, the Surviving Company); and (C) at least a majority of the members of the board of directors (or the analogous governing body) of the Parent Company (or, if there is no Parent Company, the Surviving Company) following the consummation of the Business Combination were Board members at the time of the Board's approval of the execution of the initial agreement providing for such Business Combination.

Notwithstanding the foregoing, a Change in Control shall not occur unless such transaction constitutes a change in the ownership of the Company, a change in effective control of the

Company, or a change in the ownership of a substantial portion of the Company's assets under Section 409A of the U.S. Internal Revenue Code ("**Code**").

2.5 *Notice of Termination*. Any termination of the Executive's employment hereunder by the Company or by the Executive during the Employment Term (other than termination pursuant to Section 2.3(a) on account of the Executive's death) shall be communicated by written notice of termination ("**Notice of Termination**") to the other party hereto in accordance with Section 13. The Notice of Termination shall specify:

(a) The termination provision of this Agreement relied upon;

(b) To the extent applicable, the facts and circumstances claimed to provide a basis for termination of the Executive's employment under the provision so indicated; and

(c) The applicable Termination Date.

2.6 *Termination Date*. The Executive's "**Termination Date**" shall be:

(a) If the Executive's employment hereunder terminates on account of the Executive's death, the date of the Executive's death;

(b) If the Executive's employment hereunder is terminated on account of the Executive's Disability, the date that it is determined that the Executive has a Disability;

(c) If the Company terminates the Executive's employment hereunder for Cause, the date the Notice of Termination is delivered to the Executive;

(d) If the Company terminates the Executive's employment hereunder without Cause, the date specified in the Notice of Termination, which shall be no less than 30 days following the date on which the Notice of Termination is delivered;

(e) If the Executive terminates his employment hereunder with or without Good Reason, the date specified in the Executive's Notice of Termination, which shall be no less than thirty (30) days following the date on which the Notice of Termination is delivered; provided that, the Company may waive all or any part of the 30-day notice period for no consideration by giving written notice to the Executive and for all purposes of this Agreement, the Executive's Termination Date shall be the date determined by the Company; and

Notwithstanding anything contained herein, the Termination Date shall not occur until the date on which the Executive incurs a "separation from service" within the meaning of Section 409A.

2.7 *Mitigation*. In no event shall the Executive be obligated to seek other employment or take any other action by way of mitigation of the amounts payable to the Executive under any of the provisions of this Agreement and except as provided in Section 2.2(c) or Section 2.4(a)(iii), any amounts payable pursuant to this Section 2 shall not be reduced by compensation the Executive earns on account of employment with another employer.

2.8 *Resignation of All Other Positions*. Upon termination of the Executive's employment hereunder for any reason, the Executive agrees to resign, effective on the Termination Date from all positions that the Executive holds as an officer or member of the Board (or a committee thereof) of the Company or any of its affiliates.

2.9 *Section 280G*.

(a) If any of the payments or benefits received or to be received by the Executive (including, without limitation, any payment or benefits received in connection with a Change in Control or the Executive's termination of employment, whether pursuant to the terms of this Agreement or any other plan, arrangement, or agreement, or otherwise) (all such payments collectively referred to herein as the **"280G Payments"**) constitute "parachute payments" within the meaning of Section 280G of the Code and would, but for this Section 2.9, be subject to the excise tax imposed under Section 4999 of the Code (the **"Excise Tax"**), then such 280G Payments shall be

either (i) be paid in full, or (ii) reduced in a manner determined by the Company (by the minimum possible amounts) that is consistent with the requirements of Section 409A until no amount payable to the Executive will be subject to the Excise Tax, whichever of the foregoing amounts, taking into account the applicable federal, state and local income taxes and the Excise Tax, results in the receipt by the Executive on an after-tax basis of the greatest amount of 280G Payments. If two economically equivalent amounts are subject to reduction but are payable at different times, the amounts shall be reduced (but not below zero) on a pro rata basis.

(b) All calculations and determinations under this Section 2.9 shall be made by an independent accounting firm or independent tax counsel appointed by the Company (the **"Tax Counsel"**) whose determinations shall be conclusive and binding on the Company and the Executive for all purposes. For purposes of making the calculations and determinations required by this Section 2.9, the Tax Counsel may rely on reasonable, good faith assumptions and approximations concerning the application of Section 280G and Section 4999 of the Code. The Company and the Executive shall furnish the Tax Counsel with such information and documents as the Tax Counsel may reasonably request in order to make its determinations under this Section 2.9. The Company shall bear all costs the Tax Counsel may reasonably incur in connection with its services.

2.10 *Clawback*. The Executive agrees and acknowledges that this Agreement is subject to any clawback or recoupment policy adopted by the Company from time to time, including, without limitation, any such policy with the Company may be required to adopt under the Dodd-Frank Wall Street Reform and Consumer Protection Act and implementing rules and regulations thereunder, or as otherwise required by law.

3. Governing Law: Jurisdiction and Venue. This Agreement, for all purposes, shall be construed in accordance with the laws of California without regard to conflicts of law principles. Subject to Section 4 below, any action or proceeding by either of the parties to enforce this Agreement shall be brought only in a state or federal court located in the state of California, in the counties of Santa Clara or San Francisco. The parties hereby irrevocably submit to the non-exclusive jurisdiction of such courts and waive the defense of inconvenient forum to the maintenance of any such action or proceeding in such venue.

4. Arbitration. Any dispute, controversy, or claim arising out of or related to the Executive's employment with the Company or termination of employment, this Agreement, or any alleged breach of this Agreement (in each case other than any claims the parties may not, as a matter of law, agree to arbitrate) shall be submitted to and decided by binding arbitration in the state of California, in the county of Santa Clara, under the arbitration rules set forth in California Code of Civil Procedure Sections 1280 through 1294.2, including Section 1281.8 (the "Act"), and pursuant to California law. Arbitration shall be administered before Judicial Arbitration & Mediation Services, Inc. ("**JAMS**"), pursuant to the JAMS Employment Arbitration Rules & Procedures (the "**JAMS Rules**"). A copy of the JAMS Rules is available online at https://www.jamsadr.com/rules-employment-arbitration/english. If the JAMS Rules are inconsistent with the terms of this Agreement, the terms of this Agreement shall govern. The Company will pay the arbitrator's fees and arbitration expenses and any other costs unique to the arbitration hearing. Discovery in any arbitration proceeding shall be conducted according to the JAMS Rules.

Any arbitral award determination shall be final and binding on the parties and may be entered as a judgment in a court of competent jurisdiction. This agreement to arbitrate is freely negotiated between the Executive and the Company and is mutually entered into between the parties. By entering into this Agreement, the parties are waiving all rights to have their disputes heard or decided by a jury or in a court trial.

_____ By initialing here, the Executive acknowledges the Executive has read this Section 4 and agrees with the arbitration provision.

5. Entire Agreement. Unless specifically provided herein, this Agreement contains all of the understandings and representations between the Executive and the Company pertaining to the subject matter hereof and supersedes all prior and contemporaneous understandings, agreements, representations and warranties, both written and oral, with respect to such subject matter. The parties mutually agree that the Agreement can be specifically enforced in court and can be cited as evidence in legal proceedings alleging breach of the Agreement.

6. Modification and Waiver. No provision of this Agreement may be amended or modified unless such amendment or modification is agreed to in writing and signed by the Executive and by the General Counsel of the Company. No waiver by either of the parties of any breach by the other party hereto of any condition or provision of this Agreement to be performed by the other party hereto shall be deemed a waiver of any similar or dissimilar provision or condition at the same or any prior or subsequent time, nor shall the failure of or delay by either of the parties in exercising any right, power, or privilege hereunder operate as a waiver thereof to preclude any other or further exercise thereof or the exercise of any other such right, power, or privilege.

7. Severability. Should any provision of this Agreement be held by a court of competent jurisdiction to be enforceable only if modified, or if any portion of this Agreement shall be held as unenforceable and thus stricken, such holding shall not affect the validity of the remainder of this Agreement, the balance of which shall continue to be binding upon the parties with any such modification to become a part hereof and treated as though originally set forth in this Agreement.

8. Captions. Captions and headings of the sections and paragraphs of this Agreement are intended solely for convenience and no provision of this Agreement is to be construed by reference to the caption or heading of any section or paragraph.

9. Counterparts. This Agreement may be executed in separate counterparts, each of which shall be deemed an original, but all of which taken together shall constitute one and the same instrument.

10. Section 409A.

10.1 *General Compliance*. Each payment or benefit provided under this Agreement is intended to comply with Section 409A of the Code ("**Section 409A**") or an exemption thereunder and shall be construed and administered in accordance with Section 409A. Notwithstanding any other provision of this Agreement, payments provided under this Agreement may only be made upon an event and in a manner that complies with Section 409A or an applicable exemption. Any payments under this Agreement that may be excluded from Section 409A either as separation pay due to an involuntary separation from service or as a short-term deferral shall be excluded from Section 409A to the maximum extent possible. For purposes of Section 409A, each installment payment provided under this Agreement shall be treated as a separate payment. Any payments to be made under this Agreement upon a termination of employment shall only be made upon a "separation from service" under Section 409A. Notwithstanding the foregoing, the Company makes no representations that the payments and benefits provided under this Agreement comply with Section 409A, and in no event shall the Company be liable for all or any portion of any taxes, penalties, interest, or other expenses that may be incurred by the Executive on account of non-compliance with Section 409A.

10.2 *Specified Employees*. Notwithstanding any other provision of this Agreement, if any payment or benefit provided to the Executive in connection with his termination of employment is determined to constitute "nonqualified deferred compensation" within the meaning of Section 409A and the Executive is determined to be a "specified employee" as defined in Section 409A(a)(2)(b)(i), then such payment or benefit shall not be paid until the first payroll date to occur following the six-month anniversary of the Termination Date or, if earlier, on the Executive's death (the "**Specified Employee Payment Date**"). The aggregate of any payments that would otherwise have been paid before the Specified Employee Payment Date shall be paid to the Executive in a lump sum on the Specified Employee Payment Date and thereafter, any remaining payments shall be paid without delay in accordance with their original schedule.

11. Successors and Assigns. This Agreement is personal to the Executive and shall not be assigned by the Executive. Any purported assignment by the Executive shall be null and void from the initial date of the purported assignment. The Company may assign this Agreement to any successor or assign (whether direct or indirect, by purchase, merger, consolidation, or otherwise) to all or substantially all of the business or assets of the Company. This Agreement shall inure to the benefit of the Company and permitted successors and assigns.

12. Notice. Notices and all other communications provided for in this Agreement shall be in writing and shall be delivered personally or sent by registered or certified mail, return receipt

requested, or by overnight carrier to the parties at the addresses set forth below (or such other addresses as specified by the parties by like notice):

If to the Company:

Shockwave Medical, Inc.
5403 Betsy Ross Drive
Santa Clara, California 95054
Attention: General Counsel

If to the Executive: to the address on file for the Executive in the records of the Company.

13. Withholding. The Company shall have the right to withhold from any amount payable hereunder any Federal, state, and local taxes in order for the Company to satisfy any withholding tax obligation it may have under any applicable law or regulation.

14. Survival. Upon the expiration or other termination of this Agreement, the respective rights and obligations of the parties hereto shall survive such expiration or other termination to the extent necessary to carry out the intentions of the parties under this Agreement.

[SIGNATURE PAGE FOLLOWS.]

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the date first above written.

SHOCKWAVE MEDICAL, INC.

By: /s/ Hajime Tada_____
Name: Hajime Tada
Title: General Counsel

DOUG GODSHALL (EXECUTIVE)

Signature: /s/ Doug Godshall
Print Name: Doug Godshall

AMENDED AND RESTATED SEPARATION PAY AGREEMENT

This Separation Pay Agreement (the "**Agreement**") is made and entered into as of ____, 2022, by and between [NAME] (the "**Executive**") and Shockwave Medical, Inc., a Delaware corporation (the "**Company**"), and amends and restates that certain Separation Pay Agreement entered into by and between the Executive and the Company, dated as of [DATE].

WHEREAS, the Company desires to address and handle certain aspects of the employment the Executive on the terms and conditions set forth herein; and

WHEREAS, the Executive desires to have such aspects of [his/her] employment addressed and handled by the Company on such terms and conditions.

NOW, THEREFORE, in consideration of the mutual covenants, promises, and obligations set forth herein, the parties agree as follows:

1. Term. This Agreement shall be effective as of the date hereof (the "**Effective Date**") until such time as the Executive's employment is terminated pursuant to Section 2.6 below (such period, the "**Employment Term**").

2. Termination of Employment. The Employment Term and the Executive's employment hereunder may be terminated by either the Company or the Executive at any time and for any reason; provided that, unless otherwise provided herein, either party shall be required to give the other party at least thirty (30) days advance written notice of any termination of the Executive's employment. Upon termination of the Executive's employment during the Employment Term, the Executive shall be entitled to the compensation and benefits described in this Section 2 and shall have no further rights to any compensation or any other benefits from the Company or any of its affiliates.

1.1 *Termination for Cause or Resignation*.

(a) The Executive's employment hereunder may be terminated by the Company for Cause or by the Executive for any reason. If the Executive's employment is terminated, by the Company for Cause or by the Executive for any reason, the Executive shall be entitled to receive:

(i) any accrued but unpaid salary and accrued but unused vacation which shall be paid on the Termination Date in accordance with the Company's customary payroll procedures;

(ii) any earned but unpaid incentive under the Company's annual cash incentive plan (the "**Annual Incentive**") with respect to any completed calendar year immediately preceding the Termination Date, which shall be paid on the otherwise applicable payment date; provided that, if the Executive's employment is terminated by the Company for Cause, then any such accrued but unpaid Annual Incentive shall be forfeited;

(iii) reimbursement for unreimbursed business expenses properly incurred by the Executive, which shall be subject to and paid in accordance with the Company's expense reimbursement policy; and

(iv) such employee benefits (including equity compensation), if any, to which the Executive may be entitled under the Company's employee benefit plans as of the Termination Date; provided that, in no event shall the Executive be entitled to any payments in the nature of severance or termination payments except as specifically provided herein.

Items 2.1(a)(i) through 2.1(a)(iv) are referred to herein collectively as the "**Accrued Amounts**".

(b) For purposes of this Agreement, "**Cause**" shall mean:

(i) the Executive's willful failure to perform [his/her] duties (other than any such failure resulting from incapacity due to physical or mental illness);

(ii) the Executive's engagement in dishonesty, illegal conduct, or gross misconduct, which, in each case, poses a substantial risk of material injury to the Company or its affiliates;

(iii) the Executive's embezzlement, misappropriation, or fraud, whether or not related to the Executive's employment with the Company;

(iv) the Executive's conviction of or plea of guilty or nolo contendere to a crime that constitutes a felony (or state law equivalent) or a crime that constitutes a misdemeanor involving moral turpitude;

(v) the Executive's material breach of any material obligation under this Agreement or any other written agreement between the Executive and the Company; or

(vi) any material failure by the Executive to comply with the Company's written policies or rules, as they may be in effect from time to time during the Employment Term, if such failure poses a substantial risk of material reputational or financial harm to the Company.

For purposes of this provision, no act or failure to act on the part of the Executive shall be considered "willful" unless it is done, or omitted to be done, by the Executive in bad faith or without reasonable belief that the Executive's action or omission was in the best interests of the Company. Any act, or failure to act, based upon authority given pursuant to a resolution duly adopted by the Board or upon the advice of counsel for the Company shall be conclusively presumed to be done, or omitted to be done, by the Executive in good faith and in the best interests of the Company.

Termination of the Executive's employment shall not be deemed to be for Cause unless and until the Company delivers to the Executive a copy of a resolution duly adopted by the affirmative vote of not less than a majority of the Board, finding that the Executive has engaged in the conduct described in any of (i)-(vi) above. Except for a failure, breach, or refusal which, by its nature, cannot reasonably be expected to be cured, the Executive shall have ten (10) business days from the delivery of written notice by the Company within which to cure any acts constituting Cause; provided however, that, if the Company reasonably expects irreparable injury from a delay of ten (10) business days, the Company may give the Executive notice of such shorter period within which to cure as is reasonable under the circumstances, which may include the termination of the Executive's employment without notice and with immediate effect. The Company may place the Executive on paid leave for up to sixty (60) days while it is determining whether there is a basis to terminate the Executive's employment for Cause. Any such action by the Company will not constitute Good Reason.

1.2 *Termination without Cause*. The Employment Term and the Executive's employment hereunder may be terminated by the Company without Cause. In the event of such termination, the Executive shall be entitled to receive the Accrued Amounts and, subject to the Executive's execution of a release of claims in favor of the Company, its affiliates and their respective officers and directors in a form provided by the Company (the "**Release**") and such Release becoming effective within sixty (60) days following the Termination Date (such 60-day period, the "**Release Execution Period**"), the Executive shall be entitled to receive the following:

(a) equal installment payments payable in accordance with the Company's normal payroll practices, but no less frequently than monthly, which are in the aggregate equal to 0.75 times the sum of the Executive's annual rate of base salary for the year in which the Termination Date occurs, which shall begin within sixty (60) days following the Termination Date; provided that, if the Release Execution Period begins in one taxable year and ends in another taxable year, payments shall not begin until the beginning of the second taxable year; provided further that, the first installment payment shall include all amounts that would otherwise have been paid to the Executive during the period beginning on the Termination Date and ending on the first payment date if no delay had been imposed;

(b) a payment equal to the product of (i) the Annual Incentive, if any, that the Executive would have earned for the calendar year in which the Termination Date (as determined in accordance with Section 2.6) occurs based on achievement of the applicable performance goals for such year and (ii) a fraction, the numerator of which is the number of days the Executive was employed by the Company during the year of termination and the denominator of which is the number

of days in such year (the "**Pro-Rata Bonus**"). This amount shall be paid on the date that annual bonuses are paid to similarly situated executives, but in no event later than two-and-a-half (2 1/2) months following the end of the calendar year in which the Termination Date occurs;

(c) If the Executive timely and properly elects health continuation coverage under the Consolidated Omnibus Budget Reconciliation Act of 1985 ("**COBRA**"), the Company shall reimburse the Executive for the difference between the monthly COBRA premium paid by the Executive for the Executive and the Executive's dependents and the monthly premium amount paid by similarly situated active executives. Such reimbursement shall be paid to the Executive on the 15th day of the month immediately following the month in which the Executive timely remits the premium payment. The Executive shall be eligible to receive such reimbursement until the earliest of: (i) the nine-month anniversary of the Termination Date; (ii) the date the Executive is no longer eligible to receive COBRA continuation coverage; and (iii) the date on which the Executive becomes eligible to receive substantially similar coverage from another employer or other source. Notwithstanding the foregoing, if the Company's making payments under this Section 2.2(c) would violate the nondiscrimination rules applicable to non-grandfathered plans under the Affordable Care Act (the "**ACA**"), or result in the imposition of penalties under the ACA and the related regulations and guidance promulgated thereunder), the parties agree to reform this Section 2.2(c) in a manner as is necessary to comply with the ACA.

(d) The treatment of each outstanding equity award, if any, shall be determined in accordance with the terms of the applicable plan and award agreement.

1.3 *Death or Disability*.

(a) The Executive's employment hereunder shall terminate automatically upon the Executive's death during the Employment Term, and the Company may terminate the Executive's employment on account of the Executive's Disability.

(b) If the Executive's employment is terminated during the Employment Term on account of the Executive's death or Disability, the Executive (or the Executive's estate and/or beneficiaries, as the case may be) shall be entitled to receive the Accrued Amounts**.** Notwithstanding any other provision contained herein, all payments made in connection with the Executive's Disability shall be provided in a manner which is consistent with federal and state law.

(c) For purposes of this Agreement, "**Disability**" shall mean the Executive's inability, due to physical or mental incapacity, to perform the essential functions of [his/her] job, with or without reasonable accommodation, for one hundred eighty (180) days out of any three hundred sixty-five (365) day period or one hundred twenty (120) consecutive days, or the Executive's becoming entitled to receive long-term disability benefits under the Company's long-term disability plan.

1.4 *Change in Control Termination*.

(a) Notwithstanding any other provision contained herein, if the Executive's employment hereunder is terminated by the Executive for Good Reason or by the Company without Cause (other than on account of the Executive's death or Disability), in each case within three (3) months prior to or within twelve (12) months following a Change in Control, the Executive shall be entitled to receive the Accrued Amounts and, subject to the Executive's execution of a Release which becomes effective within sixty (60) days following the Termination Date, the Executive shall be entitled to receive the following:

(i) equal installment payments payable in accordance with the Company's normal payroll practices, but no less frequently than monthly, which are in the aggregate equal to 1.5 times the sum of the Executive's annual rate of base salary for the year in which the Termination Date occurs, which shall begin within sixty (60) days following the Termination Date; provided that, if the Release Execution Period begins in one taxable year and ends in another taxable year, payments shall not begin until the beginning of the second taxable year; provided further that, the first installment payment shall include all amounts that would otherwise have been paid to the Executive during the period beginning on the Termination Date and ending on the first payment date if no delay had been imposed;

(ii) a payment equal to the product of (i) the Annual Incentive, if any, that the Executive would have earned for the calendar year in which the Termination Date (as determined in accordance with Section 2.6) occurs based on achievement of the applicable performance goals for such year and (ii) a fraction, the numerator of which is the number of days the Executive was employed by the Company during the year of termination and the denominator of which is the number of days in such year (the "**Pro-Rata Bonus**"). This amount shall be paid on the date that annual bonuses are paid to similarly situated executives, but in no event later than two-and-a-half (2 1/2) months following the end of the calendar year in which the Termination Date occurs.

(iii) If the Executive timely and properly elects health continuation coverage under the Consolidated Omnibus Budget Reconciliation Act of 1985 ("**COBRA**"), the Company shall reimburse the Executive for the difference between the monthly COBRA premium paid by the Executive for the [himself/herself] and [his/her] dependents and the monthly premium amount paid by similarly situated active executives. Such reimbursement shall be paid to the Executive on the 15th day of the month immediately following the month in which the Executive timely remits the premium payment. The Executive shall be eligible to receive such reimbursement until the earliest of: (i) the eighteen-month anniversary of the Termination Date; (ii) the date the Executive is no longer eligible to receive COBRA continuation coverage; and (iii) the date on which the Executive becomes eligible to receive substantially similar coverage from another employer or other source. Notwithstanding the foregoing, if the Company's making payments under this Section 2.4(a) would violate the nondiscrimination rules applicable to non-grandfathered plans under the Affordable Care Act (the "**ACA**"), or result in the imposition of penalties under the ACA and the related regulations and guidance promulgated thereunder), the parties agree to reform this Section 2.4(a) in a manner as is necessary to comply with the ACA.

(iv) Notwithstanding the terms of any equity incentive plan or award agreements, as of the Termination Date, all unvested equity awards granted to the Executive that are then outstanding and unvested shall become fully vested and exercisable immediately thereon, and all stock options granted to the Executive that are then outstanding shall remain exercisable for a period of one year following the Termination Date, or, if shorter for a given stock option, for the remainder of that stock option's full term. For avoidance of doubt, this provision shall serve only to expand, and not to reduce the Executive's rights with respect to any equity award.

(b) For purposes of this Agreement, "**Beneficial Owner**" and "**Beneficial Ownership**" has the meaning assigned to such term in Rule 13d-3 and Rule 13d-5 under the Securities Exchange Act of 1934, as amended, except that in calculating the beneficial ownership of any particular person, such person shall be deemed to have beneficial ownership of all securities that such person has the right to acquire by conversion or exercise of other securities, whether such right is currently exercisable or is exercisable only after the passage of time

(c) For purposes of this Agreement, "**Change in Control**" shall mean the occurrence of any of the following after the Effective Date:

(i) one person (or more than one person acting as a group) acquires ownership of stock of the Company that, together with the stock held by such person or group, constitutes more than 50% of the total fair market value or total voting power of the stock of such corporation; provided that, a Change in Control shall not occur if any person (or more than one person acting as a group) owns more than 50% of the total fair market value or total voting power of the Company's stock and acquires additional stock;

(ii) one person (or more than one person acting as a group) acquires (or has acquired during the twelve-month period ending on the date of the most recent acquisition) ownership of the Company's stock possessing 30% or more of the total voting power of the stock of such corporation;

(iii) a majority of the members of the Board are replaced during any twelve-month period by directors whose appointment or election is not endorsed by a majority of the Board before the date of appointment or election; or

(iv) the sale of all or substantially all of the Company's assets; or

(v) the consummation of a reorganization, merger, consolidation, statutory share exchange or similar form of corporate transaction involving the Company that requires the approval of the Company's shareholders, whether for such transaction or the issuance of securities in the transaction (a "**Business Combination**"), unless immediately following such Business Combination: (A) more than 50% of the total voting power of (1) the entity resulting from such Business Combination (the "**Surviving Company**"), or (2) if applicable, the ultimate parent entity that directly or indirectly has Beneficial Ownership of sufficient voting securities eligible to elect a majority of the members of the board of directors (or the analogous governing body) of the Surviving Company (the "**Parent Company**"), is represented by the outstanding voting securities of the Company entitled to vote generally in the election of directors (the "**Outstanding Company Voting Securities**") that were outstanding immediately prior to such Business Combination (or, if applicable, is represented by shares into which the Outstanding Company Voting Securities were converted pursuant to such Business Combination), and such voting power among the holders thereof is in substantially the same proportion as the voting power of the Outstanding Company Voting Securities among the holders thereof immediately prior to the Business Combination; (B) no Person (other than any employee benefit plan sponsored or maintained by the Surviving Company or the Parent Company) is or becomes the Beneficial Owner, directly or indirectly, of 50% or more of the total voting power of the outstanding voting securities eligible to elect members of the board of directors of the Parent Company (or the analogous governing body) (or, if there is no Parent Company, the Surviving Company); and (C) at least a majority of the members of the board of directors (or the analogous governing body) of the Parent Company (or, if there is no Parent Company, the Surviving Company) following the consummation of the Business Combination were Board members at the time of the Board's approval of the execution of the initial agreement providing for such Business Combination

Notwithstanding the foregoing, a Change in Control shall not occur unless such transaction constitutes a change in the ownership of the Company, a change in effective control of the Company, or a change in the ownership of a substantial portion of the Company's assets under Section 409A of the Internal Revenue Code of the U.S. Internal Revenue Code (the "**Code**").

(d) For purposes of this Agreement, "**Good Reason**" shall mean the occurrence of any of the following, in each case during the Employment Term without the Executive's written consent:

(i) a material reduction in the Executive's annual rate of base salary other than a general reduction that affects all similarly situated executives in substantially the same proportions;

(ii) a material reduction in the Executive's target incentive opportunity under the Annual Incentive; a relocation of the Executive's principal place of employment by more than thirty (30) miles; any material breach by the Company of any material provision of this Agreement;

(iii) the Company's failure to obtain an agreement from any successor to the Company to assume and agree to perform this Agreement in the same manner and to the same extent that the Company would be required to perform if no succession had taken place, except where such assumption occurs by operation of law;

(iv) a material, adverse change in the Executive's title, authority, duties, or responsibilities (other than temporarily while the Executive is physically or mentally incapacitated or as required by applicable law); or a material adverse change in the reporting structure applicable to the Executive.

The Executive cannot terminate [his/her] employment for Good Reason unless the Executive provided written notice to the Company of the existence of the circumstances providing grounds for termination for Good Reason within ninety (90) days of the initial existence of such grounds and the Company has had at least thirty (30) days from the date on which such notice is provided to cure such circumstances. If the Executive does not terminate [his/her] employment for Good Reason within one hundred twenty (120) days after the first occurrence of the applicable grounds, then the Executive will be deemed to have waived [his/her] right to terminate for Good Reason with respect to such grounds.

1.5 *Notice of Termination*. Any termination of the Executive's employment hereunder by the Company or by the Executive during the Employment Term (other than termination pursuant to Section 2.3(a) on account of the Executive's death) shall be communicated by written notice of

termination ("**Notice of Termination**") to the other party hereto in accordance with Section 13. The Notice of Termination shall specify:

(a) The termination provision of this Agreement relied upon;

(b) To the extent applicable, the facts and circumstances claimed to provide a basis for termination of the Executive's employment under the provision so indicated; and

(c) The applicable Termination Date.

1.6 *Termination Date*. The Executive's "**Termination Date**" shall be:

(a) If the Executive's employment hereunder terminates on account of the Executive's death, the date of the Executive's death;

(b) If the Executive's employment hereunder is terminated on account of the Executive's Disability, the date that it is determined that the Executive has a Disability;

(c) If the Company terminates the Executive's employment hereunder for Cause, the date the Notice of Termination is delivered to the Executive;

(d) If the Company terminates the Executive's employment hereunder without Cause, the date specified in the Notice of Termination, which shall be no less than thirty (30) days following the date on which the Notice of Termination is delivered; and

(e) If the Executive terminates [his/her] employment hereunder with or without Good Reason, the date specified in the Executive's Notice of Termination, which shall be no less than thirty (30) days following the date on which the Notice of Termination is delivered; provided that, the Company may waive all or any part of the 30-day notice period for no consideration by giving written notice to the Executive and for all purposes of this Agreement, the Executive's Termination Date shall be the date determined by the Company.

Notwithstanding anything contained herein, the Termination Date shall not occur until the date on which the Executive incurs a "separation from service" within the meaning of Section 409A.

1.7 *Mitigation*. In no event shall the Executive be obligated to seek other employment or take any other action by way of mitigation of the amounts payable to the Executive under any of the provisions of this Agreement and except as provided in Section 2.2(c) or Section 2.4(a)(iii), any amounts payable pursuant to this Section 2 shall not be reduced by compensation the Executive earns on account of employment with another employer.

1.8 *Resignation of All Other Positions*. Upon termination of the Executive's employment hereunder for any reason, the Executive agrees to resign, effective on the Termination Date from all positions that the Executive holds as an officer or member of the Board (or a committee thereof) of the Company or any of its affiliates.

1.9 *Section 280G*.

(a) If any of the payments or benefits received or to be received by the Executive (including, without limitation, any payment or benefits received in connection with a Change in Control or the Executive's termination of employment, whether pursuant to the terms of this Agreement or any other plan, arrangement, or agreement, or otherwise) (all such payments collectively referred to herein as the **"280G Payments"**) constitute "parachute payments" within the meaning of Section 280G of the Code and would, but for this Section 2.9, be subject to the excise tax imposed under Section 4999 of the Code (the **"Excise Tax"**), then such 280G Payments shall either (i) be payable in full, or (ii) be reduced in a manner determined by the Company (by the minimum possible amounts) that is consistent with the requirements of Section 409A until no amount payable to the Executive will be subject to the Excise Tax, whichever of the foregoing amounts, taking into account the applicable federal, state and local income taxes and the Excise Tax, results in the receipt by the Executive on an after-tax basis of the greatest amount of 280G Payments. If two economically equivalent amounts are subject to reduction but are payable at different times, the amounts shall be reduced (but not below zero) on a pro rata basis.

(b) All calculations and determinations under this Section 2.9 shall be made by an independent accounting firm or independent tax counsel appointed by the Company (the **"Tax Counsel"**) whose determinations shall be conclusive and binding on the Company and the Executive for all purposes. For purposes of making the calculations and determinations required by this Section 2.9, the Tax Counsel may rely on reasonable, good faith assumptions and approximations concerning the application of Section 280G and Section 4999 of the Code. The Company and the Executive shall furnish the Tax Counsel with such information and documents as the Tax Counsel may reasonably request in order to make its determinations under this Section 2.9. The Company shall bear all costs the Tax Counsel may reasonably incur in connection with its services.

1.10 *Clawback*. The Executive agrees and acknowledges that this Agreement is subject to any clawback or recoupment policy adopted by the Company from time to time, including, without limitation, any such policy with the Company may be required to adopt under the Dodd-Frank Wall Street Reform and Consumer Protection Act and implementing rules and regulations thereunder, or as otherwise required by law.

3. Governing Law; Jurisdiction and Venue. This Agreement, for all purposes, shall be construed in accordance with the laws of California without regard to conflicts of law principles. Subject to Section 5 below, any action or proceeding by either of the parties to enforce this Agreement shall be brought only in a state or federal court located in the state of California, in the counties of Santa Clara or San Francisco. The parties hereby irrevocably submit to the non-exclusive jurisdiction of such courts and waive the defense of inconvenient forum to the maintenance of any such action or proceeding in such venue.

4. Arbitration. Any dispute, controversy, or claim arising out of or related to the Executive's employment with the Company or termination of employment, this Agreement, or any alleged breach of this Agreement (in each case other than any claims the parties may not, as a matter of law, agree to arbitrate) shall be submitted to and decided by binding arbitration in the state of California, in the county of Santa Clara, under the arbitration rules set forth in California Code of Civil Procedure Sections 1280 through 1294.2, including Section 1281.8 (the "Act"), and pursuant to California law. Arbitration shall be administered before Judicial Arbitration & Mediation Services, Inc. (**"JAMS"**), pursuant to the JAMS Employment Arbitration Rules & Procedures (the **"JAMS Rules"**). A copy of the JAMS Rules is available online at https://www.jamsadr.com/rules-employment-arbitration/english. If the JAMS Rules are inconsistent with the terms of this Agreement, the terms of this Agreement shall govern. The Company will pay the arbitrator's fees and arbitration expenses and any other costs unique to the arbitration hearing. Discovery in any arbitration proceeding shall be conducted according to the JAMS Rules.

Any arbitral award determination shall be final and binding on the parties and may be entered as a judgment in a court of competent jurisdiction. This agreement to arbitrate is freely negotiated between the Executive and the Company and is mutually entered into between the parties. By entering into this Agreement, the parties are waiving all rights to have their disputes heard or decided by a jury or in a court trial.

_____ By initialing here, the Executive acknowledges the Executive has read this Section 4 and agrees with the arbitration provision.

5. Entire Agreement. Unless specifically provided herein, this Agreement contains all of the understandings and representations between the Executive and the Company pertaining to the subject matter hereof and supersedes all prior and contemporaneous understandings, agreements, representations and warranties, both written and oral, with respect to such subject matter. The parties mutually agree that the Agreement can be specifically enforced in court and can be cited as evidence in legal proceedings alleging breach of the Agreement.

6. Modification and Waiver. No provision of this Agreement may be amended or modified unless such amendment or modification is agreed to in writing and signed by the Executive and by General Counsel of the Company. No waiver by either of the parties of any breach by the other party hereto of any condition or provision of this Agreement to be performed by the other party hereto shall be deemed a waiver of any similar or dissimilar provision or condition at the same or any prior or subsequent time, nor shall the failure of or delay by either of the parties in exercising any right, power, or privilege hereunder operate as a waiver thereof to preclude any other or further exercise thereof or the exercise of any other such right, power, or privilege.

7. Severability. Should any provision of this Agreement be held by a court of competent jurisdiction to be enforceable only if modified, or if any portion of this Agreement shall be held as unenforceable and thus stricken, such holding shall not affect the validity of the remainder of this Agreement, the balance of which shall continue to be binding upon the parties with any such modification to become a part hereof and treated as though originally set forth in this Agreement.

8. Captions. Captions and headings of the sections and paragraphs of this Agreement are intended solely for convenience and no provision of this Agreement is to be construed by reference to the caption or heading of any section or paragraph.

9. Counterparts. This Agreement may be executed in separate counterparts, each of which shall be deemed an original, but all of which taken together shall constitute one and the same instrument.

10. Section 409A.

1.1 *General Compliance*. Each payment or benefit provided under this Agreement is intended to comply with Section 409A of the Code ("**Section 409A**") or an exemption thereunder and shall be construed and administered in accordance with Section 409A. Notwithstanding any other provision of this Agreement, payments provided under this Agreement may only be made upon an event and in a manner that complies with Section 409A or an applicable exemption. Any payments under this Agreement that may be excluded from Section 409A either as separation pay due to an involuntary separation from service or as a short-term deferral shall be excluded from Section 409A to the maximum extent possible. For purposes of Section 409A, each installment payment provided under this Agreement shall be treated as a separate payment. Any payments to be made under this Agreement upon a termination of employment shall only be made upon a "separation from service" under Section 409A. Notwithstanding the foregoing, the Company makes no representations that the payments and benefits provided under this Agreement comply with Section 409A, and in no event shall the Company be liable for all or any portion of any taxes, penalties, interest, or other expenses that may be incurred by the Executive on account of non-compliance with Section 409A.

1.2 *Specified Employees*. Notwithstanding any other provision of this Agreement, if any payment or benefit provided to the Executive in connection with [his/her] termination of employment is determined to constitute "nonqualified deferred compensation" within the meaning of Section 409A and the Executive is determined to be a "specified employee" as defined in Section 409A(a)(2)(b)(i), then such payment or benefit shall not be paid until the first payroll date to occur following the six- month anniversary of the Termination Date or, if earlier, on the Executive's death (the "**Specified Employee Payment Date**"). The aggregate of any payments that would otherwise have been paid before the Specified Employee Payment Date shall be paid to the Executive in a lump sum on the Specified Employee Payment Date and thereafter, any remaining payments shall be paid without delay in accordance with their original schedule.

11. Successors and Assigns. This Agreement is personal to the Executive and shall not be assigned by the Executive. Any purported assignment by the Executive shall be null and void from the initial date of the purported assignment. The Company may assign this Agreement to any successor or assign (whether direct or indirect, by purchase, merger, consolidation, or otherwise) to all or substantially all of the business or assets of the Company. This Agreement shall inure to the benefit of the Company and permitted successors and assigns.

12. Notice. Notices and all other communications provided for in this Agreement shall be in writing and shall be delivered personally or sent by registered or certified mail, return receipt requested, or by overnight carrier to the parties at the addresses set forth below (or such other addresses as specified by the parties by like notice):

If to the Company:

ShockWave Medical, Inc.
5403 Betsy Ross Drive
Santa Clara, California 95054
Attention: General Counsel

If to the Executive: to the address on file for the Executive in the records of the Company.

13. Withholding. The Company shall have the right to withhold from any amount payable hereunder any Federal, state, and local taxes in order for the Company to satisfy any withholding tax obligation it may have under any applicable law or regulation.

14. Survival. Upon the expiration or other termination of this Agreement, the respective rights and obligations of the parties hereto shall survive such expiration or other termination to the extent necessary to carry out the intentions of the parties under this Agreement.

[SIGNATURE PAGE FOLLOWS.]

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the date first above written.

SHOCKWAVE MEDICAL, INC.

By: _____
Name:
Title:

[NAME] (EXECUTIVE)

Signature: _____
Print Name: _____

SHOCKWAVE MEDICAL, INC.
AMENDED AND RESTATED NON-EMPLOYEE DIRECTOR COMPENSATION PLAN

This Shockwave Medical, Inc. Amended and Restated Non-Employee Director Compensation Plan (this "**Plan**") was originally adopted by the Board of Directors (the "**Board**") of Shockwave Medical, Inc. (the "**Company**") on February 20, 2019, and, as amended and restated below, was adopted by the Compensation Committee of the Board (the "**Compensation Committee**") on March 28, 2022 and became effective on such date.

1. Eligibility. Each member of the Board who is not a full- or part- time officer or employee of the Company (a "**Non-Employee Director**") is eligible to participate in this Plan during the period of the Non-Employee Director's service as a member of the Board.

2. Annual Cash Fees.

a. *Annual Board Member Fee*. Each Non-Employee Director will earn cash compensation for service as member of the Board at an annual rate of $50,000 (such compensation, the "**Annual Board Member Fee**").

b. *Annual Non-Executive Chair Fee*. Any Non-Employee Director serving as "Non-Executive Chair" of the Board will earn additional cash compensation for such service at an annual rate of $50,000 (such additional compensation, the "**Annual Non-Executive Chair Fee**").

c. *Annual Committee Chair Fees*. Each Non-Employee Director serving as the chair of one or more of the following committees of the Board will earn cash compensation for such service at the annual rate set forth here (such compensation, the "**Annual Committee Chair Fee**"):

i. $20,000 for the chair of the Audit Committee of the Board (the "**Audit Committee**");

ii. $15,000 for the chair of the Compensation Committee; and

iii. $10,000 for the chair of the Nominating and ESG Committee of the Board (the "**Nominating and ESG Committee**").

d. *Annual Committee Member Fee*. Each Non-Employee Director serving as a non-chair member of one or more of the following committees of the Board will earn cash compensation for such service at the annual rate set forth here (such compensation, the "**Annual Committee Member Fee**"):

i. $10,000 for each member of the Audit Committee;

ii. $7,500 for each member of the Compensation Committee; and

iii. $5,000 for each member of the Nominating and ESG Committee.

e. *Payment*. The Annual Board Member Fee, Annual Non-Executive Chair Fee, Annual Committee Chair Fee and Annual Committee Member Fee (together, the "**Annual Fees**") earned by each Non-Employee Director will be paid quarterly in arrears no later than thirty (30) days after the last day of each calendar quarter. In the event that a Non-Employee Director serves on the Board, as Non-Executive Chair or as a chair or member of a committee for less than an entire quarter, the portion of the applicable Annual Fees earned and payable for such quarter will be prorated based on the number of days in such quarter for which such Non-Employee Director provided such service.

3. Initial Equity-Based Compensation for New Non-Employee Directors. Upon the election of a Non-Employee Director to the Board who has not previously served on the Board, such director shall receive an award (an "**Initial Award**") of restricted stock units ("**RSUs**") under the Shockwave Medical, Inc., 2019 Equity Incentive Plan (the "**Equity Plan**"), with a value equal to $277,500 based on the grant date closing price of the Company's common stock, par value $0.001 per share (the "**Common Stock**"). The grant date of the Initial Award shall be the date of such director's election to the Board, or the earliest practicable date thereafter, as determined by the Company's Chief Executive Officer or Chief Financial Officer. The Initial Award shall vest in equal annual installments over three years from the date of grant, subject to the applicable director's continued service on the Board through the applicable vesting date. The Initial Award shall be granted pursuant to the Company's standard form RSU award agreement, and subject to the terms and conditions therein.

4. Annual Equity-Based Compensation for Non-Employee Directors. An annual grant of RSUs (an "**Annual Award**") shall be made under the Equity Plan to each Non-Employee Director following each annual meeting of stockholders of the Company. The Annual Award shall have a value equal to $185,000, based on the grant date closing price of the Common Stock. The grant date of the Annual Award shall be the date of such annual meeting of stockholders of the Company, or as the earliest practicable date thereafter, as determined by the Company's Chief Executive officer or Chief Financial Officer. The Annual Award shall vest in full on the earlier of (i) one year following the date of grant or (ii) the following year's annual meeting of stockholders, subject to the applicable director's continued service on the Board through the vesting date. The Annual Award shall be granted pursuant to the Company's standard form RSU award agreement, and subject to the terms and conditions therein.

5. Deferral of Compensation. Notwithstanding anything to the contrary in this Plan, any compensation under this Plan may be deferred pursuant to the terms of any deferred compensation program or plan implemented by the Compensation Committee.

6. Cash Equivalent for Equity Award. In each case where an Non-Employee Director is an equity partner or service provider of a private equity sponsor of the Company, and such sponsor has informed the Company in writing that it does not allow its equity partners or service providers, as the case may be, to accept awards of equity for compensation for services rendered to boards of directors of its portfolio companies, then such Non-Employee Director shall be eligible to receive a cash award in lieu of any Initial Award or Annual Award (each, a "**Cash Equivalent Award**") with a value equal to the designated value of the equity award that would otherwise be provided hereunder, but otherwise subject to the same terms and conditions applicable to such award.

7. Administration. This Plan will be administered by the Board, or if the Board so determines in its discretion, by the Compensation Committee. The Board (or the Compensation Committee, as the case may be) will have the power to construe this Plan, to determine all questions hereunder, and to adopt and amend such rules and regulations for the administration of this Plan as it may deem desirable. All decisions, determinations, and interpretations of the Board (or the Compensation Committee, as the case may be) with respect to this Plan will be final and binding.

8. Transfer and Assignment. The right of a Non-Employee Director to receive the payment of all or a portion of an Annual Fee or to be granted an Initial Award or Annual Award may not be assigned, transferred, pledged or encumbered, other than by will or the laws of descent and distribution and any attempted assignment or transfer will be null and void.

9. Governing Law. This Plan will be administered, interpreted, and enforced under the internal laws of the State of Delaware without regard to conflicts of laws thereof.

10. Amendment and Termination. The Board (or the Compensation Committee, if so authorized by the Board) may amend, modify or terminate this Plan for any reason at any time; *provided*, that no amendment, modification or termination, without the consent of the applicable Non-Employee Director, will materially adversely affect any then issued and outstanding Initial Award or Annual Award held by such Non-Employee Director.

Exhibit 31.1

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER PURSUANT TO RULES 13a-14(a) AND 15d-14(a) UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Douglas Godshall, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Shockwave Medical, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: May 9, 2022

By: /s/ Douglas Godshall

Douglas Godshall

President and Chief Executive Officer
(*Principal Executive Officer*)

Exhibit 31.2

CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER PURSUANT TO RULES 13a-14(a) AND 15d-14(a) UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Dan Puckett, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Shockwave Medical, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: May 9, 2022

By: /s/ Dan Puckett

Dan Puckett

Chief Financial Officer
(*Principal Financial Officer*)

Exhibit 32.1

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER PURSUANT TO 18 U.S.C. SECTION 1350, AS ADOPTED PURSUANT TO SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Quarterly Report of Shockwave Medical, Inc. (the "Company") on Form 10-Q for the period ending March 31, 2022 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: May 9, 2022

By: /s/ Douglas Godshall

Douglas Godshall

President and Chief Executive Officer
(*Principal Executive Officer*)

Exhibit 32.2

CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER PURSUANT TO 18 U.S.C. SECTION 1350, AS ADOPTED PURSUANT TO SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Quarterly Report of Shockwave Medical, Inc. (the "Company") on Form 10-Q for the period ending March 31, 2022 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: May 9, 2022

By: /s/ Dan Puckett

Dan Puckett

Chief Financial Officer
(*Principal Financial Officer*)