

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION WASHINGTON, DC 20549
FORM 10-Q

Quarterly report pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934

For the quarterly period ended March 31, 2022

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 001-33957

HARVARD BIOSCIENCE, INC.
(Exact Name of Registrant as Specified in Its Charter)

Delaware
(State or other jurisdiction of
Incorporation or organization)

04-3306140
(I.R.S. Employer
Identification No.)

84 October Hill Road, Holliston, Massachusetts 01746
(Address of Principal Executive Offices, including zip code)

(508) 893-8999
(Registrant's telephone number, including area code)

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

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, \$0.01 par value	HBIO	The Nasdaq Global 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 No

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

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

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

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

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

As of April 29, 2022, there were 41,241,449 shares of the registrant's common stock issued and outstanding.

HARVARD BIOSCIENCE, INC.

FORM 10-Q

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PART I. FINANCIAL INFORMATION

Item 1. Financial Statements.

HARVARD BIOSCIENCE, INC.
CONSOLIDATED BALANCE SHEETS
(Unaudited, in thousands, except share and per share data)

	March 31, 2022	December 31, 2021
Assets		
Current assets:		
Cash and cash equivalents	\$ 5,433	\$ 7,821
Accounts receivable, net	20,274	21,834
Inventories	28,711	27,587
Other current assets	5,030	4,341
Total current assets	59,448	61,583
Property, plant and equipment, net	3,499	3,415
Operating lease right-of-use assets	6,605	6,897
Goodwill	57,356	57,689
Intangible assets, net	25,878	27,385
Other long-term assets	5,258	5,375
Total assets	\$ 158,044	\$ 162,344
Liabilities and Stockholders' Equity		
Current liabilities:		
Current portion of long-term debt	\$ 2,720	\$ 3,235
Current portion of operating lease liabilities	2,151	2,142
Accounts payable	6,218	4,911
Deferred revenue	3,956	4,266
Other current liabilities	12,181	10,762
Total current liabilities	27,226	25,316
Long-term debt, net	46,244	45,095
Deferred tax liability	1,442	1,558
Operating lease liabilities	6,159	6,488
Other long-term liabilities	598	486
Total liabilities	81,669	78,943
Commitments and contingencies - Note 12		
Stockholders' equity:		
Preferred stock, par value \$0.01 per share, 5,000,000 shares authorized	-	-
Common stock, par value \$0.01 per share, 80,000,000 shares authorized: 41,241,449 shares issued and outstanding at March 31, 2022; 41,142,876 shares issued and outstanding at December 31, 2021	452	452
Additional paid-in-capital	226,203	225,650
Accumulated deficit	(139,554)	(132,674)
Accumulated other comprehensive loss	(10,726)	(10,027)
Total stockholders' equity	76,375	83,401
Total liabilities and stockholders' equity	\$ 158,044	\$ 162,344

See accompanying notes to condensed consolidated financial statements.

HARVARD BIOSCIENCE, INC.
CONSOLIDATED STATEMENTS OF OPERATIONS
(Unaudited, in thousands, except per share data)

	Three Months Ended March 31,	
	2022	2021
Revenues	\$ 28,778	\$ 26,989
Cost of revenues	12,601	11,558
Gross profit	<u>16,177</u>	<u>15,431</u>
Sales and marketing expenses	6,687	5,386
General and administrative expenses	6,325	6,333
Research and development expenses	3,220	2,487
Amortization of intangible assets	1,466	1,464
Settlement of litigation - Note 13	5,191	-
Total operating expenses	<u>22,889</u>	<u>15,670</u>
Operating loss	<u>(6,712)</u>	<u>(239)</u>
Other (expense) income:		
Interest expense	(384)	(411)
Other income (expense), net	78	(34)
Total other expense	<u>(306)</u>	<u>(445)</u>
Loss before income taxes	(7,018)	(684)
Income tax benefit	(138)	(15)
Net loss	<u>\$ (6,880)</u>	<u>\$ (669)</u>
Loss per share:		
Basic and diluted loss per common share	<u>\$ (0.17)</u>	<u>\$ (0.02)</u>
Weighted-average common shares:		
Basic and diluted	41,219	39,787

See accompanying notes to condensed consolidated financial statements.

HARVARD BIOSCIENCE, INC.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS
(Unaudited, in thousands)

	Three Months Ended March 31,	
	2022	2021
Net loss	\$ (6,880)	\$ (669)
Other comprehensive loss:		
Foreign currency translation adjustments	(699)	(1,325)
Comprehensive loss	<u>\$ (7,579)</u>	<u>\$ (1,994)</u>

See accompanying notes to condensed consolidated financial statements.

HARVARD BIOSCIENCE, INC.
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(Unaudited, in thousands)

	Number of Shares Issued	Common Stock	Additional Paid-in Capital	Accumulated Deficit	Accumulated Other Comprehensive Loss	Treasury Stock	Total Stockholders' Equity
Balance at December 31, 2021	41,143	\$ 452	\$ 225,650	\$ (132,674)	\$ (10,027)	\$ -	\$ 83,401
Stock option exercises	11	-	31	-	-	-	31
Vesting of restricted stock units	151	-	-	-	-	-	-
Shares withheld for taxes	(64)	-	(501)	-	-	-	(501)
Stock-based compensation expense	-	-	1,023	-	-	-	1,023
Net loss	-	-	-	(6,880)	-	-	(6,880)
Other comprehensive loss	-	-	-	-	(699)	-	(699)
Balance at March 31, 2022	<u>41,241</u>	<u>\$ 452</u>	<u>\$ 226,203</u>	<u>\$ (139,554)</u>	<u>\$ (10,726)</u>	<u>\$ -</u>	<u>\$ 76,375</u>
Balance at December 31, 2020	47,153	\$ 444	\$ 232,357	\$ (132,386)	\$ (13,066)	\$ (10,668)	\$ 76,681
Stock option exercises	311	4	1,920	-	-	-	1,924
Vesting of restricted stock units	340	-	-	-	-	-	-
Shares withheld for taxes	(108)	-	(464)	-	-	-	(464)
Stock-based compensation expense	-	-	968	-	-	-	968
Net loss	-	-	-	(669)	-	-	(669)
Other comprehensive loss	-	-	-	-	(1,325)	-	(1,325)
Balance at March 31, 2021	<u>47,696</u>	<u>\$ 448</u>	<u>\$ 234,781</u>	<u>\$ (133,055)</u>	<u>\$ (14,391)</u>	<u>\$ (10,668)</u>	<u>\$ 77,115</u>

See accompanying notes to condensed consolidated financial statements.

HARVARD BIOSCIENCE, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(Unaudited, in thousands)

	Three Months Ended March 31,	
	2022	2021
Cash flows from operating activities:		
Net loss	\$ (6,880)	\$ (669)
Adjustments to reconcile net loss to net cash provided by operating activities:		
Depreciation	382	445
Amortization of intangible assets	1,466	1,464
Amortization of deferred financing costs	70	70
Stock-based compensation expense	1,023	968
Deferred income taxes and other	(123)	(53)
Changes in operating assets and liabilities:		
Accounts receivable	1,506	584
Inventories	(1,308)	(602)
Other assets	(466)	(94)
Accounts payable and accrued expenses	2,729	(245)
Deferred revenue	(300)	(135)
Other liabilities	(85)	(696)
Net cash (used in) provided by operating activities	<u>(1,986)</u>	<u>1,037</u>
Cash flows from investing activities:		
Additions to property, plant and equipment	(471)	(151)
Additions to intangible assets	-	(150)
Net cash used in investing activities	<u>(471)</u>	<u>(301)</u>
Cash flows from financing activities:		
Borrowing from revolving line of credit	1,500	-
Repayment of revolving line of credit	-	(4,000)
Repayment of term debt	(936)	(500)
Debt issuance costs	-	(101)
Proceeds from exercise of stock options	31	1,924
Taxes paid related to net share settlement of equity awards	(501)	(464)
Net cash provided by (used in) financing activities	<u>94</u>	<u>(3,141)</u>
Effect of exchange rate changes on cash	(25)	(97)
Decrease in cash and cash equivalents	(2,388)	(2,502)
Cash and cash equivalents at beginning of period	7,821	8,317
Cash and cash equivalents at end of period	<u>\$ 5,433</u>	<u>\$ 5,815</u>
Supplemental disclosures of cash flow information:		
Cash paid for interest	\$ 383	\$ 458
Cash paid (received) for income taxes, net of refunds	\$ 107	\$ (113)

See accompanying notes to condensed consolidated financial statements.

NOTES TO UNAUDITED CONSOLIDATED FINANCIAL STATEMENTS

1. Basis of Presentation and Summary of Significant Accounting Policies, and Risks and Uncertainties

Basis of Presentation and Summary of Significant Accounting Policies

The unaudited consolidated financial statements of Harvard Bioscience, Inc. and its wholly-owned subsidiaries (collectively, “Harvard Bioscience” or the “Company”) as of March 31, 2022 and for the three months ended March 31, 2022 and 2021, have been prepared by the Company pursuant to the rules and regulations of the Securities and Exchange Commission (the “SEC”). Certain information and footnote disclosures normally included in financial statements prepared in accordance with U.S. generally accepted accounting principles (“U.S. GAAP”) have been condensed or omitted pursuant to such rules and regulations. The December 31, 2021, consolidated balance sheet was derived from audited financial statements but does not include all disclosures required by U.S. GAAP. However, the Company believes that the disclosures are adequate to make the information presented not misleading. These unaudited consolidated financial statements should be read in conjunction with the consolidated financial statements and the notes thereto included in the Company’s Annual Report on Form 10-K for the fiscal year ended December 31, 2021.

In the opinion of management, all adjustments, which include normal recurring adjustments necessary to present a fair statement of financial position as of March 31, 2022, results of operations and comprehensive loss and cash flows for the three months ended March 31, 2022 and 2021, as applicable, have been made. The results of operations for the three months ended March 31, 2022, are not necessarily indicative of the operating results for the full fiscal year or any future periods.

The accounting policies underlying the accompanying unaudited consolidated financial statements are set forth in Note 2 to the consolidated financial statements included in the Company’s Annual Report on Form 10-K for the year ended December 31, 2021. There have been no material changes in the Company’s significant accounting policies during the three months ended March 31, 2022.

Risks and Uncertainties

On March 11, 2020, the World Health Organization declared the outbreak of a novel coronavirus (COVID-19) as a pandemic. The COVID-19 pandemic has had a negative impact on the Company’s operations to date and the future impacts of the pandemic and any resulting economic impact are largely unknown and rapidly evolving. Since the global outbreak of COVID-19, many customers, particularly academic research institutions, have reduced laboratory work which has negatively impacted, and will continue to negatively impact, the Company’s sales. Also, countries world-wide continue to issue COVID-19 related policies in an attempt to control the pandemic. In particular, during the beginning of 2022, China implemented area-wide shutdowns in order to control the spread of COVID-19. To ensure business continuity while maintaining a safe environment for employees aligned with guidance from government and health organizations, the Company transitioned a significant portion of its workforce to work-from-home while implementing social distancing requirements and other measures to allow manufacturing and other personnel essential to production to continue work within the Company’s facilities. Business travel was significantly reduced during this period. While a portion of the workforce has returned to in-office work and travel is less restricted, the Company continued to have restrictions which represent disruptions that can impact productivity including sales and marketing activities.

The global supply chain has experienced significant disruptions due to electronic component and labor shortages and other macroeconomic factors which have emerged since the onset of COVID-19, leading to increased cost of freight, purchased materials, and manufacturing labor costs, while also delaying customer shipments. Accordingly, these conditions in addition to the overall impact on the global economy have negatively impacted results of operations and cash flows.

2. Recently Issued Accounting Pronouncements

Accounting Pronouncements to be Adopted

In November 2021, the Financial Accounting Standards Board (“FASB”) issued Accounting Standards Update (“ASU”) 2021-10, *Government Assistance (Topic 832), Disclosures by Business Entities About Government Assistance*, which requires entities to provide disclosures on material government assistance transactions for annual reporting periods. The disclosures include information around the nature of the assistance, the related accounting policies used to account for government assistance, the effect of government assistance on the entity’s financial statements, and any significant terms and conditions of the agreements, including commitments and contingencies. The new standard impacts footnote disclosures and is effective for the Company’s December 31, 2022 annual financial statements. The Company is currently evaluating the potential impact of adopting ASU 2021-10 will have on its consolidated financial statements.

In January 2017, the FASB issued ASU 2017-04, *Intangibles—Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment* (ASU 2017-04), which eliminates the performance of Step 2 from the goodwill impairment test. In performing its annual or interim impairment testing, an entity will instead compare the fair value of the reporting unit with its carrying amount and recognize any impairment charge for the amount by which the carrying amount exceeds the reporting unit's fair value. Additionally, an entity should consider income tax effects from any tax-deductible goodwill on the carrying amount of the reporting unit when measuring the goodwill impairment loss. ASU 2017-04 is effective for the Company for fiscal years beginning after December 15, 2022. The Company is currently evaluating the potential impact that adopting ASU 2017-04 will have on its consolidated financial statements.

In September 2016, the FASB issued ASU No. 2016-13, *Financial Instruments—Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments (ASU 2016-13)*, which amends the impairment model by requiring entities to use a forward-looking approach based on expected losses rather than incurred losses to estimate credit losses on certain types of financial instruments, including trade receivables. This may result in the earlier recognition of allowances for losses. The FASB issued several ASUs after ASU 2016-13 to clarify implementation guidance and to provide transition relief for certain entities. ASU 2016-13 is effective for the Company for fiscal years beginning after December 15, 2022, with early adoption permitted. The Company is evaluating the impact that adopting ASU 2016-13 and related amendments will have on its consolidated financial statements.

3. Goodwill and Intangible Assets

Goodwill

The change in the carrying amount of goodwill for the three months ended March 31, 2022, were as follows:

(in thousands)

Carrying amount at December 31, 2021	\$ 57,689
Effect of change in currency translation	(333)
Carrying amount at March 31, 2022	<u>\$ 57,356</u>

Intangible Assets

Identifiable intangible assets at March 31, 2022 and December 31, 2021 consist of the following:

(in thousands)	Average Life*	March 31, 2022			December 31, 2021		
		Gross	Accumulated Amortization	Net	Gross	Accumulated Amortization	Net
Amortizable intangible assets:							
Distribution agreements/customer relationships	7.7	\$ 17,594	\$ (8,938)	\$ 8,656	\$ 17,689	\$ (8,675)	\$ 9,014
Existing technology	3.9	38,611	(24,786)	13,825	38,707	(23,962)	14,745
Trade names and patents	4.2	8,467	(5,304)	3,163	8,496	(5,108)	3,388
Total amortizable intangible assets		<u>\$ 64,672</u>	<u>\$ (39,028)</u>	<u>\$ 25,644</u>	<u>\$ 64,892</u>	<u>\$ (37,745)</u>	<u>\$ 27,147</u>
Indefinite-lived intangible assets:				234			238
Total intangible assets				<u>\$ 25,878</u>			<u>\$ 27,385</u>

* Weighted average life in years as of March 31, 2022

Intangible asset amortization expense was \$1.5 million for each the three months ended March 31, 2022 and 2021. Estimated amortization expense of existing amortizable intangible assets for each of the five succeeding years and thereafter as of March 31, 2022, is as follows:

Year Ending December 31, (in thousands)	Amortization Expense
2022 (remainder of year)	\$ 4,366
2023	5,728
2024	5,427
2025	4,109
2026	2,368
Thereafter	3,646
Total	<u>\$ 25,644</u>

4. Balance Sheet Information

The following tables provide details of selected balance sheet items as of the periods indicated:

Inventories: (in thousands)	March 31, 2022	December 31, 2021
Finished goods	\$ 6,798	\$ 5,646
Work in process	3,439	3,410
Raw materials	18,474	18,531
Total	<u>\$ 28,711</u>	<u>\$ 27,587</u>

Other Current Liabilities: (in thousands)	March 31, 2022	December 31, 2021
Compensation	\$ 2,878	\$ 6,048
Professional fees	396	480
Warranty costs	242	240
Customer related costs	2,058	2,265
Settlement of litigation	4,814	-
Accrued income taxes	141	224
Other	1,653	1,505
Total	<u>\$ 12,181</u>	<u>\$ 10,762</u>

5. Restructuring and Other Exit Costs

On an ongoing basis, the Company reviews the global economy, the healthcare industry, and the markets in which it competes to identify operational efficiencies, enhance commercial capabilities, and align its cost base and infrastructure with customer needs and its strategic plans. In order to realize these opportunities, the Company undertakes restructuring-type activities from time to time to transform its business. A portion of these transformation activities are considered restructuring costs under *ASC 420 – Exit or Disposal Cost Obligations* and are discussed below.

During 2019, the Company initiated a restructuring program to improve operational efficiency and reduce costs which entailed consolidating and downsizing several sites and headcount reductions in Europe and North America. This program was completed in 2021. Restructuring costs under this program were \$0.6 million for the three months ended March 31, 2021, substantially all of which have been included as a component of general and administrative expenses.

6. Related Party Transactions

In connection with the 2014 acquisitions of Multi Channel Systems MCS GmbH (“MCS”), the Company entered into a facility lease agreement with the former principal owner of MCS who became an employee of the Company at the time of the acquisition and subsequently retired in 2021. The MCS agreement expires on December 31, 2024. Pursuant to this lease agreement, the Company made rent payments of approximately \$0.1 million for each of the three months ended March 31, 2022 and 2021.

7. Leases

The Company has noncancelable operating leases for offices, manufacturing facilities, warehouse space, automobiles and equipment expiring at various dates through 2030.

The components of lease expense for the three months ended March 31, 2022 and 2021, are as follows:

(in thousands)	Three Months Ended March 31,	
	2022	2021
Operating lease cost	\$ 504	\$ 517
Short-term lease cost	64	46
Sublease income	(25)	(25)
Total lease cost	<u>\$ 543</u>	<u>\$ 538</u>

Supplemental cash flow information related to the Company's operating leases was as follows:

(in thousands)	Three Months Ended March 31,	
	2022	2021
Cash paid for amounts included in the measurement of lease liabilities:	\$ 594	\$ 611
Right-of-use assets obtained in exchange for lease obligations:	\$ 39	-

Supplemental balance sheet information related to the Company's operating leases was as follows:

(in thousands)	March 31,	December 31,
	2022	2021
Operating lease right-of-use assets	\$ 6,605	\$ 6,897
Current portion, operating lease liabilities	\$ 2,151	\$ 2,142
Operating lease liabilities, long-term	6,159	6,488
Total operating lease liabilities	<u>\$ 8,310</u>	<u>\$ 8,630</u>
Weighted average remaining lease term (years)	6.5	6.7
Weighted average discount rate	9.3%	9.3%

Future minimum lease payments for operating leases for each twelve-month period subsequent to March 31, 2022, are as follows:

<u>Year Ending December 31,</u>	
(in thousands)	
2022 (remainder of year)	\$ 1,611
2023	2,133
2024	1,765
2025	1,019
2026	980
Thereafter	3,871
Total lease payments	11,379
Less imputed interest	(3,069)
Total operating lease liabilities	<u>\$ 8,310</u>

8. Capital Stock and Stock-Based Compensation

Stock-Based Payment Awards

Stock-based awards consist of stock options, time-based restricted stock units (“RSUs”), performance-based RSU’s and shares issued under the Company’s employee stock purchase plan. Activity under the Company’s equity incentive plans for the three months ended March 31, 2022, was as follows:

	Stock Options Outstanding	Weighted Average Exercise Price	Time-Based RSUs Outstanding	Grant Date Fair Value	Performance- Based RSUs Outstanding	Grant Date Fair Value
Balance at December 31, 2021	1,404,816	\$ 3.10	1,141,164	\$ 3.57	860,155	\$ 3.13
Granted	-	-	518,163	5.52	205,122	5.92
Exercised	(10,987)	2.78	-	-	-	-
Vested (RSUs)	-	-	(151,185)	2.30	-	-
Cancelled/Forfeited	(3,126)	3.79	(12,917)	3.07	-	-
Balance at March 31, 2022	<u>1,390,703</u>	\$ 3.10	<u>1,495,225</u>	\$ 4.37	<u>1,065,277</u>	\$ 3.67

Stock-based compensation expense for the three months ended March 31, 2022 and 2021, was allocated as follows:

(in thousands)	Three Months Ended March 31,	
	2022	2021
Cost of revenues	\$ 36	\$ 20
Sales and marketing expenses	154	93
General and administrative expenses	791	834
Research and development expenses	42	21
Total stock-based compensation expenses	<u>\$ 1,023</u>	<u>\$ 968</u>

As of March 31, 2022, the total compensation costs related to unvested awards not yet recognized is \$8.2 million and the weighted average period over which it is expected to be recognized is approximately 2.2 years. The Company did not capitalize any stock-based compensation.

The weighted average estimated fair value of the performance-based RSUs that were granted during the three months ended March 31, 2022 was \$5.92 per unit. The following assumptions were used to estimate the fair value of the performance-based RSUs granted during the three months ended March 31, 2022 using a Monte-Carlo valuation simulation:

	2022
Volatility	65.1%
Risk-free interest rate	1.4%
Correlation coefficient	38.5%
Dividend yield	-%

Earnings (Loss) Per Share

Basic earnings (loss) per share (EPS) is calculated by dividing net income (loss) by the number of weighted average shares of common stock outstanding during the period. The calculation of diluted earnings per share assumes conversion of stock options, time-based RSUs, and performance-based RSUs into common stock using the treasury method. The weighted average number of shares used to compute basic and diluted earnings per share consists of the following:

(in thousands)	Three Months Ended March 31,	
	2022	2021
Basic	41,219	39,787
Dilutive effect of equity awards	-	-
Diluted	<u>41,219</u>	<u>39,787</u>

For the three months ended March 31, 2022, and 2021, the Company excluded from the calculations of diluted earnings per share approximately 3.5 million shares and 4.5 million shares, respectively, of weighted average shares of underlying stock-based awards as the impact of including these potential shares would be anti-dilutive.

9. Long-Term Debt

As of March 31, 2022 and December 31, 2021, the Company's borrowings were comprised of:

(in thousands)	March 31, 2022	December 31, 2021
Long-term debt:		
Term loan	\$ 37,064	\$ 38,000
Revolving line	12,950	11,450
Less unamortized deferred financing costs	(1,050)	(1,120)
Total debt	48,964	48,330
Current portion of long-term debt	(3,000)	(3,515)
Current unamortized deferred financing costs	280	280
Long-term debt	<u>\$ 46,244</u>	<u>\$ 45,095</u>

On December 22, 2020, the Company entered into a Credit Agreement (the "Credit Agreement") with Citizens Bank, N.A., Wells Fargo Bank, National Association, and Silicon Valley Bank (together, the "Lenders"). The Credit Agreement provides for a term loan of \$40.0 million and a \$25.0 million senior revolving credit facility (including a \$10.0 million sub-facility for the issuance of letters of credit and a \$10.0 million swingline loan sub-facility) (collectively, the "Credit Facility"). The Company's obligations under the Credit Agreement are guaranteed by certain of the Company's direct, domestic wholly-owned subsidiaries; none of the Company's direct or indirect foreign subsidiaries has guaranteed the Credit Facility. The Company's obligations under the Credit Agreement are secured by substantially all of the assets of Harvard Bioscience, Inc., and each guarantor (including all or a portion of the equity interests in certain of the Company's domestic and foreign subsidiaries). The Credit Facility matures on December 22, 2025. Issuance costs of \$1.4 million are amortized over the contractual term to maturity date on a straight-line basis, which approximates the effective interest method. Available and unused borrowing capacity under the revolving line of credit was \$6.8 million as of March 31, 2022. Total revolver borrowing capacity is limited by the Maximum Leverage ratio as defined under the Credit Agreement. The Credit Facility replaced the Company's prior credit facility, which was repaid with borrowings under the Credit Facility.

Borrowings under the Credit Facility will, at the option of the Company, bear interest at either (i) a rate per annum based on LIBOR for an interest period of one, two, three or six months, plus an applicable interest rate margin determined as provided in the Credit Agreement (a "LIBOR Loan"), or (ii) an alternative base rate plus an applicable interest rate margin, each as determined as provided in the Credit Agreement (an "ABR Loan"). LIBOR interest under the Credit Agreement is subject to applicable market rates and a floor of 0.50%. The alternative base rate is based on the Citizens Bank prime rate or the federal funds effective rate of the Federal Reserve Bank of New York and is subject to a floor of 1.0%. The applicable interest rate margin varies from 2.0% per annum to 3.25% per annum for LIBOR Loans, and from 1.5% per annum to 3.0% per annum for ABR Loans, in each case depending on the Company's consolidated leverage ratio and is determined in accordance with a pricing grid set forth in the Credit Agreement. The LIBOR index is expected to be phased out over time and the terms of the Credit Agreement allow for a replacement when that occurs. Interest on LIBOR Loans is payable in arrears on the last day of each applicable interest period, and interest on ABR Loans is payable in arrears at the end of each calendar quarter. There are no prepayment penalties in the event the Company elects to prepay and terminate the Credit Facility prior to its scheduled maturity date, subject to LIBOR breakage and redeployment costs in certain circumstances.

As of March 31, 2022, the weighted average interest rate on the Credit Agreement borrowings was 3.4%. The effective interest rate for the three months ended March 31, 2022 and 2021, was 3.1% and 3.3%, respectively. The carrying value of the debt approximates fair value because the interest rate under the obligation approximates market rates of interest available to the Company for similar instruments.

Commencing on March 31, 2021, the outstanding term loans amortizes in quarterly installments of \$0.5 million per quarter on such date and during each of the next three quarters thereafter, \$0.75 million per quarter during the next eight quarters thereafter and \$1.0 million per quarter thereafter, with a balloon payment at maturity. Furthermore, within ninety days after the end of the Company's fiscal year ended December 31, 2021, and for each fiscal year thereafter, the term loans may be permanently reduced pursuant to certain mandatory prepayment events including an annual "excess cash flow sweep" of 50% of the consolidated excess cash flow, as defined in the agreement; provided that, in any fiscal year, any voluntary prepayments of the term loans shall be credited against the Company's "excess cash flow" prepayment obligations on a dollar-for-dollar basis for such fiscal year. Amounts outstanding under the revolving credit facility can be repaid at any time but are due in full at maturity. The Company made an excess cash flow sweep payment of \$0.2 million during the three months ended March 31, 2022.

The Credit Agreement includes customary affirmative, negative, and financial covenants binding on the Company. The negative covenants limit the ability of the Company, among other things, to incur debt, incur liens, make investments, sell assets and pay dividends on its capital stock. The financial covenants include a maximum consolidated net leverage ratio and a minimum consolidated fixed charge coverage ratio. The Credit Agreement also includes customary events of default.

On April 28, 2022, the Company entered into an amendment to the Credit Agreement and Pledge and Security Agreement (the "Amendment"), among the Company, the Lenders, and Citizens Bank, N.A., as the administrative agent (the "Administrative Agent"). Pursuant to the Amendment, the Lenders and the Administrative Agent have agreed, among other things, (i) to modify the financial covenant relating to the consolidated net leverage ratio and (ii) to consent to the Settlement described in Note 13- "Subsequent Events". In consideration for the Amendment, the Company paid a fee of \$0.2 million to the Lenders and the Administrative Agent. The Company was in compliance with the covenants of the Credit Agreement, as amended by the Amendment, as of March 31, 2022.

10. Revenues

The following tables represent a disaggregation of revenue from contracts with customers for the three months ended March 31, 2022 and 2021:

(in thousands)	Three Months Ended March 31,	
	2022	2021
Instruments, equipment, software and accessories	\$ 27,538	\$ 25,827
Service, maintenance and warranty contracts	1,240	1,162
Total revenues	\$ 28,778	\$ 26,989

The following tables represent a disaggregation of revenue by geographic destination for the three months ended March 31, 2022 and 2021:

(in thousands)	Three Months Ended March 31,	
	2022	2021
United States	\$ 12,239	\$ 11,177
Europe	7,823	8,589
Asia	6,733	5,538
Rest of the world	1,983	1,685
Total revenues	\$ 28,778	\$ 26,989

Deferred revenue

The following tables provide details of deferred revenue as of the periods indicated:

(in thousands)	March 31,	December 31,
	2022	2021
Service contracts	\$ 1,995	\$ 1,976
Customer advances	1,961	2,290
Total deferred revenue	\$ 3,956	\$ 4,266

During the three months ended March 31, 2022 and 2021, the Company recognized revenue of \$0.7 million and \$1.2 million from contract liabilities existing at December 31, 2021 and 2020, respectively.

Allowance for Doubtful Accounts

Allowance for doubtful accounts is based on the Company's assessment of the collectability of accounts receivable. Activity in the allowance for doubtful accounts is as follows:

(in thousands)	Three Months Ended March 31,	
	2022	2021
Balance, beginning of period	\$ 136	\$ 227
Bad debt (credit) expense	(6)	5
Charge-offs and other	6	22
Balance, end of period	\$ 136	\$ 254

Concentrations

No customer accounted for more than 10% of revenues for the three months ended March 31, 2022 and 2021. At March 31, 2022 and December 31, 2021, no customer accounted for more than 10% of net accounts receivable.

11. Income Tax

Income tax benefit was \$0.1 million for the three months ended March 31, 2022 and was less than \$0.1 million for the three months ended March 31, 2021. The effective tax rates for the three months ended March 31, 2022 and 2021, were 2.0% and 2.2%, respectively.

The difference between the Company's effective tax rates in 2022 and 2021 compared to the U.S. statutory tax rate of 21% is primarily due to changes in valuation allowances associated with the Company's assessment of the likelihood of the recoverability of deferred tax assets. The Company currently has valuation allowances against substantially all of its net operating loss carryforwards and tax credit carryforwards.

12. Commitments and Contingent Liabilities

On April 14, 2017, representatives for the estate of an individual plaintiff filed a wrongful death complaint with the Suffolk Superior Court, in the County of Suffolk, Massachusetts, against the Company and other defendants, including Biostage, Inc. (f/k/a Harvard Apparatus Regenerative Technology, Inc.) (“Biostage”), a former subsidiary of the Company that was spun off in 2013, as well as another third party. The complaint seeks payment for an unspecified amount of damages and alleges that the plaintiff sustained terminal injuries allegedly caused by products, including one synthetic trachea scaffold and two bioreactors, provided by certain of the named defendants and utilized in connection with surgeries performed by third parties in Europe in 2012 and 2013.

On April 28, 2022, the Company and Biostage executed a settlement with the plaintiffs (the “Settlement”) which resolves all claims relating to the litigation. The settlement is described in Note 13 – “*Subsequent Events – Litigation Settlement*”.

The Company is involved in various other claims and legal proceedings arising in the ordinary course of business. After consultation with legal counsel, the Company has determined that the ultimate disposition of such proceedings is not likely to have a material adverse effect on its business, financial condition, results of operations or cash flows. Although unfavorable outcomes in the proceedings are possible, the Company has not accrued for loss contingencies relating to any such matters as they are not considered to be probable and reasonably estimable. If one or more of these matters are resolved in a manner adverse to the Company, the impact on the Company’s business, financial condition, results of operations and cash flows could be material.

13. Subsequent Events

Litigation Settlement

On April 27, 2022, the Company and Biostage executed a settlement with the plaintiffs and Biostage’s products liability insurance carriers (the “Settlement”), which resolves with prejudice all claims relating to the litigation, including outstanding lawsuits with the plaintiffs and one of the insurance carriers. The Settlement was entered into solely by way of compromise and settlement and is not in any way an admission of liability or fault by the Company or Biostage. The Company has accrued \$5.2 million of costs related to the legal fees and the Settlement as of March 31, 2022. Biostage is required to indemnify the Company for all losses and expenses, including legal expenses, the Company incurs in connection with the litigation and the Settlement. The Company and Biostage have agreed in principle that, in satisfaction of \$4.0 million of its total indemnification obligations, Biostage will issue senior convertible preferred stock to the Company. The issuance of such preferred stock, and the terms thereof, are subject to the negotiation and execution of definitive documents. Due to Biostage’s current financial condition, there is uncertainty as to whether Biostage’s indemnification obligation together with the value, if any, of such preferred stock will offset the amounts the Company has incurred in connection with the litigation and Settlement, if at all. Accordingly, as of March 31, 2022, the Company has fully reserved any receivables from Biostage and the financial results only reflect expected losses to be paid by the Company.

Credit Agreement Amendment

On April 28, 2022, the Company entered into an amendment to the Credit Agreement and Pledge and Security Agreement (the “Amendment”), among the Company, the Lenders, and Citizens Bank, N.A., as the administrative agent (the “Administrative Agent”). Pursuant to the Amendment, the Lenders and the Administrative Agent have agreed, among other things, (i) to modify the financial covenant relating to the consolidated net leverage ratio and (ii) to consent to the Settlement described above. In consideration for the Amendment, the Company paid a fee of \$0.2 million to the Lenders and the Administrative Agent.

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

Forward-Looking Statements

This Quarterly Report on Form 10-Q contains statements that are not statements of historical fact and are forward-looking statements within the meaning of Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934 (the "Exchange Act"). The forward-looking statements are principally, but not exclusively, contained in "Item 2: Management's Discussion and Analysis of Financial Condition and Results of Operations." These statements involve known and unknown risks, uncertainties and other factors that may cause our actual results, performance, or achievements to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements. Forward-looking statements include, but are not limited to, statements about management's confidence or expectations, and our plans, objectives, expectations, and intentions that are not historical facts. In some cases, you can identify forward-looking statements by terms such as "may," "will," "should," "could," "would," "seek," "expects," "plans," "aim," "anticipates," "believes," "estimates," "projects," "predicts," "intends," "think," "potential," "objectives," "optimistic," "strategy," "goals," "sees," "new," "guidance," "future," "continue," "drive," "growth," "long-term," "projects," "develop," "possible," "emerging," "opportunity," "pursue" and similar expressions intended to identify forward-looking statements. These statements reflect our current views with respect to future events and are based on assumptions and subject to risks and uncertainties. Given these uncertainties, you should not place undue reliance on these forward-looking statements. We discuss many of these risks in detail in our Annual Report on Form 10-K for year ended December 31, 2021. You should carefully review all of these factors, as well as other risks described in our public filings, and you should be aware that there may be other factors, including factors of which we are not currently aware, that could cause these differences. Also, these forward-looking statements represent our estimates and assumptions only as of the date of this report. We may not update these forward-looking statements, even though our situation may change in the future, unless we have obligations under the federal securities laws to update and disclose material developments related to previously disclosed information. Harvard Bioscience, Inc. is referred to herein as "we," "our," "us," and "the Company."

Recent Developments

COVID-19

On March 11, 2020, the World Health Organization declared the outbreak of a novel coronavirus (COVID-19) as a pandemic. The COVID-19 pandemic has had a negative impact on our operations to date and the future impacts of the pandemic and any resulting economic impact remain unknown and continuously evolving. Since the global outbreak of COVID-19, many customers, particularly academic research institutions, reduced laboratory work which has negatively impacted, and will continue to negatively impact, our sales. Also, countries world-wide continue to issue COVID-19 related policies in an attempt to control the pandemic. In particular, during the beginning of 2022, China implemented area-wide shutdowns in order to control the spread of COVID-19. Additionally, to ensure business continuity while maintaining a safe environment for employees aligned with guidance from government and health organizations, we transitioned a significant portion of our workforce to work-from-home while implementing social distancing requirements and other measures to allow manufacturing and other personnel essential to production to continue work within our facilities. Business travel was significantly reduced during this period. While a portion of the workforce has returned to in-office work and travel is less restricted, we continue to have restrictions which represent disruptions that can impact productivity including sales and marketing activities.

The global supply chain has experienced significant disruptions due to electronic component and labor shortages and other macroeconomic factors which have emerged since the onset of COVID-19, leading to increased cost of freight, purchased materials and manufacturing labor costs, while also delaying customer shipments. We believe these supply chain trends will continue through the rest of 2022. These conditions in addition to the overall impact on the global economy have negatively impacted our results of operations and cash flows.

If business interruptions resulting from COVID-19 were to be prolonged or expanded in scope, our business, financial condition, results of operations and cash flows would be negatively impacted. We will continue to actively monitor this situation and will implement actions necessary to maintain business continuity.

Selected Results of Operations*Three months ended March 31, 2022 compared to three months ended March 31, 2021.*

(dollars in thousands)	Three Months Ended March 31,			
	2022	% of revenue	2021	% of revenue
Revenues	\$ 28,778		\$ 26,989	
Gross profit	16,177	56.2%	15,431	57.2%
Sales and marketing expenses	6,687	23.2%	5,386	20.0%
General and administrative expenses	6,325	22.0%	6,333	23.5%
Research and development expenses	3,220	11.2%	2,487	9.2%
Amortization of intangible assets	1,466	5.1%	1,464	5.4%
Settlement of litigation	5,191	18.0%	-	-
Interest expense	384	1.3%	411	1.5%
Income tax benefit	(138)	-0.5%	(15)	-0.1%

Revenue

Revenues for the three months ended March 31, 2022, were \$28.8 million, an increase of approximately \$1.8 million, or 6.6%, compared to revenues of \$27.0 million for the three months ended March 31, 2021. Revenues increased due to improved sales of products from our preclinical product family associated with improved sales processes as well as improvements in order fulfillment processes which reduce order backlog. These improvements were offset by lower orders from customers in Asia than the prior year due to COVID lockdowns in China in 2022 which delayed orders. We expect sales to China customers to remain at reduced levels until lockdown conditions are removed.

Gross profit

Gross profit increased \$0.7 million, or 4.8%, to \$16.2 million for the three months ended March 31, 2022, compared with \$15.4 million for the three months ended March 31, 2021, due primarily to the increase in revenue noted. Gross margin decreased to 56.2% for the three months ended March 31, 2022, compared with 57.2% for the three months ended March 31, 2021. The decrease in gross margin was due to higher supply chain, logistics and manufacturing labor costs. The global supply chain has experienced significant disruptions due to electronic component and labor shortages and other macroeconomic factors, leading to the increased cost noted. We believe these supply chain trends will continue through the rest of 2022. These costs were partially offset by volume increases and improved product mix and pricing.

Sales and marketing expenses

Sales and marketing expenses increased \$1.3 million, or 24.2%, to \$6.7 million for the three months ended March 31, 2022, compared to \$5.4 million during the same period in 2021. The increase was primarily due to investments in new marketing and sales support personnel and increases in travel and attendance at in-person trade shows. Travel and tradeshow costs were lower in the prior year quarter due to COVID restrictions.

General and administrative expenses

General and administrative expenses were \$6.3 million for both the three months ended March 31, 2022, and March 31, 2021. General and administrative expenses for the three months ended March 31, 2022 experienced lower restructuring expenses and variable compensation which were offset by higher consulting costs associated with enterprise-level operational improvement planning.

Research and development expenses

Research and development expenses were \$3.2 million for the three months ended March 31, 2022, an increase of \$0.7 million, or 29.5%, compared with \$2.5 million for the three months ended March 31, 2021. The increase was primarily due to costs involving investments in our preclinical product lines.

Amortization of intangible assets

Amortization of intangible asset expenses were \$1.5 million for both the three months ended March 31, 2022, and March 31, 2021.

Settlement of litigation

On April 27, 2022, the Company and Biostage executed a settlement with the plaintiffs and Biostage's products liability insurance carriers (the "Settlement"), which resolves with prejudice all claims relating to the litigation, including outstanding lawsuits with the plaintiffs and one of the insurance carriers (see "Subsequent Events" – Litigation Settlement " included in Note 13 to our Condensed Consolidated Financial Statements included in "Part I, Item 1. Financial Statement" of this report). We have accrued approximately \$5.2 million of costs as of March 31, 2022, and expect to incur an additional \$0.8 million of expenses as a result of legal fees and the Settlement. Biostage is required to indemnify us for all losses and expenses, including legal expenses, we incur in connection with the Settlement. We and Biostage have agreed in principle that, in satisfaction of \$4.0 million of its total indemnification obligations, Biostage will issue senior convertible preferred stock to the Company. The issuance of such preferred stock, and the terms thereof, are subject to the negotiation and execution of definitive documents. Due to Biostage's current financial condition, there is uncertainty as to whether Biostage's indemnification obligation together with the value, if any, of such preferred stock will offset the amounts the Company has incurred in connection with the litigation and Settlement, if at all. Accordingly, as of March 31, 2022, we have fully reserved any receivables from Biostage and the financial results only reflect expected losses to be paid by us.

Interest expense

Interest expense was \$0.4 million for both the three months ended March 31, 2022, and March 31, 2021.

Income tax benefit

Income tax benefit for the three months ended March 31, 2022 was \$0.1 million and was less than \$0.1 million for the three months ended March 31, 2021. The effective tax rates for the three months ended March 31, 2022 and 2021 were 2.0% and 2.2%, respectively. The difference between our effective tax rates in 2022 and 2021 compared to the U.S. statutory tax rate of 21% is primarily due to changes in valuation allowances associated with our assessment of the likelihood of the recoverability of our deferred tax assets. We currently have valuation allowances against substantially all of our net operating loss carryforwards and tax credit carryforwards.

Liquidity and Capital Resources

Our primary sources of liquidity are cash and cash equivalents, internally generated cash flow from operations and our revolving credit facility. Our expected cash outlays relate primarily to cash payments due under our Credit Agreement described below as well as capital expenditures, payments associated with ongoing business improvement initiatives and the litigation settlement.

As of March 31, 2022, we held cash and cash equivalents of \$5.4 million, compared with \$7.8 million at December 31, 2021. Borrowings outstanding was \$50.0 million and \$49.4 million as of March 31, 2022 and December 31, 2021, respectively.

On December 22, 2020, we entered into a Credit Agreement which provides for a term loan of \$40.0 million and a \$25.0 million senior revolving credit facility and matures on December 22, 2025 (See Note 9 to the Condensed Consolidated Financial Statements included in "Part I, Item 1. Financial Statement" of this report). As of March 31, 2022, the weighted average interest rate on our borrowings was 3.4%. Available and unused borrowing capacity under the revolving line of credit was \$6.8 million as of March 31, 2022. Total revolver borrowing capacity is limited by our Maximum Leverage ratio as defined under the Credit Agreement.

On April 28, 2022, we entered into an amendment to the Credit Agreement and Pledge and Security Agreement (the "Amendment"), among the Company, the Lenders, and Citizens Bank, N.A., as the administrative agent (see Note 13- "Subsequent Events" to our Condensed Consolidated Financial Statements). We are in compliance with the covenants of the Credit Agreement, as amended by the Amendment, as of March 31, 2022.

Based on our current operating plans, we expect that our available cash, cash generated from current operations and debt capacity will be sufficient to finance current operations, any costs associated with restructuring activities and capital expenditures for at least the next 12 months. This assessment includes consideration of our best estimates of the impact of the COVID-19 pandemic on our financial results described above. Our forecast of the period of time through which our financial resources will be adequate to support our operations is a forward-looking statement that involves risks and uncertainties, and actual results could vary as a result of a number of factors.

CONDENSED CONSOLIDATED CASH FLOW STATEMENTS

(in thousands)	Three Months Ended March 31,	
	2022	2021
Cash (used in) provided by operating activities	\$ (1,986)	\$ 1,037
Cash used in investing activities	(471)	(301)
Cash provided by (used in) financing activities	94	(3,141)
Effect of exchange rate changes on cash	(25)	(97)
Decrease in cash and cash equivalents	<u>\$ (2,388)</u>	<u>\$ (2,502)</u>

Cash (used in) provided by operating activities was \$(2.0) million and \$1.0 million for the three months ended March 31, 2022 and 2021, respectively. Cash flow from operations for the three months ended March 31, 2022, was lower than the same prior year period due to higher variable compensation payments as well as increases in marketing and R&D investments as discussed above.

Cash used in investing activities was \$0.5 million and \$0.3 million for the three months ended March 31, 2022 and 2021, respectively, primarily consisting of capital expenditures in manufacturing and information technology infrastructure.

Cash provided by (used in) financing activities was \$0.1 million and \$(3.1) million for the three months ended March 31, 2022 and 2021, respectively. During the three months ended March 31, 2022, we increased total debt outstanding under our credit facility by \$0.6 million. This increase included \$0.9 million paid under the term loan and an increase in revolver borrowings of \$1.5 million. We also paid \$0.5 million for taxes related to net share settlement of equity awards. During the three months ended March 31, 2021, we repaid \$4.5 million of debt, which included a term loan installment payment of \$0.5 million and paydown of debt under our revolving facility of \$4.0 million. Net cash proceeds from the issuance of common stock associated with stock option exercises were \$1.5 million during the three months ended March 31, 2021.

Impact of Foreign Currencies

Our international operations in some instances operate in a natural hedge as we sell our products in many countries and a substantial portion of our revenues, costs and expenses are denominated in foreign currencies, especially the British pound, the euro, the Canadian dollar, and the Swedish krona.

During the three months ended March 31, 2022, changes in foreign currency exchange rates resulted in an unfavorable translation effect on our consolidated revenues of approximately \$0.5 million and a favorable effect on expenses of approximately \$0.4 million.

The loss associated with the translation of foreign equity into U.S. dollars included as a component of comprehensive loss was \$0.7 million and \$1.3 million during each of the three months ended March 31, 2022 and 2021, respectively.

In addition, currency exchange rate fluctuations included as a component of net income resulted in currency (losses) gains of \$(0.1) million and \$0.1 million during each of the three months ended March 31, 2022 and 2021, respectively.

Critical Accounting Policies

The critical accounting policies underlying the accompanying unaudited consolidated financial statements are those set forth in Part II, Item 7 included in our Annual Report on Form 10-K for the fiscal year ended December 31, 2021.

Recently Issued Accounting Pronouncements

For information on recent accounting pronouncements impacting our business, see “Recently Issued Accounting Pronouncements” included in Note 2 to our Condensed Consolidated Financial Statements included in “Part I, Item 1. Financial Statement” of this report.

Item 3. Quantitative and Qualitative Disclosures about Market Risk.

Most of our manufacturing and testing of products occurs in our facilities in the United States, Germany, Sweden and Spain. We sell our products globally through our distributors, direct sales force, websites and catalogs. As a result, our financial results are affected by factors such as changes in foreign currency exchange rates and weak economic conditions in foreign markets. In addition, we are subject to the broad market risk that is created by the global market disruptions and uncertainties resulting from the COVID-19 pandemic.

We collect amounts representing a substantial portion of our revenues and pay amounts representing a substantial portion of our operating expenses in foreign currencies. As a result, changes in currency exchange rates from time to time may affect our operating results (see “Impact of Foreign Currencies” included in “Part I, Item 2. “Management’s Discussion and Analysis of Financial Condition and Results of Operations” of this report). For example, we estimate that a 10% increase in foreign currency exchange rates during the three months ended March 31, 2022 as compared to the actual rates incurred, would have resulted in a favorable translation effect on our consolidated revenues of approximately \$0.9 million and an unfavorable effect on expenses of approximately \$0.8 million.

We are exposed to market risk from changes in interest rates primarily through our financing activities. Our Credit Facility provides for a term loan of \$40.0 million and a \$25.0 million senior revolving credit facility. Borrowings under the Credit Facility bear interest at variable rates (see Note 9 to our Condensed Consolidated Financial Statements included in “Part I, Item 1. Financial Statement” of this report). As of March 31, 2022, we had \$50.0 million outstanding under our Credit Facility with a weighted average interest rate of 3.4%.

Assuming no other changes which would affect the margin of the interest rate, the estimated effect of interest rate fluctuations on outstanding borrowings under our Credit Facility over the next twelve months from March 31, 2022, is as follows:

(in thousands)	Interest expense increase
Interest rates increase by 1%	\$ 500
Interest rates increase by 2%	\$ 1,000

Item 4. Controls and Procedures.*Evaluation of Disclosure Controls and Procedures*

As of March 31, 2022, the end of the period covered by this report, our management, including our Chief Executive Officer and our Chief Financial Officer, reviewed and evaluated the effectiveness of our disclosure controls and procedures (as defined in Rule 13a-15(e) or 15d-15(e) of the Exchange Act). Based upon management’s review and 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 were effective to provide reasonable assurance that information required to be disclosed in our Exchange Act reports is recorded, processed, summarized and reported within the time periods specified by the SEC and is accumulated and communicated to management, including the Chief Executive Officer and Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosure.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting during the first quarter of fiscal 2022 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting. We continue to monitor the impact of the COVID-19 pandemic and, despite many of our employees working remotely, have not experienced any changes that materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Limitations on Effectiveness of Controls and Procedures

In designing and evaluating our controls and procedures, management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives, and management is required to apply its judgment in evaluating the cost-benefit relationship of possible controls and procedures. 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 within the Company have been detected.

PART II. OTHER INFORMATION

Item 1 Legal Proceedings.

The information included in Note 12 and Note 13 to the Condensed Consolidated Financial Statements (Unaudited) included in Part I, Item 1 of this quarterly report is incorporated herein by reference.

Item 1A. Risk Factors.

You should carefully consider the risk factors set forth below together with the risk factors discussed in Part I, “Item 1A. Risk Factors” in our Annual Report on Form 10-K for the fiscal year ended December 31, 2021, which could materially affect our business, financial position, or future results of operations. The risks described below and in our Annual Report on Form 10-K are not the only risks we face. Additional risks and uncertainties not currently known to us or that we currently deem to be immaterial may also materially adversely affect our business, financial position, or future results of operations.

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

There were no unregistered sales of equity securities during the period covered by this report.

Item 3. Defaults Upon Senior Securities.

None.

Item 4. Mine Safety Disclosures.

Not applicable.

Item 5. Other Information.

None.

Item 6. Exhibits

- [10.1](#) [Separation Agreement and Release between Harvard Bioscience, Inc. and Ken Olson, dated as of January 26, 2022 \(previously filed as an exhibit to the Company’s Current Report on Form 8-K on January 28, 2022 and incorporated by reference thereto\).](#)
- [10.2](#) [First Amendment to Credit Agreement and Amendment to Pledge and Security Agreement, dated April 27, 2022, among Harvard Bioscience, Inc., Citizens Bank, N.A., as the administrative agent, and the lenders party thereto \(previously filed as an exhibit to the Company’s Current Report on Form 8-K on April 28, 2022 and incorporated by reference thereto\).](#)
- [31.1](#) [Certification of Chief Financial Officer of Harvard Bioscience, Inc., pursuant to Rules 13a-14\(a\) and 15d-14\(a\), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.](#)
- [31.2](#) [Certification of Chief Executive Officer of Harvard Bioscience, Inc., pursuant to Rules 13a-14\(a\) and 15d-14\(a\), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.](#)
- [32.1*](#) [Certification of Chief Financial Officer of Harvard Bioscience, Inc., 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 Chief Financial Officer of Harvard Bioscience, Inc., 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

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 Labels Linkbase Document

101.PRE Inline XBRL Taxonomy Extension Presentation Linkbase Document

104 Cover Page Interactive Data File (formatted in Inline XBRL and contained in Exhibit 101)

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

SIGNATURES

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

Date: May 4, 2022

HARVARD BIOSCIENCE, INC.

By: /s/ JAMES GREEN
James Green
Chief Executive Officer

By: /s/ MICHAEL A. ROSSI
Michael A. Rossi
Chief Financial Officer

Certification

I, Michael A. Rossi, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Harvard Bioscience, 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(s) 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(s) 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 4, 2022

/s/ MICHAEL A. ROSSI

Michael A. Rossi
Chief Financial Officer

Certification

I, James Green, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Harvard Bioscience, 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(s) 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(s) 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 4, 2022

/s/ JAMES GREEN

James Green
Chief Executive Officer

CERTIFICATION OF PERIODIC FINANCIAL REPORT PURSUANT TO 18 U.S.C. SECTION 1350

The undersigned officer of Harvard Bioscience, Inc. (the “Company”) hereby certifies to his knowledge that the Company’s Quarterly Report on Form 10-Q for the quarterly period ended March 31, 2022 (the “Report”) to which this certification is being furnished as an exhibit, as filed with the Securities and Exchange Commission on the date hereof, fully complies with the requirements of Section 13(a) or 15(d), as applicable, of the Securities Exchange Act of 1934, as amended (the “Exchange Act”), and that the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company. This certification is provided solely pursuant to 18 U.S.C. Section 1350 and Item 601(b)(32) of Regulation S-K (Item 601(b)(32)) promulgated under the Securities Act of 1933, as amended (the “Securities Act”), and the Exchange Act. In accordance with clause (ii) of Item 601(b)(32), this certification (A) shall not be deemed “filed” for purposes of Section 18 of the Exchange Act, or otherwise subject to the liability of that section, and (B) shall not be deemed to be incorporated by reference into any filing under the Securities Act or the Exchange Act, except to the extent that the Company specifically incorporates it by reference.

Date: May 4, 2022

/s/ MICHAEL A. ROSSI

Name: Michael A. Rossi
Title: Chief Financial Officer

CERTIFICATION OF PERIODIC FINANCIAL REPORT PURSUANT TO 18 U.S.C. SECTION 1350

The undersigned officer of Harvard Bioscience, Inc. (the “Company”) hereby certifies to his knowledge that the Company’s Quarterly Report on Form 10-Q for the quarterly period ended March 31, 2022 (the “Report”) to which this certification is being furnished as an exhibit, as filed with the Securities and Exchange Commission on the date hereof, fully complies with the requirements of Section 13(a) or 15(d), as applicable, of the Securities Exchange Act of 1934, as amended (the “Exchange Act”), and that the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company. This certification is provided solely pursuant to 18 U.S.C. Section 1350 and Item 601(b)(32) of Regulation S-K (Item 601(b)(32)) promulgated under the Securities Act of 1933, as amended (the “Securities Act”), and the Exchange Act. In accordance with clause (ii) of Item 601(b)(32), this certification (A) shall not be deemed “filed” for purposes of Section 18 of the Exchange Act, or otherwise subject to the liability of that section, and (B) shall not be deemed to be incorporated by reference into any filing under the Securities Act or the Exchange Act, except to the extent that the Company specifically incorporates it by reference.

Date: May 4, 2022

/s/ JAMES GREEN

Name: James Green

Title: Chief Executive Officer