

UNITED STATES SECURITIES AND EXCHANGE COMMISSION
Washington, DC 20549

FORM 10-Q

(Mark One)

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

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

For the transition period from _____ to _____

Commission File Number: 001-12584

SYNTHETIC BIOLOGICS, INC.

(Exact name of Registrant as Specified in Its Charter)

Nevada

(State or Other Jurisdiction of Incorporation or Organization)

13-3808303

(I.R.S. Employer Identification No.)

9605 Medical Center Drive, Suite 270
Rockville, MD

(Address of Principal Executive Offices)

20850

(Zip Code)

(301) 417-4364

(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	SYN	NYSE American

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	<input type="checkbox"/>	Accelerated Filer	<input type="checkbox"/>
Non-accelerated Filer	<input checked="" type="checkbox"/>	Smaller Reporting Company	<input checked="" type="checkbox"/>
		Emerging growth company	<input type="checkbox"/>

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 May 13, 2022, the registrant had 158,437,840 shares of common stock, \$0.001 par value per share, outstanding.

SYNTHETIC BIOLOGICS, INC.

NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Quarterly Report on Form 10-Q contains “forward-looking statements” within the meaning of Section 27A of the Securities Act of 1933, as amended (the “Securities Act”), and Section 21E of the Securities Exchange Act of 1934, as amended (the “Exchange Act”). In particular, statements contained in this Quarterly Report on Form 10-Q, including but not limited to, statements regarding the timing of our clinical trials, the development and commercialization of our pipeline products, the sufficiency of our cash, our ability to finance our operations and business initiatives and obtain funding for such activities and the timing of any such financing, our future results of operations and financial position, business strategy and plans prospects, or costs and objectives of management for future research, development or operations, are forward-looking statements. These forward-looking statements relate to our future plans, objectives, expectations and intentions and may be identified by words such as “may,” “will,” “should,” “expects,” “plans,” “anticipates,” “intends,” “targets,” “projects,” “contemplates,” “believes,” “seeks,” “goals,” “estimates,” “predicts,” “potential” and “continue” or similar words. Readers are cautioned that these forward-looking statements are based on our current beliefs, expectations and assumptions and are subject to risks, uncertainties, and assumptions that are difficult to predict, including those identified below, under Part II, Item 1A. “Risk Factors” and elsewhere in this Quarterly Report on Form 10-Q, and those identified under Part I, Item 1A of our [Annual Report on Form 10-K for the year ended December 31, 2021 \(the “2021 Form 10-K”\) filed with the Securities and Exchange Commission \(the “SEC”\) on March 16, 2022](#). Therefore, actual results may differ materially and adversely from those expressed, projected or implied in any forward-looking statements. We undertake no obligation to revise or update any forward-looking statements for any reason.

NOTE REGARDING COMPANY REFERENCES

Throughout this Quarterly Report on Form 10-Q, “Synthetic Biologics,” the “Company,” “we,” “us” and “our” refer to Synthetic Biologics, Inc.

NOTE REGARDING TRADEMARKS

All trademarks, trade names and service marks appearing in this Quarterly Report on Form 10-Q are the property of their respective owners.

SYNTHETIC BIOLOGICS, INC.

FORM 10-Q
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PART I—FINANCIAL INFORMATION

ITEM 1. FINANCIAL STATEMENTS (UNAUDITED)

Synthetic Biologics, Inc. and Subsidiaries
Condensed Consolidated Balance Sheets
(In thousands except share and par value amounts)

	March 31, 2022	December 31, 2021
Assets		
Current Assets		
Cash and cash equivalents	\$ 56,692	\$ 67,325
Prepaid expenses and other current assets	2,863	1,533
Total Current Assets	59,555	68,858
Non-Current Assets		
Property and equipment, net	302	101
Restricted cash	103	
Right of use asset	1,338	1,383
In-process research and development	21,869	—
Goodwill	5,809	—
Deposits and other assets	23	23
Total Assets	\$ 88,999	\$ 70,365
Liabilities and Stockholders' Equity		
Current Liabilities:		
Accounts payable	\$ 1,354	\$ 524
Accrued expenses	1,535	1,928
Accrued employee benefits	423	978
Contingent consideration, current portion	7,470	—
Loans Payable-current	68	—
Operating lease liability	126	124
Total Current Liabilities	10,976	3,554
Non-current Liabilities		
Non-current contingent consideration	4,688	—
Loan Payable - Long term	229	—
Deferred tax liabilities, net	3,728	—
Lease liability - Long term	1,351	1,403
Total Liabilities	20,972	4,957
Commitments and Contingencies		
Stockholders' Equity (Deficit):		
Common stock, \$0.001 par value; 200,000,000 shares authorized, 158,440,168 issued and 158,437,840 outstanding at March 31, 2022 and 132,044,866 issued and 132,042,538 outstanding at December 31, 2021	158	132
Additional paid-in capital	343,245	336,560
Accumulated other comprehensive loss	181	—
Accumulated deficit	(275,557)	(271,284)
Total Stockholders' Equity	68,027	65,408
Total Liabilities and Stockholders' Equity	\$ 88,999	\$ 70,365

See accompanying notes to unaudited condensed consolidated financial statements.

Synthetic Biologics, Inc. and Subsidiaries
Condensed Consolidated Statements of Operations and Comprehensive Loss
(In thousands, except share and per share amounts)
(Unaudited)

	For the three months ended March 31,	
	2022	2021
Operating Costs and Expenses:		
General and administrative	\$ 1,655	\$ 1,419
Research and development	2,597	1,118
Total Operating Costs and Expenses	4,252	2,537
Loss from Operations	(4,252)	(2,537)
Other Expense:		
Exchange loss	(23)	—
Interest income	2	—
Total Other Expense	(21)	—
Net Loss	(4,273)	(2,537)
Net Loss Attributable to Non-controlling Interest	—	(1)
Net Loss Attributable to Synthetic Biologics, Inc. and Subsidiaries	\$ (4,273)	\$ (2,536)
Series A Preferred Stock Dividends	—	(24)
Effect of Series A Preferred Stock price adjustment	—	(7,402)
Series B Preferred Stock Dividends	—	(1,497)
Net Loss Attributable to Common Stockholders	\$ (4,273)	\$ (11,459)
Net Loss Per Share - Basic and Dilutive	\$ (0.03)	\$ (0.13)
Weighted average number of shares outstanding during the period - Basic and Dilutive	138,201,442	90,807,693
Net Loss	(4,273)	(2,537)
Loss on foreign currency translation	(181)	—
Total comprehensive loss	(4,454)	(2,537)
Comprehensive loss attributable to non-controlling interest	—	(1)
Comprehensive loss attributable to Synthetic Biologics, Inc. and Subsidiaries	\$ (4,454)	\$ (2,536)

See accompanying notes to unaudited condensed consolidated financial statements.

Synthetic Biologics, Inc. and Subsidiaries
Condensed Consolidated Statements of Stockholders Equity (Deficit)
(In thousands, except share and par value amounts)

	Common Stock \$0.001 Par Value		Series B Preferred		APIC	Accumulated Deficit	Accumulated Other Comprehensive income	Total Stockholders' Equity
	Shares	Amount	Shares	Amount				
Balance at December 31, 2021	132,042,538	\$ 132	—	\$ —	\$ 336,560	\$ (271,284)	\$ —	\$ 65,408
Stock-based compensation	—	—	—	—	112	—	—	112
Issuance of Common Stock for VCN Acquisition	26,395,303	26	—	—	6,573	—	—	6,599
Translation gains (losses)	—	—	—	—	—	—	181	181
Net loss	—	—	—	—	—	(4,273)	—	(4,273)
Balance at March 31, 2022	158,437,841	\$ 158	—	\$ —	\$ 343,245	\$ (275,557)	\$ 181	\$ 68,027

	Common Stock \$0.001 Par Value		Series B Preferred		APIC	Accumulated Deficit	Non-Controlling Interest	Total Stockholders' Deficit
	Shares	Amount	Shares	Amount				
Balance at December 31, 2020	29,249,925	\$ 29	3,973	\$ 2,477	\$ 240,821	\$ (248,094)	\$ (2,773)	\$ (7,540)
Stock-based compensation	—	—	—	—	101	—	—	101
Stock issued under "at-the-market" offering	78,685,315	79	—	—	65,881	—	—	65,960
Warrants Exercised	11,655,747	12	—	—	8,030	—	—	8,042
Series A Preferred Stock Dividends	—	—	—	—	—	(24)	—	(24)
Effect of Series A Preferred Stock price adjustment	—	—	—	—	7,402	(7,402)	—	—
Conversion of Series A Preferred Stock to Common	8,996,768	9	—	—	12,813	—	—	12,822
Conversion of Series B Preferred Stock to Common	3,454,783	3	(3,973)	(2,477)	3,971	(1,497)	—	—
Net loss	—	—	—	—	—	(2,536)	—	(2,536)
Non-controlling interest	—	—	—	—	—	—	(1)	(1)
Balance at March 31, 2021	132,042,538	\$ 132	—	\$ —	\$ 339,019	\$ (259,553)	\$ (2,774)	\$ 76,824

See accompanying notes to unaudited condensed consolidated financial statements.

Synthetic Biologics, Inc. and Subsidiaries
Condensed Consolidated Statements of Cash Flows
(In thousands)
(Unaudited)

	For the Three Months Ended March 31,	
	2022	2021
Cash Flows From Operating Activities:		
Net loss	\$ (4,273)	\$ (2,537)
Adjustments to reconcile net loss to net cash used in operating activities:		
Stock-based compensation	112	101
Depreciation	18	33
Changes in operating assets and liabilities:		
Prepaid expenses and other current assets	390	(42)
Right of use asset	45	39
Accounts payable	13	(265)
Accrued expenses	(513)	(71)
Accrued employee benefits	(645)	(518)
Lease liability	(49)	(68)
Net Cash Used In Operating Activities	(4,902)	(3,328)
Cash Flows from Investing Activities		
Purchase of property and equipment	—	(14)
Cash paid for business combination, net of cash acquired	(3,863)	—
Pre-acquisition loan to VCN	(417)	—
Net Cash Used in Investing Activities	(4,280)	(14)
Cash Flows from Financing Activities		
Payment of VCN's CDTI loan	(1,376)	—
Proceeds from "at the market" stock issuance	—	65,960
Proceeds from issuance of common stock for warrant exercises	—	8,042
Net Cash Provided by Financing Activities	(1,376)	74,002
Effects of FX on cash	28	—
Net increase (decrease) in cash and cash equivalents and restricted cash	(10,530)	70,660
Cash and cash equivalents and restricted at the beginning of this period	67,325	6,227
Cash and cash equivalents and restricted cash at the end of this period	\$ 56,795	\$ 76,887
Reconciliation of cash, cash equivalents, and restricted cash reported in the statement of financial position		
Cash and cash equivalents	\$ 56,692	\$ 76,887
Restricted cash included in other long-term assets	103	—
Total cash, cash equivalents, and restricted cash shown in the statement of cash flows	\$ 56,795	\$ 76,887
Supplemental non-cash investing and financing activities:		
Fair value of contingent consideration in a business combination	\$ 12,158	\$ —
Fair value of equity issued as consideration in a business combination	\$ 6,599	\$ —
Effective settlement of pre-closing VCN financing	\$ 417	\$ —
Effect of Series A Preferred Stock price adjustment	\$ —	\$ 7,402
Conversion of Series B Preferred Stock	\$ —	\$ 2,477
Deemed dividends for accretion of Series B Preferred Stock discount	\$ —	\$ 1,497
In-kind dividends paid in preferred stock	\$ —	\$ 23

See accompanying notes to unaudited condensed consolidated financial statements.

Synthetic Biologics, Inc. and Subsidiaries
Notes to Condensed Consolidated Financial Statements
(Unaudited)

1. Organization, Nature of Operations and Basis of Presentation

Description of Business

Synthetic Biologics, Inc. (the “Company” or “Synthetic Biologics”) is a diversified clinical-stage company developing therapeutics in areas of high unmet need. Prior to the Acquisition of VCN, the Company’s focus was on developing therapeutics designed to treat gastrointestinal (GI) diseases in areas which included our lead clinical development candidates: (1) SYN-004 (ribaxamase) which is designed to degrade certain commonly used intravenous (IV) beta-lactam antibiotics within the GI tract to prevent microbiome damage, *Clostridioides difficile* infection (CDI), overgrowth of pathogenic organisms, the emergence of antimicrobial resistance (AMR), and acute graft-versus-host-disease (aGVHD) in allogeneic hematopoietic cell transplant (HCT) recipients, and (2) SYN-020, a recombinant oral formulation of the enzyme intestinal alkaline phosphatase (IAP) produced under cGMP conditions and intended to treat both local GI and systemic diseases. Upon consummation of the Acquisition of VCN, described in more detail below, the Company is transitioning its strategic focus to oncology through the development of VCN’s new oncolytic adenovirus platform designed for intravenous and intravitreal delivery to trigger tumor cell death, improve access of co-administered cancer therapies to the tumor, and promote a robust and sustained anti-tumor response by the patient’s immune system.

Basis of Presentation

The accompanying condensed consolidated financial statements have been prepared pursuant to the rules and regulations of the Securities and Exchange Commission (“SEC”) for interim financial information. Accordingly, they do not include all of the information and notes required by Accounting Principles Generally Accepted in the United States of America (“U.S. GAAP”) for complete financial statements. The accompanying condensed consolidated financial statements include all adjustments, comprised of normal recurring adjustments, considered necessary by management to fairly state the Company’s results of operations, financial position and cash flows. The operating results for the interim periods are not necessarily indicative of results that may be expected for any other interim period or for the full year. These condensed consolidated financial statements should be read in conjunction with the consolidated financial statements and notes thereto included in the Company’s 2021 Form 10-K. The interim results for the three months ended March 31, 2022 are not necessarily indicative of results for the full year.

The condensed consolidated financial statements are prepared in conformity with U.S. GAAP, which requires the use of estimates, judgments and assumptions that affect the amounts of assets and liabilities at the reporting date and the amounts of revenue and expenses in the periods presented. The Company believes that the accounting estimates employed are appropriate and the resulting balances are reasonable; however, due to the inherent uncertainties in making estimates, actual results may differ from the original estimates, requiring adjustments to these balances in future periods. As of March 31, 2022 the Company has one operating segment (which includes the legacy Company business and the VCN business) and therefore one reporting segment.

Business Combination

The Company accounts for acquisitions using the acquisition method of accounting, which requires that all identifiable assets acquired, and liabilities assumed be recorded at their estimated fair values. The excess of the fair value of purchase consideration over the fair values of identifiable assets and liabilities is recorded as goodwill. When determining the fair values of assets acquired and liabilities assumed, management makes significant estimates and assumptions. Critical estimates in valuing certain intangible assets include but are not limited to future expected cash flows from acquired patented technology. Management’s estimates of fair value are based upon assumptions believed to be reasonable, but are inherently uncertain and unpredictable and, as a result, actual results may differ from estimates.

Synthetic Biologics, Inc. and Subsidiaries
Notes to Condensed Consolidated Financial Statements

1. Organization, Nature of Operations and Basis of Presentation – (continued)

As a result of the acquisition of VCN (see Note 2), the Company has two intangible assets, in-process research and development (“IPR&D”) and goodwill. The IPR&D and goodwill are deemed to have indefinite lives and therefore not amortized.

IPR&D

IPR&D assets represent the fair value assigned to technologies that the Company acquires, which at the time of acquisition have not reached technological feasibility and have no alternative future use. IPR&D assets are considered to have indefinite-lives until the completion or abandonment of the associated research and development projects. If and when development is complete, which generally occurs upon regulatory approval and the ability to commercialize products associated with the IPR&D assets, these assets are then deemed to have definite lives and are amortized based on their estimated useful lives at that point in time. If development is terminated or abandoned, the Company may have a full or partial impairment charge related to the IPR&D assets, calculated as the excess of carrying value of the IPR&D assets over fair value.

During the period that the assets are considered indefinite-lived, they are tested for impairment on an annual basis on October 1, or more frequently if the Company becomes aware of any events occurring or changes in circumstances that could indicate an impairment. The impairment test consists of a comparison of the estimated fair value of the IPR&D with its carrying amount. If the carrying amount exceeds the fair value, an impairment charge is recognized in an amount equal to that excess. No impairment of the IPR&D asset was identified during the March 2022 period after the acquisition.

Goodwill

The Company tests the carrying amounts of goodwill for recoverability on an annual basis on October 31 or more frequently if events or changes in circumstances indicate that the asset might be impaired. The Company performs a one-step test in its evaluation of the carrying value of goodwill if qualitative factors determine it is necessary to complete a goodwill impairment test. In the evaluation, the fair value of the relevant reporting unit is determined and compared to its carrying value. If the fair value is greater than the carrying value, then the carrying value is deemed to be recoverable, and no further action is required. If the fair value estimate is less than the carrying value, goodwill is considered impaired for the amount by which the carrying amount exceeds the reporting unit’s fair value, and a charge is reported in impairment of goodwill in the Company’s consolidated statements of operations. As of March 31, 2022, the Company has determined that it has one reporting unit. The Company has not identified any events or changes in circumstances that indicate the existence of potential impairment of goodwill during the three months ended March 31, 2022.

Contingent Consideration

Consideration paid in a business combination may include potential future payments that are contingent upon the acquired business achieving certain milestones in the future (“contingent consideration”). Contingent consideration liabilities are measured at their estimated fair value as of the date of acquisition, with subsequent changes in fair value recorded in the consolidated statements of operations. The Company estimates the fair value of the contingent consideration as of the acquisition date using the estimated future cash outflows based on the probability of meeting future milestones. The milestone payments will be made upon the achievement of clinical and commercialization milestones as well as single low digit royalty payments and payments upon receipt of sublicensing income. Subsequent to the date of acquisition, the Company reassesses the actual consideration earned and the probability-weighted future earn-out payments at each balance sheet date. Any adjustment to the contingent consideration liability will be recorded in the consolidated statements of operations. Contingent consideration liabilities expected to be settled within 12 months after the balance sheet date are presented in current liabilities, with the non-current portion recorded under long term liabilities in the consolidated balance sheets.

Synthetic Biologics, Inc. and Subsidiaries
Notes to Condensed Consolidated Financial Statements

1. Organization, Nature of Operations and Basis of Presentation – (continued)

Recent Accounting Pronouncements and Developments

In August 2020, the Financial Accounting Standards Board (“FASB”) issued Accounting Standards Update (“ASU”) 2020-06 *Debt – Debt with Conversion and Other Options (Subtopic 470-20) and Derivatives and Hedging – Contracts in Entity’s Own Equity (subtopic 815-40): Accounting for Convertible Instruments and Contracts in an Entity’s Own Equity*. This ASU amends the guidance on convertible instruments and the derivatives scope exception for contracts in an entity’s own equity and improves and amends the related earnings per share guidance for both Subtopics. The ASU will be effective for annual reporting periods after December 15, 2023 and interim periods within those annual periods and early adoption is permitted in annual reporting periods ending after December 15, 2020. The Company is currently assessing the impact of ASU 2020-06 on its consolidated financial statements.

Impairment of Long-Lived Assets

Long-lived assets include property, equipment and right-of-use assets. In accordance with ASC 360, *Property, Plant and Equipment* (“ASC 360”), management reviews the Company’s long-lived assets for impairment annually or whenever events or changes in circumstances indicate that the carrying amount of an asset may not be fully recoverable. The Company determines the extent to which an asset may be impaired based upon its expectation of the asset’s future usability as well as whether there is reasonable assurance that the future cash flows associated with the asset will be in excess of its carrying amount. If the total of the expected undiscounted future cash flows is less than the carrying amount of the asset, a loss is recognized for the difference between the fair value and the carrying value of the asset. As a result, no impairment charges were recorded during the three months ended March 31, 2022 and 2021.

2. BUSINESS COMBINATION

Summary

On March 10, 2022, the Company completed the acquisition of all the outstanding shares of VCN Biosciences S.L. (the “VCN Shares”) from the shareholders of VCN. VCN is a private, clinical-stage biopharmaceutical company developing new oncolytic adenoviruses for the treatment of cancer. VCN’s lead product candidate, VCN-01, is being studied in clinical trials for pancreatic cancer and retinoblastoma. VCN-01 is designed to be administered systemically, intratumorally or intravitreally, either as a monotherapy or in combination with standard of care, to treat a wide variety of cancer indications. VCN-01 is designed to replicate selectively and aggressively within tumor cells, and to degrade the tumor stroma barrier that serves as a significant physical and immunosuppressive barrier to cancer treatment. Degrading the tumor stroma has been shown to improve access to the tumor by the virus and additional therapies such as chemo- and immuno-therapies. Importantly, degrading the stroma exposes tumor antigens, turning “cold” tumors “hot” and enabling a sustained anti-tumor immune response. VCN has the rights to four exclusive patents for proprietary technologies, as well as technologies developed in collaboration with the Virotherapy Group of the Catalan Institute of Oncology (ICO-IDIBELL) and with Hospital Sant Joan de Deu (HSJD), with a number of additional patents pending. As consideration for the purchase of the VCN Shares, the Company paid \$4,700,000 to Grifols Innovation and New Technologies Limited the owner of approximately 86% of the equity of VCN, and issued to the remaining sellers and certain key employees and consultants of VCN 26,395,303 shares of its common stock. In addition to the consideration described above, under the terms of the Purchase Agreement, the Company assumed up to \$2,400,000 of existing liabilities of VCN and has agreed to make cash payments of up to \$70.25 million to Grifols upon the achievement of certain clinical and commercialization milestones.

In anticipation of the Acquisition, prior to the Closing, the Company loaned VCN \$417,000 to help finance the costs of certain of VCN’s research and development activities. At the Closing, VCN and Grifols entered into a sublease agreement for the sublease by VCN of laboratory and office space as well as a transitional services agreement. As a Purchase post-Closing covenant, Synthetic has agreed to commit to fund VCN’s research and development programs, including but not limited to VCN01 in a pancreatic ductal adenocarcinoma PDAC phase 2 trial, VCN01 in a retinoblastoma (RB) phase 2/3 trial and necessary G&A within a budgetary plan of approximately \$27.8 million.

Synthetic Biologics, Inc. and Subsidiaries
Notes to Condensed Consolidated Financial Statements

2. BUSINESS COMBINATION - (continued)

As of March 31, 2022, the fair value of the contingent consideration was \$12.2 million. Total consideration including cash, restricted shares and contingent consideration was valued at \$23.9 million.

Purchase consideration consisted of the following:

Cash paid at Closing	\$	4,700
Receivable from VCN "effectively settled"		417
FV of common shares issued		6,599
FV of contingent consideration		12,159
	\$	<u>23,874</u>

We acquired VCN due to its proven track record of being a research and development growth engine capable of fueling sustainable growth, to expand our research and development pipeline, and to diversify our potential future revenue opportunities.

The preliminary allocation of the fair value of the VCN acquisition is shown in the table below.

	<u>Estimated fair value</u> <u>(\$ in thousands)</u>
Cash and cash equivalents	\$ 837
Receivables	1,707
Property and equipment	216
In-process research and development intangible asset	21,703
Goodwill	5,765
Other assets	—
Deferred tax assets (liabilities), net	(3,699)
Accounts payable	(814)
Accrued expenses	(113)
Accrued employee benefits	(90)
Loan Payable-current	(67)
Other long-term liabilities	(1,570)
Total purchase consideration	<u>\$ 23,875</u>

The above allocation of the purchase price is based upon certain preliminary valuations and other analyses that have not been finalized as of the date of this filing. Any changes in the estimated fair values of the purchase consideration and of the net assets recorded for this business combination upon the finalization of more detailed analyses of the facts and circumstances that existed at the date of the transaction may change the amount and allocation of the purchase price. As such, the purchase price amount and allocations for this transaction are preliminary estimates including in-process research and development, goodwill and contingent consideration, which may be subject to change within the measurement period.

The net assets were recorded at their estimated fair value. In valuing acquired assets and liabilities, fair value estimates were based primarily on future expected cash flows, market rate assumptions for contractual obligations, and appropriate discount rates. In connection with the acquisition, we recognized \$21.7 million of indefinite-lived in-process research and development intangible assets.

Goodwill is considered an indefinite-lived asset and relates primarily to intangible assets that do not qualify for separate recognition, such as the assembled workforce and synergies between the entities. Goodwill of \$5.8 million was established as a result of the Acquisition.

VCN operations recorded a net loss of \$197,000 from the date of acquisition through March 31, 2022.

Synthetic Biologics, Inc. and Subsidiaries
Notes to Condensed Consolidated Financial Statements

2. BUSINESS COMBINATION - (continued)***Pro Forma Consolidated Financial Information (unaudited)***

The following unaudited pro forma consolidated financial information summarizes the results of operations for the periods indicated as if the VCN acquisition had been completed as of January 1, 2021.

(in thousands)	Quarter Ended March 31,	
	2022	2021
Net revenues	\$ —	\$ —
Net loss	\$ (4,796)	\$ (2,699)

Transaction Costs

In conjunction with the Acquisition, the Company incurred approximately \$1.2 million and 0.2 million in 2021 and 2022, respectively, in transaction costs, which were expensed as general, and administrative expense in the consolidated statement of operations.

3. Goodwill and Intangibles

Goodwill of \$5.8 million and in-process R&D of \$21.7 million were recorded in connection with the acquisition of VCN, as described in Note 2. The Company will perform an annual impairment test unless condition exist where an interim impairment analysis is necessary. This analysis requires significant judgments, including primarily the estimation of future development costs, the probability of success in various phases of its development programs, potential post-launch cash flows and a risk-adjusted weighted average cost of capital.

The following table provides the Company's goodwill as of March 31, 2022. There was no goodwill impairment during the quarter ended March 31, 2022.

	Goodwill
Balance at December 31, 2021	\$ —
Goodwill from Acquisition of VCN	5,765
Goodwill impairment loss	—
Effects of exchange rates	44
Balance at March 31, 2022	<u>\$ 5,809</u>

The following table provides the Company's in-process R&D as of March 31, 2022. There was no change in in-process R&D during the quarter ended March 31, 2022.

	In-process R&D
Balance at December 31, 2021	\$ —
Acquired IPR&D -	21,703
In-process R&D impairment loss	—
Effects of exchange rates	166
Balance at March 31, 2022	<u>\$ 21,869</u>

Synthetic Biologics, Inc. and Subsidiaries
Notes to Condensed Consolidated Financial Statements

4. Fair Value of Financial Instruments

Accounting Standards Codification (“ASC”) Topic 820, *Fair Value Measurement*, defines fair value as the amount that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants. As such, fair value is determined based upon assumptions that market participants would use in pricing an asset or liability. Fair value measurements are rated on a three-tier hierarchy as follows:

- **Level 1 inputs:** Quoted prices (unadjusted) for identical assets or liabilities in active markets;
- **Level 2 inputs:** Inputs, other than quoted prices, included in Level 1 that are observable either directly or indirectly; and
- **Level 3 inputs:** Unobservable inputs for which there is little or no market data, which require the reporting entity to develop its own assumptions.

In many cases, a valuation technique used to measure fair value includes inputs from multiple levels of the fair value hierarchy described above. The lowest level of significant input determines the placement of the entire fair value measurement in the hierarchy.

The carrying amounts of the Company’s short-term financial instruments, including cash and cash equivalents, other current assets, accounts payable and accrued liabilities approximate fair value due to the relatively short period to maturity for these instruments.

In connection with the acquisition of VCN, we may pay up to \$70.2 million in additional consideration related to the achievement of certain milestones, including regulatory filings completed noted in Note 3. The discounted cash flow method used to value this contingent consideration includes inputs of not readily observable market data, which are Level 3 inputs. As of the March 10, 2022 acquisition date, the contingent consideration had a fair value of \$12.2 million. The fair value of the contingent consideration was \$12.2 million as of March 31, 2022 and is reflected as current accrued contingent consideration of \$7.5 million and non-current contingent consideration liability of \$4.7 million in the consolidated balance sheet.

The fair value of financial instruments measured on a recurring basis is as follows:

Description	As of March 10, 2022			
	Total	Level 1	Level 2	Level 3
Liabilities:				
Contingent consideration	\$ 12,159	—	—	\$ 12,159

Description	As of March 31, 2022			
	Total	Level 1	Level 2	Level 3
Liabilities:				
Contingent consideration	\$ 12,159	—	—	\$ 12,159

Synthetic Biologics, Inc. and Subsidiaries
Notes to Condensed Consolidated Financial Statements

4. Fair Value of Financial Instruments – (continued)

The recurring Level 3 fair value measurements of contingent consideration for which a liability is recorded include the following significant unobservable inputs:

		As of March 10, 2022	
Contingent Consideration	Valuation Methodology	Significant Unobservable Input	Weighted Average (range, if applicable)
	Probability weighted income approach	Milestone dates	2022-2027
		Discount rate	7.3% to 8.6%
		Weighted Average Discount rate	7.77%
		Probability of Occurrence (periodic for each Milestone)	9.9% to 82.4%
		Probability of occurrence (cumulative through each Milestone)	5.1% to 62.8%
		As of March 31, 2022	
Contingent Consideration	Valuation Methodology	Significant Unobservable Input	Weighted Average (range, if applicable)
	Probability weighted income approach	Milestone dates	2022-2027
		Discount rate	7.1% to 8.7%
		Weighted Average Discount rate	7.78%
		Probability of Occurrence (periodic for each Milestone)	9.9% to 82.4%
		Probability of occurrence (cumulative through each Milestone)	5.1% to 62.8%

5. Selected Balance Sheet Information

Prepaid expenses and other current assets (in thousands)

	March 31, 2022	December 31, 2021
Receivable from prior owner	\$ 1,594	\$ —
Prepaid insurances	557	803
Prepaid clinical research organizations	266	458
Prepaid consulting, subscriptions and other expenses	217	272
VAT receivable	127	—
Prepaid manufacturing expenses	102	—
Total	<u>\$ 2,863</u>	<u>\$ 1,533</u>

Prepaid clinical research organizations (CROs) expense is classified as a current asset. The Company makes payments to the CROs based on agreed upon terms that include payments in advance of study services. Receivable from prior VCN owner includes amounts due related to research and development tax rebates, VAT and corporate taxes.

Synthetic Biologics, Inc. and Subsidiaries
Notes to Condensed Consolidated Financial Statements

5. Selected Balance Sheet Information – (continued)*Property and equipment, net (in thousands)*

	March 31, 2022	December 31, 2021
Computers and office equipment	\$ 1,348	\$ 827
Leasehold improvements	94	94
Software	15	11
	1,456	932
Less: accumulated depreciation and amortization	(1,154)	(831)
Total	\$ 302	\$ 101

Accrued expenses (in thousands)

	March 31, 2022	December 31, 2021
Accrued clinical consulting services	\$ 1,008	\$ 696
Accrued vendor payments	305	1,028
Accrued manufacturing costs	126	204
Vat payable	91	—
Other accrued expenses	5	—
Total	\$ 1,535	\$ 1,928

Accrued employee benefits (in thousands)

	March 31, 2022	December 31, 2021
Accrued bonus expense	\$ 225	\$ 886
Accrued vacation expense	115	92
Accrued compensation expense	83	—
Total	\$ 423	\$ 978

6. Stock-Based Compensation*Stock Incentive Plans*

On March 20, 2007, the Company's Board of Directors approved the 2007 Stock Incentive Plan (the "2007 Stock Plan") for the issuance of up to 71,429 shares of common stock to be granted through incentive stock options, nonqualified stock options, stock appreciation rights, dividend equivalent rights, restricted stock, restricted stock units and other stock-based awards to officers, other employees, directors and consultants of the Company and its subsidiaries. This plan was approved by the stockholders on November 2, 2007. The exercise price of stock options under the 2007 Stock Plan was determined by the compensation committee of the Board of Directors and could be equal to or greater than the fair market value of the Company's common stock on the date the option is granted. The total number of shares of stock with respect to which stock options and stock appreciation rights may be granted to any one employee of the Company or a subsidiary during any one-year period under the 2007 stock plan shall not exceed 7,143. Options become exercisable over various periods from the date of grant and generally expire ten years after the grant date. As of March 31, 2022, there were 5,145 options issued and outstanding under the 2007 Stock Plan.

Synthetic Biologics, Inc. and Subsidiaries
Notes to Condensed Consolidated Financial Statements

6. Stock-Based Compensation – (continued)

On November 2, 2010, the Board of Directors and stockholders adopted the 2010 Stock Incentive Plan (“2010 Stock Plan”) for the issuance of up to 85,714 shares of common stock to be granted through incentive stock options, nonqualified stock options, stock appreciation rights, dividend equivalent rights, restricted stock, restricted stock units and other stock-based awards to officers, other employees, directors and consultants of the Company and its subsidiaries. On October 22, 2013, the stockholders approved and adopted an amendment to the Company’s 2010 Stock Plan to increase the number of shares of Company’s common stock reserved for issuance under the Plan from 85,714 to 171,429; on May 15, 2015, increased the number of shares from 171,429 to 228,572; on August 25, 2016, increased the number of shares from 228,572 to 400,000; on September 7, 2017, increased the number of shares from 400,000 to 500,000; on September 24, 2018 increased the number of shares from 500,000 to 1,000,000; and on September 5, 2019, increased the number of shares from 1,000,000 to 4,000,000. The exercise price of stock options under the 2010 Stock Plan is determined by the compensation committee of the Board of Directors and may be equal to or greater than the fair market value of the Company’s common stock on the date the option is granted. Options become exercisable over various periods from the date of grant and expire between five and ten years after the grant date. As of March 31, 2022, there were 2,434,237 options issued and outstanding under the 2010 Stock Plan.

On September 17, 2020, the stockholders approved and adopted the 2020 Stock Incentive Plan (“2020 Stock Plan”) for the issuance of up to 4,000,000 shares of Common Stock to be granted through incentive stock options, nonqualified stock options, stock appreciation rights, dividend equivalent rights, restricted stock, restricted stock units and other stock-based awards to officers, other employees, directors and consultants of the Company and its subsidiaries. As of March 31, 2022, there were 3,668,333 options issued and outstanding under the 2010 Stock Plan.

In the event of an employee’s termination, the Company will cease to recognize compensation expense for that employee. Stock forfeitures are recognized as incurred. There is no deferred compensation recorded upon initial grant date. Instead, the fair value of the stock-based payment is recognized over the stated vesting period.

The Company has applied fair value accounting for all stock-based payment awards since inception. The fair value of each option granted is estimated on the date of grant using the Black-Scholes option pricing model. There were no options granted during the three months ended March 31, 2022 and 2021.

Expected dividends—The Company has never declared or paid dividends on its common stock and has no plans to do so in the foreseeable future.

Expected volatility—Volatility is a measure of the amount by which a financial variable such as a share price has fluctuated (historical volatility) or is expected to fluctuate (expected volatility) during a period. The expected volatility assumption is derived from the historical volatility of the Company’s common stock over a period approximately equal to the expected term.

Risk-free interest rate—The assumed risk free rate used is a zero coupon U.S. Treasury security with a maturity that approximates the expected term of the option.

Expected life of the option—The period of time that the options granted are expected to remain unexercised. Options granted during the year have a maximum term of seven years. The Company estimates the expected life of the option term based on the weighted average life between the dates that options become fully vested and the maximum life of options granted.

The Company records stock-based compensation based upon the stated vesting provisions in the related agreements. The vesting provisions for these agreements have various terms as follows:

- immediate vesting,
- in full on the one-year anniversary date of the grant date,
- half vesting immediately and the remaining over three years,

Synthetic Biologics, Inc. and Subsidiaries
Notes to Condensed Consolidated Financial Statements

6. Stock-Based Compensation – (continued)

- quarterly over three years,
- annually over three years,
- one-third immediate vesting and the remaining annually over two years,
- one-half immediate vesting and the remaining over nine months,
- one-quarter immediate vesting and the remaining over three years,
- one-quarter immediate vesting and the remaining over 33 months,
- monthly over one year, and
- monthly over three years.

Synthetic Biologics, Inc. and Subsidiaries
Notes to Condensed Consolidated Financial Statements

6. Stock-Based Compensation – (continued)

A summary of stock option activity for the three months ended March 31, 2022 and the year ended December 31, 2021 is as follows:

	Options	Weighted Average Exercise Price	Weighted Average Remaining Contractual Life	Aggregate Intrinsic Value
Balance - December 31, 2020	3,997,418	\$ 2.35	6.09 years	\$ —
Granted	2,260,000	0.33		
Exercised	—	—		
Expired	(2,143)	45.15		
Forfeited	—	—		
Balance - December 31, 2021	6,255,275	1.61	5.58 years	—
Granted	—	—		
Exercised	—	—		
Expired	(2,413)	75.60		
Forfeited	(145,417)	0.36		
Balance - March 31, 2022 - outstanding	6,107,715	\$ 1.61	5.26 years	\$ —
Balance - March 31, 2022 - exercisable	3,221,457	\$ 2.73	4.37 years	\$ —
Grant date fair value of options granted – three months ended March 31, 2022		\$ —		
Weighted average grant date fair value – three months ended March 31, 2022		\$ —		
Grant date fair value of options granted – year ended December 31, 2021		\$ 501,000		
Weighted average grant date fair value – year ended December 31, 2021		\$ 0.22		

Stock-based compensation expense included in general and administrative expenses and research and development expenses relating to stock options issued to employees for the three months ended March 31, 2022 and 2021 was \$59,000 and \$49,000, respectively. Stock-based compensation expense included in general and administrative expenses and research and development expenses relating to stock options issued to consultants for the three months ended March 31, 2022 and 2021 were \$53,000 and \$52,000, respectively.

As of March 31, 2022, total unrecognized stock-based compensation expense related to stock options was \$624,000, which is expected to be expensed through February 2024.

The FASB's guidance for stock-based payments requires cash flows from excess tax benefits to be classified as a part of cash flows from operating activities. Excess tax benefits are realized tax benefits from tax deductions for exercised options in excess of the deferred tax asset attributable to stock compensation costs for such options. The Company did not record any excess tax benefits during the three months ended March 31, 2022 and 2021.

Synthetic Biologics, Inc. and Subsidiaries
Notes to Condensed Consolidated Financial Statements

7. Stock Warrants

On October 15, 2018, the Company closed its underwritten public offering pursuant to which it received gross proceeds of approximately \$18.6 million before deducting underwriting discounts, commissions and other offering expenses payable by the Company and sold an aggregate of (i) 2,520,000 Class A Units (the “Class A Units”), with each Class A Unit consisting of one share of the Common Stock, and one five-year warrant to purchase one share of Common Stock at an initial exercise price of \$1.38 per share, which subsequently was reduced to \$0.69 per share (each a “Warrant” and collectively, the “Warrants”), with each Class A Unit to be offered to the public at a public offering price of \$1.15, and (ii) 15,723 Class B Units (the “Class B Units”, and together with the Class A Units, the “Units”), with each Class B Unit offered to the public at a public offering price of \$1,000 per Class B Unit and consisting of one share of the Company’s Series B Convertible Preferred Stock (the “Series B Preferred Stock”), with a stated value of \$1,000 and convertible into shares of Common Stock at the stated value divided by a conversion price of \$1.15 per share, with all shares of Series B Preferred Stock convertible into an aggregate of 13,672,173 shares of Common Stock, and issued with an aggregate of 13,672,173 Warrants.

On November 16, 2020, the exercise price of the Warrants was reduced from \$1.38 per Warrant per full share of the Company’s common stock, \$0.001 par value per share (the “Common Stock”), to \$0.69 per Warrant per full share of Common Stock in accordance with the anti-dilution terms of the Warrant. The reduction was the result of the issuance of shares of Common Stock by the Company through its “at the market offering” facility. The effect of the change in the exercise price of the warrants as a result of the triggering of the down round protection clause in the Warrants was recorded as a deemed dividend of \$0.9 million during the year ended December 31, 2020, which reduces the income available to common stockholders. In addition, pursuant to the underwriting agreement that the Company had entered into with A.G.P./Alliance Global Partners (the “Underwriters”), as representative of the underwriters, the Company granted the Underwriters a 45 day option (the “Over-allotment Option”) to purchase up to an additional 2,428,825 shares of Common Stock and/or additional Warrants to purchase an additional 2,428,825 shares of Common Stock. The Underwriters partially exercised the Over-allotment Option by electing to purchase from the Company additional Warrants to purchase 1,807,826 shares of Common Stock. If, at the time of exercise, there is no effective registration statement registering, or no current prospectus available for, the issuance of the shares of Common Stock to the holder, then the Warrants may only be exercised through a cashless exercise. No fractional shares of Common Stock will be issued in connection with the exercise of a Warrant. In lieu of fractional shares, the holder will receive an amount in cash equal to the fractional amount multiplied by the fair market value of any such fractional shares. The Company has concluded that the Warrants are required to be equity classified. The Warrants were valued on the date of grant using Monte Carlo simulations. During the three months ended March 31, 2021, 11,655,747 warrants were exercised for cash proceeds of \$8.0 million. There were no warrants exercised during the three months ended March 31, 2022.

A summary of all warrant activity for the Company for the quarter ended March 31, 2022 and the year ended December 31, 2021 is as follows:

	Number of Warrants	Weighted Average Exercise Price
Balance at December 31, 2020	18,000,713	0.69
Granted	—	—
Exercised	(11,655,747)	0.69
Forfeited	—	—
Balance at December 31, 2021	6,344,966	\$ 0.69
Granted	—	—
Exercised	—	—
Forfeited	—	—
Balance at March 31, 2022	6,344,966	\$ 0.69

Synthetic Biologics, Inc. and Subsidiaries
Notes to Condensed Consolidated Financial Statements

7. Stock Warrants – (continued)

On December 26, 2017, the Company entered into a consulting agreement for advisory services for a period of six months. As compensation for such services, the consultant was paid an upfront payment, a monthly fee and on January 24, 2018 was issued a warrant exercisable for 714 shares of the Company's common stock on the date of issue. The warrant is equity classified and the fair value of the warrant approximated \$9,000 and was measured using the Black-Scholes option pricing model.

A summary of all outstanding and exercisable common stock warrants as of March 31, 2022 is as follows:

Exercise Price	Warrants Outstanding	Warrants Exercisable	Weighted Average Remaining Contractual Life
\$ 0.69	6,344,252	6,344,252	1.53 years
18.20	714	714	0.74 years
\$ 0.69	6,344,966	6,344,966	1.53 years

8. Net Loss per Share

Basic net loss per share is computed by dividing net loss by the weighted average number of common shares outstanding. Diluted net loss per share is computed by dividing net loss by the weighted average number of common shares outstanding including the effect of common share equivalents. Diluted net loss per share assumes the issuance of potential dilutive common shares outstanding for the period and adjusts for any changes in income and the repurchase of common shares that would have occurred from the assumed issuance, unless such effect is anti-dilutive. Net loss attributable to common stockholders for the three months ended March 31, 2022 was \$4.3 million. Net loss attributable to common stockholders for the three months ended March 31, 2021 was \$11.5 million and excludes net loss attributable to non-controlling interest of \$0.1 million and includes the accretion of the Series B preferred discount of \$1.5 million as a result of converted shares and Series A preferred stock accrued dividends of \$0.1 million and the deemed dividend of \$7.4 million resulting from the effect of the Series A preferred stock price adjustment during the first quarter of 2021. There were no shares of common stock underlying Series B Preferred shares convertible to common stock that were excluded from the computations of net loss per common share for the three months ended March 31, 2021 since all remaining Series B preferred stock were converted to common stock in 2021. The number of options and warrants for the purchase of common stock that were excluded from the computations of net loss per common share and for the three months ended March 31, 2022 were 6,107,715 and 6,344,966, respectively and for the three months ended March 31, 2021 were 3,997,418 and 6,344,966, respectively, because their effect is anti-dilutive.

9. Non-controlling Interest and Related Party

On September 5, 2018, the Company entered into an agreement (the "Stock Purchase Agreement") with Cedars-Sinai Medical Center (CSMC) for an investigator-sponsored Phase 2b clinical study of SYN-010 to be co-funded by the Company and CSMC (the "Study"). The Study will provide further evaluation of the efficacy and safety of SYN-010, the Company's modified-release reformulation of lovastatin lactone, which is exclusively licensed to the Company by CSMC. SYN-010 is designed to reduce methane production by certain microorganisms (*M. smithii*) in the gut to treat an underlying cause of irritable bowel syndrome with constipation (IBS-C).

In consideration of the support provided by CSMC for the Study, the Company paid \$328,000 to support the Study and the Company entered into a Stock Purchase Agreement with CSMC pursuant to which the Company, upon the approval of the Study protocol by the Institutional Review Board (IRB): (i) issued to CSMC fifty thousand (50,000) shares of common stock of the Company; and (ii) transferred to CSMC an additional two million four hundred twenty thousand (2,420,000) shares of common stock of its subsidiary SYN Biomics, Inc. ("Synbiomics") owned by the Company, such that after such issuance CSMC owns an aggregate of seven million four hundred eighty thousand (7,480,000) shares of common stock of SYN Biomics, representing seventeen percent (17%) of the issued and outstanding shares of SYN Biomics' common stock. The services rendered are recorded to research and development expense in proportion with the progress of the study and based overall on the fair value of the shares (\$285,000) as determined at the date of IRB approval. There was no expense recorded related to this transaction during the three months ended March 31, 2022 and 2021.

Synthetic Biologics, Inc. and Subsidiaries
Notes to Condensed Consolidated Financial Statements

9. Non-controlling Interest and Related Party – (continued)

The Agreement also provided CSMC with a right, commencing on the six month anniversary of issuance of the stock under certain circumstances in the event that the shares of stock of SYN Biomics are not then freely tradeable, and subject to NYSE American, LLC approval, to exchange its SYN Biomics shares for unregistered shares of the Company's common stock, with the rate of exchange based upon the relative contribution of the valuation of SYN Biomics to the public market valuation of the Company at the time of each exchange. The Stock Purchase Agreement also provides for tag-along rights in the event of the sale by the Company of its shares of SYN Biomics.

On September 30, 2020, CSMC MAST formally agreed to discontinue the ongoing Phase 2b investigator-sponsored clinical study of SYN-010 following the results of a planned interim futility analysis. Although it was concluded that SYN-010 was well tolerated, SYN-010 was unlikely to meet its primary endpoint by the time enrollment is completed.

On November 9, 2020, the Company and its subsidiary, Synthetic Biomics, Inc. and CSMC mutually agreed to terminate the exclusive license agreement dated December 5, 2013 and all amendments thereto and the clinical trial agreement relating to SYN-010. The determination to terminate the SYN-010 license agreement was agreed following the completion of a planned interim futility analysis of the Phase 2b investigator-sponsored clinical trial of SYN-010. On September 30, 2020, CSMC (the Company's SYN-010 clinical development partner) informed the Company that it discontinued the ongoing Phase 2b investigator-sponsored clinical study of SYN-010 IBS-C patients. During 2021, CSMC returned its shares of SYN Biomics to the Company. The Company's interest in SYN Biomics is now 100%. This is reflected in the Consolidated Statements of Equity (Deficit).

The Company's non-controlling interest was accounted for under ASC 810, Consolidation and represents the minority stockholder's ownership interest related to the Company's subsidiary, SYN Biomics. In accordance with ASC 810, the Company reports its non-controlling interest in subsidiaries as a separate component of equity in the Consolidated Balance Sheets and reports both net loss attributable to the non-controlling interest and net loss attributable to the Company's common stockholders in the face of the Consolidated Statements of Operations.

10. Common and Preferred Stock

Series B Preferred Stock

On October 15, 2018, the Company closed its underwritten public offering pursuant to which it received gross proceeds of approximately \$18.6 million before deducting underwriting discounts, commissions and other offering expenses payable by the Company and sold an aggregate of (i) 2,520,000 Class A Units, with each Class A Unit offered to the public at a public offering price of \$1.15, and (ii) 15,723 Class B Units, with each Class B Unit offered to the public at a public offering price of \$1,000 per Class B Unit and consisting of one share of the Company's Series B Preferred Stock, with a stated value of \$1,000 and convertible into shares of Common Stock at the stated value divided by a conversion price of \$1.15 per share, with all shares of Series B Preferred Stock convertible into an aggregate of 13,672,173 shares of Common Stock, and issued with an aggregate of 13,672,173 October 2018 Warrants. Since the above units are equity instruments, the proceeds were allocated on a relative fair value basis which created the Series B Preferred Stock discount.

In addition, pursuant to the Underwriting Agreement that the Company entered into with the Underwriters on October 10, 2018, the Company granted the Underwriters a 45 day option (the "Over-allotment Option") to purchase up to an additional 2,428,825 shares of Common Stock and/or additional warrants to purchase an additional 2,428,825 shares of Common Stock. Each Warrant is exercisable for one share of common stock. The Underwriters partially exercised the Over-allotment Option by electing to purchase from the Company additional Warrants to purchase 1,807,826 shares of Common Stock.

The conversion price of the Series B Preferred Stock and exercise price of the October 2018 Warrants is subject to appropriate adjustment in the event of recapitalization events, stock dividends, stock splits, stock combinations, reclassifications, reorganizations or similar events affecting the Common Stock. The exercise price of the Warrants is subject to adjustment in the event of certain dilutive issuances.

Synthetic Biologics, Inc. and Subsidiaries
Notes to Condensed Consolidated Financial Statements

10. Common and Preferred Stock – (continued)

On November 16, 2020, the exercise price of the Warrants was reduced from \$1.38 per Warrant per full share of common stock to \$0.69 per Warrant per full share of common stock. The reduction was the result of the issuance of shares of Common Stock by the Company through its “at the market offering” facility. The effect of the change in the exercise price of the warrants as a result of the triggering of the down round protection clause in the Warrants was recorded as a deemed dividend in accumulated deficit of \$880,000, which reduces the income available to common stockholders for the year ended December 31, 2020.

The October 2018 Warrants are immediately exercisable at a price of \$0.69 effective November 16, 2020) per share of common stock (which was 120% of the public offering price of the Class A Units) and will expire on October 15, 2023. If, at the time of exercise, there is no effective registration statement registering, or no current prospectus available for, the issuance of the shares of common stock to the holder, then the October 2018 warrants may only be exercised through a cashless exercise. No fractional shares of common stock will be issued in connection with the exercise of any October 2018 warrants. In lieu of fractional shares, the holder will receive an amount in cash equal to the fractional amount multiplied by the fair market value of any such fractional shares.

Since the effective conversion price of the Series B Preferred Stock is less than the fair value of the underlying common stock at the date of issuance, there is a beneficial conversion feature (“BCF”) at the issuance date. Because the Series B Preferred Stock has no stated maturity or redemption date and is immediately convertible at the option of the holder, the discount created by the BCF is immediately charged to accumulated deficit as a “deemed dividend” and impacts earnings per share. During the three months ended March 31, 2021, 3,973 shares were converted resulting in the recognition of a deemed dividends of \$1.5 million for the amortization of the Series B Preferred Stock discount upon conversion. During the three months ended March 31, 2022 there were no shares converted as all shares were converted in 2021 and 2020.

Series A Preferred Stock

On September 11, 2017, the Company entered into a share purchase agreement (the “Purchase Agreement”) with an investor (the “Investor”), pursuant to which the Company offered and sold in a private placement 120,000 shares of its Series A Convertible Preferred Stock, par value \$0.001 per share (the “Series A Preferred Stock”) for an aggregate purchase price of \$12 million, or \$100 per share.

The Series A Preferred Stock ranks senior to the shares of the Company’s common stock, and any other class or series of stock issued by the Company with respect to dividend rights, redemption rights and rights to the distribution of assets on any voluntary or involuntary liquidation, dissolution or winding up of the affairs of the Company. Holders of Series A Preferred Stock are entitled to a cumulative dividend at the rate of 2.0% per annum, payable quarterly in arrears, as set forth in the Certificate of Designation of Series A Preferred Stock classifying the Series A Preferred Stock. The Series A Preferred Stock is convertible at the option of the holders at any time into shares of common stock at an initial conversion price of \$0.54 per share which was increased to \$18.90 after taking into account the 2018 reverse stock split, subject to certain customary anti-dilution adjustments and was decreased to \$1.50 on January 27, 2021, see below.

Any conversion of Series A Preferred Stock may be settled by the Company in shares of common stock only.

The holder’s ability to convert the Series A Preferred Stock into common stock is subject to (i) a 19.99% blocker provision to comply with NYSE American Listing Rules, (ii) if so elected by the Investor, a 4.99% blocker provision that will prohibit beneficial ownership of more than 4.99% of the outstanding shares of the Company’s common stock or voting power at any time, and (iii) applicable regulatory restrictions.

In the event of any liquidation, dissolution or winding-up of the Company, holders of the Series A Preferred Stock are entitled to a preference on liquidation equal to the greater of (i) an amount per share equal to the stated value plus any accrued and unpaid dividends on such share of Series A Preferred Stock (the “Accreted Value”), and (ii) the amount such holders would receive in such liquidation if they converted their shares of Series A Preferred Stock (based on the Accreted Value and without regard to any conversion limitation) into shares of the common stock immediately prior to any such liquidation, dissolution or winding-up (the greater of (i) and (ii), is referred to as the “Liquidation Value”).

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10. Common and Preferred Stock – (continued)

Except as otherwise required by law, the holders of Series A Preferred Stock have no voting rights, other than customary protections against adverse amendments and issuance of *pari passu* or senior preferred stock. Upon certain change of control events involving the Company, prior to the filing of the amendment to the Certificate of Designation for the Series A Preferred Stock described below, the Company will be required to repurchase all of the Series A Preferred Stock at a redemption price equal to the greater of (i) the Accreted Value and (ii) the amount that would be payable upon a change of control (as defined in the Certificate of Designation) in respect of common stock issuable upon conversion of such share of Series A Preferred Stock if all outstanding shares of Series A Preferred Stock were converted into common stock immediately prior to the change of control.

On or at any time after (i) the VWAP (as defined in the Certificate of Designation) for at least 20 trading days in any 30 trading day period is greater than \$70.00, subject to adjustment in the case of stock split, stock dividends or the like the Company has the right, after providing notice not less than 6 months prior to the redemption date, to redeem, in whole or in part, on a pro rata basis from all holders thereof based on the number of shares of Series A Preferred Stock then held, the outstanding Series A Preferred Stock, for cash, at a redemption price per share of Series A Preferred Stock of \$7,875.00, subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to the Series A Convertible Preferred Stock or (ii) the five year anniversary of the issue date, the Company shall have the right to redeem, in whole or in part, on a pro rata basis from all holders thereof based on the number of shares of Series A Convertible Preferred Stock then held, the outstanding Series A Preferred Stock, for cash, at a redemption price per share equal to the Liquidation Value.

The Series A Preferred Stock is classified as temporary equity due to the shares being redeemable based on contingent events outside of the Company's control. Since the effective conversion price of the Series A Preferred Stock is less than the fair value of the underlying common stock at the date of issuance, there is a beneficial conversion feature ("BCF") at the issuance date. Because the Series A Preferred Stock has no stated maturity or redemption date and is immediately convertible at the option of the holder, the discount created by the BCF is immediately charged to accumulated deficit as a "deemed dividend" and impacts earnings per share. During the year ended December 31, 2017, the Company recorded a discount of \$6.9 million. Because the Series A Preferred Stock is not currently redeemable, the discount arising from issuance costs was allocated to temporary equity and will not be accreted until such time that redemption becomes probable. The stated dividend rate of 2% per annum is cumulative and the Company accrues the dividend on a quarterly basis (in effect accreting the dividend regardless of declaration because the dividend is cumulative). During the three months ended March 31, 2021 and 2020, the Company accrued dividends of \$24,000 and \$62,000, respectively. Once the dividend is declared, the Company will reclassify the declared amount from temporary equity to a dividends payable liability. When the redemption of the Series A Preferred Stock becomes probable, the temporary equity will be accreted to redemption value as a deemed dividend.

On January 27, 2021, the Company filed an amendment to the Certificate of Designation for the Series A Preferred Stock to (i) lower the stated Conversion Price through September 30, 2021 and (ii) remove their change in control put, as an inducement for the holder to fully convert its Series A Preferred Stock. The Amendment to the Certificate of Designation for its Series A Convertible Preferred Stock (the "Certificate of Amendment") with the Secretary of State of the State of Nevada adjusted the conversion price from \$18.90 per share to \$1.50 per share and removed the redemption upon change of control. The Company received notice from the holder of the Series A Preferred Stock that it was increasing the Maximum Percentage as defined in the "Certificate of Designation" from 4.99% to 9.99%, such increase to be effective 61 days from the date hereof. During the three months ended March 31, 2021, all outstanding shares of Series A Convertible Preferred Stock were converted to approximately 9.0 million shares of the Company's common stock. There are no remaining shares of the Series A Convertible Preferred stock outstanding after these conversions. During January and February 2021, the Company issued 8,996,768 shares of its common stock upon the conversion effected on such date by the holder of 120,000 shares of its Series A Convertible Preferred Stock. The fair value of the consideration issued to the holder to induce conversion is accounted for as a deemed dividend and increased net loss available to common shareholders for purposes of calculating loss per share. The Company estimated fair value of the inducement consideration of \$7.4 million and as a result has recorded a corresponding deemed dividend of \$7.4 million during the three months ended March 31, 2021.

Synthetic Biologics, Inc. and Subsidiaries
Notes to Condensed Consolidated Financial Statements

10. Common and Preferred Stock – (continued)*B. Riley Securities Sales Agreement*

On August 5, 2016, the Company entered into the B. Riley FBR Sales Agreement with FBR Capital Markets & Co. (now known as B. Riley Securities), which enables the Company to offer and sell shares of common stock from time to time through B. Riley Securities, Inc. as the Company's sales agent. Sales of common stock under the B. Riley Securities Sales Agreement are made in sales deemed to be "at-the-market" equity offerings as defined in Rule 415 promulgated under the Securities Act. B. Riley Securities, Inc. is entitled to receive a commission rate of up to 3.0% of gross sales in connection with the sale of the Common Stock sold on the Company's behalf. The Company did not sell any shares of common stock during the three months ended March 31, 2022 through the Riley Securities Sales Agreement.

On February 9, 2021, the Company entered into an amended and restated sales agreement with B. Riley Securities, Inc. ("B. Riley") and A.G.P./Alliance Global Partners ("AGP") in order to include AGP as an additional sales agent for the Company's "at the market offering" program (the "Amended and Restated Sales Agreement"). The Sales Agreement amended and restated the At Market Issuance Sales Agreement, dated August 5, 2016, with B. Riley Securities, Inc. (formerly known as B. Riley FBR, Inc.), as amended by amendment no. 1, dated May 7, 2018, to the At Market Issuance Sales Agreement.

During the three months ended March 31, 2021, the Company sold through the At Market Issuance Sales Agreement and the Amended and Restated Sales Agreement approximately 78.7 million shares of the Company's common stock and received net proceeds of approximately \$66.0 million. During the three months ended March 31, 2022, there were no sales of the Company's common stock through the At Market Issuance Sales Agreement and the Amended and Restated Sales Agreement.

11. INDEBTEDNESS

As a result of the acquisition of VCN the company acquired interest-free or below-market interest rates loans (0%-1%) extended by Spanish governmental institutions of Ministerio de Ciencia , Innovacion y Universidades and ACC10 Generalitat de Catalunya (CDIT loans) The maturities of these loans are between 2027 and 2028. As a result of the VCN acquisition, the company maintains a restricted cash collateral account of \$103,000 relating to the RETOS loan, which is reflected a non-current assets on the balance sheet.

	<u>March 31, 2022</u> <u>Current</u>	<u>March 31, 2022</u> <u>Non-current</u>
<i>NEBT Loan</i>	15	\$ 40
<i>RETOS 2015</i>	53	189
	<u>\$ 68</u>	<u>\$ 229</u>

The difference between the fair value of these liabilities (when relevant conditions associated with the grants are met) and the amount received is recognized as a government grant and classified as other operating income in the statement of profit and loss.

A maturity analysis of the debt as of March 31, 2022 is as follows (*amounts in thousands of dollars*):

2023	68
2024	65
2025	63
2026	52
2027	32
2028	17
Total	<u>297</u>

Synthetic Biologics, Inc. and Subsidiaries
Notes to Condensed Consolidated Financial Statements

12. Commitments and Contingencies

The Company's existing lease as of March 31, 2022 for its U.S. location is classified as an operating lease. As of March 31, 2022, the Company has two operating lease for facilities. During the quarter ended June 30, 2021, the Company renewed its Rockville MD facility lease by entering into a Second Lease Amendment which extends the lease term for 63 months beginning on September 1, 2022 and ending on December 31, 2027 at stated rental rates and including a 3-month rent abatement. The Second Amendment also has options for a Tenant Improvement Allowance and a Second Extension Term. The Second Amendment also gives the Company the right to expand their space by giving notice to the landlord before December 31, 2021. The Company did not give notice to expand the space during 2021. The Second Extension Term is offered at market rates and there is no economic incentive for the lessee, therefore the Company has determined that it is not part of the original lease term. There is an option in this Second Amendment to Lease for the Company to borrow funds for tenant improvements subject to an 8.5% interest rate.

The Company also leases research and office facilities in Barcelona Spain for its 100 percent owned VCN subsidiary. The current lease is short term agreement with a 90-day termination notice provision that can be exercised by either party. On the closing date of the VCN acquisition, a sublease was executed for SYN to lease research and office facilities at a new location in Parets del Valles (Barcelona) from the former owner of VCN. This lease was executed for an initial term estimated to begin in January 2023 until October 2026, with an option to renew for an additional five years.

Operating lease costs are presented as part of general and administrative expenses in the condensed consolidated statements of operations, and for the quarter ended March 31, 2022 and 2021 approximated \$107,000 and \$51,000, respectively. For the quarter ended March 31, 2022 and 2021, operating cash flows used for operating leases approximated \$112,000 and \$79,000, respectively, and the right of use assets exchanged for operating the lease obligation was \$1.3 million. The day one non-cash addition of right of use assets due to adoption of ASC 842 was \$538,000.

A maturity analysis of our operating leases as of March 31, 2022 is as follows (*amounts in thousands of dollars*):

Future undiscounted cash flow for the years ending March 31,	
2022	165
2023	327
2024	337
2025	347
2026	357
2027	368
Total	1,901
Discount factor	(424)
Lease liability	1,477
Lease liability – current	(126)
Lease liability – long term	\$ 1,351

Risks and Uncertainties

On January 30, 2020, the World Health Organization (“WHO”) announced a global health emergency because of COVID-19 and the risks to the international community as the virus spreads globally beyond its point of origin. In March 2020, the WHO classified the COVID-19 outbreak as a pandemic, based on the rapid increase in exposure globally.

Synthetic Biologics, Inc. and Subsidiaries
Notes to Condensed Consolidated Financial Statements

12. Commitments and Contingencies – (continued)

As COVID-19 continued to spread around the globe, the Company experienced disruptions that impacted its business and clinical trials, including the postponement of clinical site initiation of the Phase 1b/2a clinical trial of SYN-004. The extent to which the COVID-19 pandemic impacts the Company's business, the clinical development of SYN-004 (ribaxamase) and SYN-020, the business of the Company's suppliers and other commercial partners, the Company's corporate development objectives and the value of and market for the Company's common stock, will depend on future developments that are highly uncertain and cannot be predicted with confidence at this time, especially in light of the new variants, such as the ultimate duration of the pandemic, travel restrictions, quarantines, social distancing and business closure requirements in the United States, Europe and other countries, and the effectiveness of actions taken globally to contain and treat the disease. The global economic slowdown, the overall disruption of global healthcare systems and the other risks and uncertainties associated with the pandemic could have a material adverse effect on the Company's business, financial condition, results of operations and growth prospects. In addition, to the extent the ongoing COVID-19 pandemic adversely affects the Company's business and results of operations, it may also have the effect of heightening many of the other risks and uncertainties which the Company faces.

Through the VCN Acquisition, the Company has operations in Spain and may conduct research and development, manufacturing, and clinical trials in Western European countries. The invasion of Ukraine by Russia and the retaliatory measures that have been taken, or could be taken in the future, by the United States, NATO, and other countries have created global security concerns that could result in a regional conflict and otherwise have a lasting impact on regional and global economies, any or all of which could disrupt our supply chain, and despite the fact that we currently do not plan any clinical trials in Eastern Europe, may adversely impact the cost and conduct of R&D, manufacturing, and international clinical trials of our product candidates.

ITEM 2. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS.

The following discussion should be read in conjunction with our unaudited condensed consolidated financial statements and notes thereto included in this Quarterly Report on Form 10-Q, and our audited consolidated financial statements and notes thereto for the year ended December 31, 2021 included in our 2020 Form 10-K. This discussion contains forward-looking statements reflecting our current expectations that involve risks and uncertainties. See "Note Regarding Forward-Looking Statements" for a discussion of the uncertainties, risks and assumptions associated with these statements. Our actual results and the timing of events could differ materially from those expressed or implied by the forward-looking statements due to important factors and risks including, but not limited to, those set forth below under "Risk Factors" and elsewhere herein, and those identified under Part I, Item 1A of our 2021 Form 10-K.

Overview

We are a diversified clinical-stage company developing therapeutics in areas of high unmet need. Prior to the Acquisition of VCN, our focus was on developing therapeutics designed to treat gastrointestinal (GI) diseases which included our lead clinical development candidates: (1) SYN-004 (ribaxamase) which is designed to degrade certain commonly used intravenous (IV) beta-lactam antibiotics within the GI tract to prevent microbiome damage, *Clostridioides difficile* infection (CDI), overgrowth of pathogenic organisms, the emergence of antimicrobial resistance (AMR), and acute graft-versus-host-disease (aGVHD) in allogeneic hematopoietic cell transplant (HCT) recipients, and (2) SYN-020, a recombinant oral formulation of the enzyme intestinal alkaline phosphatase (IAP) produced under cGMP conditions and intended to treat both local GI and systemic diseases. Upon consummation of the Acquisition of VCN, described in more detail below, we are transitioning our strategic focus to oncology, through the development of new oncolytic adenovirus products designed for intravenous and intravitreal delivery to trigger tumor cell death, improve access of co-administered cancer therapies to the tumor, and promote a robust and sustained anti-tumor response by the patient's immune system.

As part of our strategic transformation into an oncology focused company, we are exploring value creation options around our SYN-020 and SYN-004 assets. SYN-004 and SYN-020 both have significant potential opportunity in non-oncology related indications. Advancement of these products may be better achieved through out-licensing or partnering and we will explore opportunities for both SYN-004 and SYN-020 moving forward.

Acquisition of VCN Biosciences, S.L

On March 10, 2022, pursuant to the terms of the Share Purchase Agreement ("Purchase Agreement") we entered into with VCN and the shareholders of VCN Biosciences S.L. (the "Sellers"), we completed our acquisition of all the outstanding shares of VCN (the "VCN Shares") from the shareholders of VCN. Pursuant to the Purchase Agreement, as consideration for the purchase of the VCN Shares of capital stock, we paid \$4,700,000 (the "Closing Cash Consideration") to Grifols Innovation and New Technologies Limited ("Grifols"), the owner of approximately 86% of the equity of VCN, and issued to the remaining Sellers 26,395,303 shares of our common stock, \$0.01 par value (the "Closing Shares"), representing 19.99% of the outstanding shares of our common stock on December 14, 2021, the date of the Purchase Agreement. As additional consideration for the purchase of the VCN Shares held by Grifols, we also agreed to make certain milestone payments to Grifols. Pursuant to the terms of the Purchase Agreement we loaned VCN \$417,000 to help finance the costs of certain of VCN's research and development activities. In addition, at Closing VCN and Grifols entered into a sublease agreement for the sublease by VCN of the laboratory and office space as well as a transitional services agreement. We agreed as a post-Closing covenant to commit to fund VCN's research and development programs, including but not limited to VCN-01 PDAC phase 2 trial, VCN-01 RB trial and necessary G&A within a budgetary plan of approximately \$27.8 million.

VCN is a private, clinical-stage biopharmaceutical company developing new oncolytic adenoviruses for the treatment of cancer. VCN's lead product candidate, VCN-01, is being studied in clinical trials for pancreatic cancer and retinoblastoma. VCN-01 is designed to be administered systemically, intratumorally or intravitreally, either as a monotherapy or in combination with standard of care, to treat a wide variety of cancer indications. VCN-01 is designed to replicate selectively and aggressively within tumor cells, and to degrade the tumor stroma barrier that serves as a significant physical and immunosuppressive barrier to cancer treatment. Degrading the tumor stroma has been shown to improve access to the tumor by the virus and additional therapies such as chemo- and immuno-therapies. Importantly, degrading the stroma exposes tumor antigens, turning "cold" tumors "hot" and enabling a sustained anti-tumor immune response. VCN has the rights to four exclusive patents for proprietary technologies, as well as technologies developed in collaboration with the Virotherapy Group of the Catalan Institute of Oncology (ICO-IDIBELL) and with Hospital Sant Joan de Deu (HSJD), with a number of additional patents pending.

Our Current Product Pipeline

Technology	Candidate	Target	Pre-IND	Phase 1	Phase 2	Collaborators	Status*
Stroma Degrading Oncolytic Virus (OV)	VCN-01	Pancreatic Cancer (IV) ± Gem/nab-P					Finalizing Ph 2 Protocol (ODD EU)
		Retinoblastoma (IVit)					Developing Ph 2/3 Protocol (ODD US)
		HNSCC (IV) + CPI					Enrollment Complete
		Solid Tumors – Brain, Ovarian, PDAC (IV)					Ph 1 Investigator Sponsored Studies Initiated
Oral β-lactamase	SYN-004	Prevention of aGVHD in allo-HCT					Cohort 1 Topline H2'22
Oral IAP	SYN-020	Potential indications include celiac, NAFLD/NASH, radiation enteritis					MAD Study Topline Q2'22
OV Albumin Shield	VCN-11	Solid tumors (IV)					Preclinical studies are on-going

*Based on management’s current beliefs and expectations

aGVHD acute graft-vs-host disease; **allo-HCT** allogeneic hematopoietic cell transplant. **IAP** recombinant bovine intestinal alkaline phosphatase II. **CPI** immune checkpoint inhibitor. **Gem/Nab-P** Gemcitabine + Abraxane® (nab-paclitaxel). **HNSCC** head and neck squamous cell carcinoma. **IV** intravenous. **IVit** intravitreal. **MAD** multiple ascending dose. **ODD** Orphan Drug Designation. **OV** oncolytic adenovirus engineered to selectively replicate in tumors and express hyaluronidase enzyme PH20.

¹Additional products with preclinical proof-of-concept include SYN-006 (carbapenemase) to prevent aGVHD and infection by carbapenem resistant enterococci and SYN-007 (ribaxamase) DR to prevent antibiotic associated diarrhea with oral β-lactam antibiotics.

²Depending on funding/partnership. SYN-004 may enter an FDA-agreed Phase 3 clinical trial for the treatment of Clostridioides difficile infection.

³We have an option-license agreement with Massachusetts General Hospital to develop SYN-020 in several potential indications related to inflammation and gut barrier dysfunction.

Our Gastrointestinal (GI) and Microbiome-Focused Pipeline

Our SYN-004 (ribaxamase) and SYN-020 clinical programs are focused on the gastrointestinal tract (GI) and the gut microbiome, which is home to billions of microbial species and composed of a natural balance of both “good” beneficial species and potentially “bad” pathogenic species. When the natural balance or normal function of these microbial species is disrupted, a person’s health can be compromised. All of our programs are supported by our growing intellectual property portfolio. We are maintaining and building our patent portfolio through: filing new patent applications; prosecuting existing applications; and licensing and acquiring new patents and patent applications.

Clinical and Pre-Clinical Update

SYN-004 (ribaxamase) — Prevention of antibiotic-mediated microbiome damage, C. difficile infections (CDI), overgrowth of pathogenic organisms, the emergence of antimicrobial resistance (AMR) and acute graft-versus-host disease (aGVHD) in allogeneic HCT recipients

Phase 1b/2a Clinical Study in Allogeneic HCT Recipients

In August 2019, we entered into a Clinical Trial Agreement (CTA) with the Washington University School of Medicine (Washington University) to conduct a Phase 1b/2a clinical trial of SYN-004 (ribaxamase). Under the terms of this agreement, we serve as the sponsor of the study and supply SYN-004 (ribaxamase). Dr. Erik R. Dubberke, Professor of Medicine and Clinical Director, Transplant Infectious Diseases at Washington University and a member of the SYN-004 (ribaxamase) steering committee serves as the principal investigator of the clinical trial in collaboration with his Washington University colleague Dr. Mark A. Schroeder, Associate Professor of Medicine, Division of Oncology, Bone Marrow Transplantation and Leukemia.

On January 7, 2020, we announced the receipt of official meeting minutes from the FDA following a Type-C meeting held on December 2, 2019 at our request to discuss the development of SYN-004 (ribaxamase) for treatment of allogeneic HCT recipients who are administered IV beta-lactam antibiotics in response to fever. Based on the final meeting minutes, the Phase 1b/2a clinical trial will comprise a single center, randomized, double-blinded, placebo-controlled clinical trial of oral SYN-004 (ribaxamase) in up to 36 evaluable adult allogeneic HCT recipients. The goal of this study is to evaluate the safety, tolerability and potential absorption into the systemic circulation (if any) of oral SYN-004 (ribaxamase; 150 mg four times daily) administered to allogeneic HCT recipients who receive an IV carbapenem or beta-lactam antibiotic to treat fever. Study participants will be enrolled into three sequential cohorts administered a different study-assigned IV antibiotic. Each cohort seeks to complete eight evaluable participants treated with SYN-004 (ribaxamase) and four evaluable participants treated with placebo. Safety and pharmacokinetic data for each cohort will be reviewed by an independent Data and Safety Monitoring Committee, which will make a recommendation on whether to proceed to the next IV antibiotic cohort. The study will also evaluate potential protective effects of SYN-004 on the gut microbiome as well as generate preliminary information on potential therapeutic benefits and patient outcomes of SYN-004 in allogeneic HCT recipients.

On July 30, 2020, we received written notification from the FDA informing us that they determined the Phase 1b/2a clinical program in adult allogeneic HCT recipients may proceed per the submitted clinical study protocol. On December 22, 2020, we announced that we received approval from the Institutional Review Board (IRB) at Washington University to commence the Phase 1b/2a clinical trial of SYN-004. During the first quarter of 2021, Washington University began screening patients for enrollment of the first of three antibiotic cohorts in the Phase 1b/2a clinical trial of SYN-004 in allogeneic HCT recipients. On April 14, 2021, we announced that the first patient had been dosed in our Phase 1b/2a clinical trial of SYN-004 (ribaxamase) in allogeneic hematopoietic cell transplant (HCT) recipients for the prevention of acute graft-versus-host-disease (aGVHD). To date, we have dosed 17 patients (11 that are considered evaluable) in the study. If enrollment proceeds on the current schedule we may be positioned to announce as many as three interim data readouts during the next 18-24 months with the first one anticipated from the first antibiotic cohort during the second half of 2022, pandemic conditions permitting, the second cohort during the second half of 2023 and the third cohort during the second half of 2024.

Due to the unique challenges posed by the global COVID-19 pandemic, Washington University had previously halted the commencement of the Phase 1b/2a clinical trial and they continue to evaluate non-essential activities which may have a direct impact on the continuation of the ongoing clinical trial. Continuation of the Phase 1b/2a clinical trial including, but not limited to, the enrollment of new patients remains largely at the discretion of Washington University and is contingent upon their ability to conduct this clinical program free from the impact of COVID-19. We remain in close contact with Washington University and are actively monitoring the potential impact of COVID-19 on the clinical development plans of SYN-004 (ribaxamase) program.

SYN-020 — Oral Intestinal Alkaline Phosphatase

SYN-020 is a quality-controlled, recombinant version of bovine Intestinal Alkaline Phosphatase (IAP) produced under cGMP conditions and formulated for oral delivery. The published literature indicates that IAP functions to diminish GI inflammation, tighten the gut barrier to diminish “leaky gut,” promote a healthy microbiome, and diminish GI and systemic inflammation. Despite its broad therapeutic potential, a key hurdle to commercialization has been the high cost of IAP manufacture, which is commercially available for as much as \$10,000 per gram. We believe we have developed technologies to traverse this hurdle currently now have the ability to produce more than 3 grams per liter of SYN-020. If the yields are successfully translated to a commercial scale, we could ultimately manufacture IAP for roughly a few hundred dollars per gram. Based on the known IAP mechanisms of action, as well as our own supporting animal model data, we intended to initially develop SYN-020 to mitigate the intestinal damage caused by radiation therapy that is routinely used to treat pelvic cancers. While we believe SYN-020 may play a pivotal role in addressing acute and long-term complications associated with radiation exposure to the GI tract, we have begun planning for potential development of SYN-020 in indications that may offer a more accelerated or streamlined pathway to registration while also addressing significant unmet medical needs. Such indications include celiac disease, non-alcoholic fatty liver disease (“NAFLD”), and indications to treat and prevent metabolic and inflammatory disorders associated with aging, which are supported by our collaboration with Massachusetts General Hospital (“MGH”). Across the six major markets, the total prevalent cases of celiac disease are expected to increase from 5.8 million cases in 2013 to an expected 8.1 million cases in 2023, representing an annual growth rate of approximately 4%. During the same period, prevalent cases in the U.S. are expected to increase from 2.8 million in 2013 to an expected 4.3 million in 2023, representing a significant market opportunity.

During the second quarter of 2020, we announced that we entered into an agreement with Massachusetts General Hospital granting us an option for an exclusive license to intellectual property and technology related to the use of IAP to maintain GI and microbiome health, diminish systemic inflammation, and treat age-related diseases. During the second quarter of 2021, we announced an amendment to our option for an exclusive license agreement with MGH to include intellectual property and technology related to the use of SYN-020 to inhibit liver fibrosis in select diseases, including NAFLD. Research published by a team of investigators led by Richard Hodin, MD, Chief of the Massachusetts General Hospital Division of General and Gastrointestinal Surgery and Professor of Surgery, Harvard Medical School, evaluated long-term oral supplementation of IAP, including SYN-020, in mice. Dr. Hodin’s research demonstrated that IAP administration, starting at 10 months of age, slowed the microbiome changes, gut-barrier dysfunction, and gastrointestinal and systemic inflammation that normally accompany aging. Additionally, the IAP administration resulted in improved metabolic profiles in the aged mice, diminished frailty, and extended lifespan. Under the terms of the agreement, we are granted exclusive rights to negotiate a worldwide license with MGH to commercially develop SYN-020 to treat and prevent metabolic and inflammatory diseases associated with aging. If executed, we would use this license in the advancement of an expanded clinical development program for SYN-020.

On June 30, 2020, we submitted an IND application to the FDA in support of an initial indication for the treatment of radiation enteropathy secondary to pelvic cancer therapy. On July 30, 2020, we announced that we received a study-may-proceed letter from the FDA to conduct a Phase 1a single-ascending-dose (“SAD”) study in healthy volunteers designed to evaluate SYN-020 for safety, tolerability and pharmacokinetic parameters. On April 1, 2021, we announced that enrollment had commenced in the Phase 1 SAD clinical trial of SYN-020. On June 29, 2021, we announced that enrollment, patient dosing and observation had been completed in the Phase 1, open-label, SAD study of SYN-020. The SAD study enrolled 6 healthy adult volunteers into each of four cohorts with SYN-020 given orally as single doses ranging from 5 mg to 150 mg. Analyses of preliminary data demonstrated that SYN-020 maintained a favorable safety profile, was well tolerated at all dose levels, and no adverse events were attributed to the study drug. No serious adverse events were reported. During the third quarter of 2021 we initiated a Phase 1 clinical study evaluating multiple ascending doses (“MAD”) of SYN-020. On October 21, 2021 we announced that patient enrollment, dosing and observation commenced in the Phase 1 MAD of SYN-020. This Phase 1, placebo-controlled MAD study was designed to evaluate the safety, tolerability and biodistribution of SYN-020 upon repeated dosing in 8 healthy adult volunteers in each of four cohorts (32 total study participants). SYN-020 was given orally twice daily for fourteen days as multiple ascending doses ranging from 5 mg to 75 mg. Safety reviews were conducted at the end of each cohort to approve progression into the next higher dose cohort.

On May 10, 2022, we announced positive safety data from its Phase 1, placebo-controlled, double-blind multiple ascending dose (MAD) clinical trial of SYN-020 intestinal alkaline phosphatase (IAP). The Phase 1 MAD study enrolled 32 healthy adult volunteers into four cohorts with SYN-020 administered orally in doses ranging from 5 mg to 75 mg twice daily for 14 days with a follow-up evaluation at day 35. Each cohort included six subjects who received SYN-020 and two who received placebo. Analyses of preliminary data demonstrated that SYN-020 maintained a favorable safety profile and was well-tolerated across all dose levels. There were a few treatment-related adverse events, and all were mild (grade 1) and resolved without medical intervention. The most common adverse event, constipation, occurred in three out of 24 subjects in the treatment arm and in one out of eight subjects in the placebo arm. No adverse event led to discontinuation of the study drug and there were no serious adverse events. SYN-020 levels were below the limit of quantitation in all plasma samples at all timepoints during the study.

The Phase 1 data from our SAD and MAD studies are intended to support the development of SYN-020 in multiple clinical indications targeting disorders stemming from gastrointestinal (GI) inflammation. We will continue to explore the therapeutic potential of SYN-020 across indications including celiac disease, NAFLD, age-related metabolic and inflammatory diseases. Contingent on funding, we expect to initiate a Phase 2a study in the second half of 2022.

Our Current Oncology-Focused Pipeline (through the acquisition of VCN)

Oncolytic Viruses

Our oncology platform is based on oncolytic virotherapy (“OV therapy”), which exploits the ability of certain viruses to kill tumor cells and trigger an anti-tumor immune response. This novel class of anticancer agents has unique mechanisms of action compared to other cancer drugs. Oncolytic viruses exploit the fact that cancer cells contain mutations that cause them to lose growth control and form tumors. Once inside a tumor cell, oncolytic viruses exploit the tumor cell machinery to generate thousands of additional copies of the virus, which then kill the tumor cell and spread to neighboring cells, causing a chain reaction of cell killing. This infection by OVs also alerts the immune system, which can then attack the virus infected cells and the tumor cells to help destroy the tumor in some instances.

Our OV products are engineered to efficiently infect and selectively replicate to a high extent in tumor cells versus normal host cells, which enables intravenous delivery. By contrast, many other oncolytic viruses in clinical development today are administered by direct injection into the tumor. Intravenous delivery has the potential to expand the therapeutic effect of OVs because the virus can infect both the primary tumor and tumor metastases throughout the body.

Our first product, VCN-01, is a clinical stage oncolytic human adenovirus that is modified to express an enzyme, hyaluronidase, that helps the virus and other molecules to penetrate the tumor. VCN-01 can be used alone or in combination with other cancer therapies such as chemotherapy and immunotherapy, for difficult to treat cancers. An expanding intellectual property portfolio supports our oncology programs, and because our products are characterized as biologics, they will be further protected by data and/or market exclusivity in major markets.

VCN-01 — An oncolytic human type-5 virus engineered for intravenous administration and to express a tumor matrix degrading enzyme (PH20, hyaluronidase) that facilitates the entry of therapeutics and immune cells into tumors

VCN-01 is a genetically modified oncolytic adenovirus that has been engineered to contain four independent genetic modifications on the backbone of the wild-type human adenovirus serotype 5 (HAd5) genome. These modifications have been shown in preclinical and clinical studies to confer tumor selective replication and antitumor activity. VCN-01 was engineered to replicate in and kill virtually all cancer cells, to expose tumor neoantigens of lysed tumors, to increase tumor targeting, and to express PH20 hyaluronidase to enhance the penetration of virus, chemotherapy and immune cells into the tumor.

Malignant tumors are made up of tumor cells as well as significant supporting tissue known as tumor stroma. The tumor stroma supports the formation and growth of tumors and contains cells and other components that are required for robust tumor growth and metastasis. The stroma also forms an effective barrier to the entry of therapeutic agents such as chemotherapy and antibodies. VCN-01 is designed to overcome the stroma barrier problem by expressing the well-characterized stroma degrading enzyme PH20 hyaluronidase after it infects tumor cells. Expression of PH20 by VCN-01 degrades the hyaluronic acid within the tumor stroma and improves virus spread. Based upon the foregoing, we believe our oncolytic virus platform, exemplified by VCN-01, represents a new and potentially powerful form of therapy that combines tumor cell killing, anti-tumor immunity and stroma destruction after intravenous delivery.

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The VCN-01 product candidate is provided as a sterile liquid concentrate that is diluted for infusion or injection. The proposed therapeutic indication for VCN-01 is the treatment of solid tumors, as its selectivity mechanism relies on cellular properties shared by virtually all human tumor cells. Our initial indication for clinical development is unresectable metastatic pancreatic cancer, a disease for which there is currently no cure and only limited therapeutic options.

VCN-01 has been evaluated in 72 patients across four Phase 1 clinical trials, including patients with pancreatic cancer, head and neck squamous cell carcinoma, colorectal cancer, and retinoblastoma.

Pancreatic Ductal Adenocarcinoma

Cancer of the pancreas consists of two main histological types: cancer that arises from the ductal (exocrine) cells of the pancreas or, much less often, cancers may arise from the endocrine compartment of the pancreas. Pancreatic Ductal Adenocarcinoma (“PDAC”) accounts for more than 90% of all pancreatic tumors. It can be located either in the head of the gland or in the body-tail. Pancreatic cancer usually gives metastases to liver and peritoneum. Other less common sites are lungs, brain, kidney and bone. Since in early stages the pancreatic cancer does not give any characteristic symptoms, patients visit their physician late. In many instances, progressive abdominal pain is the first symptom. Therefore, for most cases, pancreatic cancer is diagnosed in its late stages (locally advanced non-metastatic or metastatic stage of the disease) when the radical resection and possibly curative treatment is not possible anymore. It’s generally assumed that only 10% of cases are resectable at presentation, whereas 30-40% of patients are diagnosed at local advanced/unresectable stage and 50-60% presents distant metastases.

PDAC Clinical Unmet need and Market Opportunity

PDAC is one of the most fatal cancers accounting for the 3rd highest cause of cancer-associated deaths in US and 4th in the European Union. Despite significant research efforts, minimal progress has been achieved to date. The five-year overall survival rate is < 10% and has not substantially improved over the last 30 years. Surgery is the only treatment that offers the prospect of long term-survival; however, the 5-year survival for the limited number of patients in whom resection is possible remains low (20 – 30 %). Patients with advanced disease are managed with chemotherapy. In recent years, the combination of gemcitabine with albumin-bound paclitaxel (GA), and the combination of folic acid, 5-fluorouracil, irinotecan and oxaliplatin (FOLFIRINOX) have emerged as the standard of care. However, the results are still very poor and new therapeutic interventions are needed. The increase is particularly evident in younger people and several studies anticipate that pancreatic cancer is expected to become the second leading cause of cancer-related death in the United States by 2030. The rising incidence of pancreatic cancer and its current economic burden place increased pressure to improve outcomes for patients.

In May 2011, the Committee for Orphan Medicinal Products (“COMP”) from the European Medicines Agency (“EMA”) recommended granting Orphan Medicinal Product Designation to VCN-01 for the treatment of pancreatic cancer and in June 2011, the European Commission confirmed the designation under Regulation (“EC”) No 141/2000 of the European Parliament and of the Council.

Phase 1a/Proof of Concept Trial of VCN-01 by intratumor administration in PDAC

In September 2019, VCN presented a poster at the European Society for Molecular Oncology (“ESMO”) annual meeting describing initial mechanism of action data from a multicenter, Phase 1 dose escalation study of intratumoral (“IT”) VCN-01 administered to pancreatic cancer patients in combination with standard doses/schedules of either gemcitabine or nab-paclitaxel plus gemcitabine (“NCT02045589”). The study was conducted at three hospitals in Spain and 8 patients with confirmed histologic diagnosis of unresectable PDAC amenable to endoscopic ultrasound guided (“EUS”) injection were treated with 3 injections (coincident with 1st day of the chemotherapy cycles) at two different dose levels of VCN-01 (six patients had metastatic disease and two had locally advanced disease). The treatment regimen was generally well-tolerated; however, one patient died from severe intraabdominal fluid collection that was considered to be related to VCN-01 treatment. Evaluation of virus pharmacokinetics and PH20 levels in serum were consistent with strong virus replication in the tumors. This was supported by the presence of viral particles in tumor cells as assessed in paired tumor biopsies collected before and after treatment. Tumor stiffness was reduced in all VCN-01-injected lesions as measured by elastography. Disease stabilization of injected lesions was observed in 5 out of 6 patients although subsequent tumor progression was observed in most of the patients due to the appearance of new lesions or growth of distant, non-injected, metastatic lesions. This study provided encouraging mechanism of action data for VCN-01; however, intratumoral injection did not appear to deliver sufficiently high VCN-01 levels for effective delivery to non-injected tumors. We believe these results supported the evaluation of the safety/tolerability and potential efficacy of VCN-01 via intravenous administration in combination with chemotherapy and/or immunotherapies for the treatment of advanced PDAC.

Phase 1 Trial of intravenous VCN-01 with or without nab-paclitaxel plus gemcitabine in patients with solid tumors and PDAC

In March 2022, we announced the peer-reviewed publication of a Phase 1, multicenter, open-label, dose-escalation study investigating the safety, tolerability and biodistribution of intravenous VCN-01 oncolytic adenovirus with or without standard-of-care (SoC) chemotherapy (gemcitabine/nab-paclitaxel) in patients with advanced solid tumors. The data, published in the Journal for ImmunoTherapy of Cancer, suggests that treatment with VCN-01 is feasible and has an acceptable safety profile, with encouraging biological and clinical activity. (Journal for ImmunoTherapy of Cancer 2022;10:e003255. doi:10.1136/jitc-2021-003255).

Data from the recent publication had previously been presented, in part, in a poster at the ESMO 2019 annual meeting. The published study was a multicenter, open-label, dose-escalation phase I clinical trial of a single dose of intravenous VCN-01 alone (Part I, 16 patients with advanced refractory solid tumors) or in combination with nab-paclitaxel plus gemcitabine (Part II and III; patients with pancreatic adenocarcinoma). In Part II, 12 patients received VCN-01 dose concurrent with chemotherapy on day 1, whereas in Part III 14 additional patients received the dose of VCN-01 seven days before chemotherapy. The RP2D was determined to be 1×10^{13} viral particles (vp)/patient in Part I, 3.3×10^{12} vp/patient in Part II and 1×10^{13} vp/patient in Part III. Based on its apparent safety profile and the absence of dose-limiting toxicities, 1×10^{13} vp/patient using sequential dosing schedule was selected for further clinical development.

Pharmacokinetic data showed dose linearity, as well as relevant VCN-01 exposure. Analysis of VCN-01 clearance in patients enrolled in Part II did not show significant differences with respect to patients receiving VCN-01 as a single agent. VCN-01 viral genomes were detected in tumor tissue in 5 out of 6 biopsies. A second viral peak in plasma and increased hyaluronidase serum levels suggested replication after intravenous injection in all patients. Increased levels of immune biomarkers (IFN γ , sLAG3, IL-6, IL-10) were found after VCN-01 administration. In patients with pancreatic adenocarcinoma, the overall response rate (ORR) was 50% for Part II and 50% for Part III, as assessed by the investigators. Median progression free survival (PFS) for patients in Part III was 6.7 months, and median overall survival (OS) was 13.5 months. Eight patients (66.7%) survived more than 12 months. In addition, in April 2021, a subgroup analysis of patients at the RP2D (1×10^{13} vp/patient followed by nab-paclitaxel plus gemcitabine one week later, n=6) was conducted and showed an ORR of 83%, with a median PFS of 6.3 months and median OS of 20.8 months. Some VCN-01 treated patients appeared to benefit from late-onset responses. This form of delayed anti-tumor activity is not common with chemotherapy but is frequently observed with immunotherapies. We believe an immune mechanism of action associated with the oncolytic activity of VCN-01 may be the underlying explanation. VCN-01 appeared to convert the typically immunosuppressive tumor microenvironment of pancreatic adenocarcinomas into an enhanced inflammatory microenvironment (IDO, CD28, PD-1, CTL signature up-regulation, and collagen formation) after treatment.

Future Planning and Potential Regulatory Strategy for development of VCN-01 in PDAC

We are currently planning a Phase 2 clinical trial of systemically administered VCN-01 in PDAC patients and anticipate submission of the protocol to the FDA and EMA in Q2 2022. The proposed Phase 2 trial is expected to be an open-label, randomized study to test the efficacy of VCN-01 in combination with gemcitabine and nab-paclitaxel in patients with newly diagnosed metastatic pancreatic cancer. The study is expected to enroll 92 patients and be conducted at approximately 25 sites in the US and EU. Two doses of VCN-01 are planned in the treatment arm: the 1st dose will be administered on day 1, then one week later 3 cycles of gemcitabine and nab-paclitaxel as standard of care will be administered. The second VCN-01 dose will be administered 7 days before the 4th cycle of chemotherapy, followed by additional chemotherapy. Dr. Manuel Hidalgo, chief of the Division of Hematology and Medical Oncology at Weill Cornell Medicine/New York-Presbyterian Hospital has been appointed as Principal Investigator. If the regulatory agencies allow us to proceed, initiation of recruitment is expected during Q4 2022.

Retinoblastoma

Retinoblastoma is a tumor that originates in the retina and it is the most common type of eye cancer in children. It occurs in approximately 1 / 14,000-1 / 18,000 live newborns and accounts for 15% of the tumors in the pediatric population < 1 year old. The average age of pediatric patients at diagnosis is 2, and it rarely occurs in children older than 6. In the US, retinoblastoma shows an incidence rate of 3.3 per 1,000,000 with only about 200 to 300 children diagnosed per year according to the American Cancer Society. Bilateral retinoblastoma (Rb1 germinal mutation) represents 25-35% of the cases while unilateral retinoblastoma (sporadic mutation) accounts for 65-75%. While retinoblastoma is a highly curable disease, with a current disease-free survival rate of >95%, the clinical challenge for those who treat retinoblastoma is to preserve life and to prevent the loss of an eye, blindness and other serious effects of treatment that reduce the patient's life span or the quality of life.

Current treatments are not without significant morbidity, which may include visual impairment and severe cosmetic deformity secondary to enucleation and/or irradiation of the orbital region. The use of intravenous chemotherapy and more recently intra-arterial and intravitreal chemotherapy have resulted in a significantly greater number of eyes preserved with fewer long-term effects compared to past treatments such as external radiation therapy. However, allowing patients with advanced intraocular disease to be treated conservatively, led to the appearance of a subgroup of patients with advanced intraocular disease who relapsed after an initial response. Most of these cases include those patients who present gross vitreous or subretinal seeding. Once the aforementioned treatments are exhausted, these patients rarely manage to preserve the eyes and vision and must be enucleated. The ocular preservation rate of these eyes with advanced disease is still less than 50%.

In February 2022, the FDA granted orphan drug designation to VCN-01 for the treatment of retinoblastoma.

Phase 1 Trial of intravitreal VCN-01 in patients with retinoblastoma

During the third quarter of 2017, VCN entered into a Clinical Trial Agreement with Hospital Sant Joan de Déu (Barcelona, Spain) to conduct an investigator sponsored Phase 1 clinical study evaluating the safety and tolerability of two intravitreal injections of VCN-01 in patients with intraocular retinoblastoma refractory to systemic, intra-arterial or intravitreal chemotherapy, or radiotherapy, in whom enucleation was the only recommended treatment (NCT03284268). Patients received two doses of VCN-01 injected 14 days apart using a dose escalation regimen. At this time, the dose-escalation phase of the study has already been completed in 4 patients distributed in two cohorts (2 x 10⁹ vp/eye and 2 x 10¹⁰ vp/eye). VCN-01 was well tolerated to date after intravitreal administration, although some degree of intravitreal inflammation and associated turbidity were observed. Inflammation has been managed and potential turbidity minimized with local and systemic administration of anti-inflammatory drugs. VCN-01 does not appear to change the retinal function, and selective VCN-01 replication in retinoblastoma cells has been observed by immunohistochemical analysis. Replication within retinoblastoma tumors over time was detected and VCN-01 reduced the number of vitreous seeds in all patients treated at 2 x 10¹⁰ vp/eye (n=3). The investigator has reported that one patient treated with VCN-01 has had a complete regression lasting more than 30 months.

This study is currently ongoing and anticipated to be completed in the second half of 2022. We anticipate the initiation of a Phase 2/3 trial of VCN-01 as either an adjunct to chemotherapy or a potential rescue therapy in pediatric patients with advanced retinoblastoma in early 2023.

VCN-01 in combination with Immunomodulatory therapeutics

Based on the clinical and pre-clinical data described below, we believe that the administration of VCN-01, can elicit an anti-tumor immune response that could potentiate the effects of VCN-01 and co-administered therapeutics. Biopsies from the Phase I trial of PDAC patients administered intravenous VCN-01 demonstrated lymphocyte (CD8+) infiltration and modulated levels of immune markers in tumors, including an induction of the PD1/PD-L1 expression in tumor tissue from some of the patients. Preclinical experiments demonstrated that VCN-01 significantly increased extravasation of an anti-PD-L1 antibody into subcutaneous xenograft tumors compared to non-treated (PBS) tumors and also that PH20 hyaluronidase improves the ingress of T-cells in animal models. Thus, we hypothesize that the administration of VCN-01 into the tumor will help to overcome the observed resistance to PD-L1 checkpoint inhibitors and to mesothelin-directed CAR-T cells.

Phase I Trial of intravenous VCN-01 in Combination with Durvalumab in Subjects with Recurrent/ Metastatic SCCHN

In February 2019, VCN entered into a Clinical Trial Agreement with Catalan Institute of Oncology (ICO) (Spain) to conduct an investigator sponsored Phase I clinical study to evaluate the safety, tolerability and RP2D of a single intravenous injection of VCN-01 combined with durvalumab in two administration regimens: VCN-01 concomitantly with durvalumab, or sequentially with durvalumab starting two weeks after VCN-01 administration (NCT03799744). The study is also designed to evaluate whether VCN-01 treatment can re-sensitize PD-(L)-1 refractory tumors to subsequent anti-PD-L1 therapy. Durvalumab is a human monoclonal antibody (mAb) of the immunoglobulin G (IgG) 1 kappa subclass that inhibits binding of PD-L1 and is being developed by AstraZeneca/MedImmune, which supplies the product for its use in the clinical study. This Phase I trial is a multicenter, open label, dose escalation study in patients with histologically confirmed head and neck squamous cell carcinoma from specific sites: oral cavity, oropharynx, larynx or hypopharynx that is recurrent/metastatic (R/M) and not amenable to curative therapy by surgery or radiation. In addition, all patients should have undergone prior exposure to anti-PD-(L) 1 and progressed. Patients are entered at each dose level, according to a planned dose escalation schedule. The treatment is a single intravenous VCN-01 dose combined with concomitant intravenous durvalumab (MEDI4736) 1500 mg Q4W (Arm I) or durvalumab starting two weeks after VCN-01 administration ("sequential schedule"; Arm II). Patient recruitment into Arm I and Arm II was performed concurrently. Intravenous VCN-01 is administered to each patient only once during the trial at the VCN-01 dose level to which they are randomized. Durvalumab is administered Q4W until disease progression, unacceptable toxicity, withdrawal of consent, or another discontinuation criterion. Patient recruitment into the study was completed in February 2022 with a total of 18 patients enrolled.

Phase I Trial evaluating the safety and feasibility of huCART-meso cells when given in combination with VCN-01

In July 2021, VCN entered into a Clinical Trial Agreement with the University of Pennsylvania (Philadelphia) to conduct an investigator sponsored Phase I clinical study to evaluate the safety, tolerability and feasibility of intravenous administration of VCN-01 in combination with lentiviral transduced huCART-meso cells (developed by the laboratory of Dr. Carl June) in patients with histologically confirmed unresectable or metastatic pancreatic adenocarcinoma and serous epithelial ovarian cancer (NCT05057715). This is a Phase I study evaluating the combination of VCN-01 when given in combination with huCART-meso cells in a dose-escalation design in two cohorts (N = 3-6), where patients will receive VCN-01 as a single IV infusion (at 3.3×10^{12} or 1×10^{13} vp) on Day 0, followed by a single dose of 5×10^7 huCART-meso cells on Day 14 via IV infusion. huCART-meso cells are modified T-cells targeting the mesothelin antigen, which is frequently expressed in multiple tumor types, particularly in pancreatic and ovarian cancers. Dr. June's previous clinical studies have shown that huCART-meso cells encounter significant challenges in the tumor microenvironment, including immunosuppressive cells and soluble factors as well as metabolic restrictions. Initial VCN-01 clinical data from the studies described above suggest that administration of VCN-01 may increase tumor immunogenicity and improve access of the huCART-meso cells to tumor cells. This Phase I study will evaluate the safety and tolerability of the VCN-01 huCART-meso cell combination and test the hypothesis that administration of VCN-01 may enhance the potential antitumor effects of the co-administered huCART-meso cells. The trial is open and we anticipate initiation of VCN-01 dosing the first half of 2022.

Phase 1 Trial evaluating the intravenous administration of VCN-01 in patients prior to surgical resection of high-grade brain tumors

In the second quarter of 2021, VCN entered into a Clinical Trial Agreement with the University of Leeds (UK) to sponsor a proof-of-concept Phase 1 clinical study to evaluate whether intravenously administered VCN-01 can cross the blood-brain barrier and infect the target brain tumor. This is an open-label, non-randomized, single center study of VCN-01 given intravenously at a dose of 1×10^{13} virus particles to patients prior to planned surgery for recurrent high-grade primary or metastatic brain tumors. We believe that the intravenous delivery of anti-cancer therapy to brain tumors, if effective, may allow repeat dosing may enable the treatment of systemically disseminated brain metastases and may allow for reduction in the need to use neurosurgery to administer the drugs. This study aims to assess the presence of VCN-01 within the resected surgical specimen after systemic VCN-01 delivery and determine the safety of intravenous VCN-01 in patients with recurrent high-grade glioma or brain metastases. By confirming the presence of VCN-01 in high grade brain tumors following intravenous delivery, this study may pave the way for larger trials to study VCN-01 efficacy, both as a monotherapy and in combination with PD-1/PD-L1 blockade. This trial has already received approval from Medicines & Healthcare Products Regulatory Agency (MHRA) from UK Government and we anticipate initiation of VCN-01 dosing the first half of 2022.

Research Programs

SYN-006, SYN-007 and SYN-005

To date, our research programs have been primarily directed to the development of GI acting products that have generated preclinical proof-of-concept with two pipeline products (SYN-006 and SYN-007) that expand the potential utility of our beta-lactamase strategy. SYN-007 is a specially formulated version of SYN-004 (ribaxamase) designed to degrade orally administered beta-lactam antibiotics to protect the gut microbiome from antibiotic-mediated dysbiosis. SYN-006 is a carbapenemase designed to degrade intravenous (IV) carbapenem antibiotics within the GI tract to maintain the natural balance of the gut microbiome for the prevention of CDI, overgrowth of pathogenic organisms and the emergence of antimicrobial resistance (AMR). Our SYN-005 monoclonal antibody program is intended to both treat and prevent pertussis. Our research programs may be expanded to include development of new oncolytic virus products and/or explore oncology applications of our existing products such as SYN-006 and SYN-020.

VCN-11

VCN-11 is a novel virus that we believe has the potential to extend our OV platform. VCN-11 has been engineered to contain all of the features of VCN-01 as well as an additional modification to include an albumin binding domain (ABD) in the virus capsid. The virus capsid is the target for neutralizing antibodies (NAbs) that are generated by the host immune system to destroy circulating viruses. The presence of an albumin binding domain, however, blocks the binding of most neutralizing antibodies, which allows the virus to reach the tumor following intravenous administration. This “albumin shield” works because human blood contains a large amount of albumin to coat the VCN-11 virus. Importantly, this coating of albumin appears to be displaced after the virus reaches tumor cells to infect them. In pre-clinical mouse studies to test the functionality of the “albumin shield”, mice pre-immunized with virus are able to completely neutralize an unmodified OV because they have a large concentration of neutralizing antibodies in their blood. By contrast, viruses containing the albumin binding domain such as VCN-11 are not neutralized and retain their ability to infect and destroy tumor cells. We believe these results support the further development of VCN-11 for tumors in which rapid multi-dosing may be beneficial.

In the second quarter of 2020, VCN had several interactions with Spanish regulatory authorities (AEMPS) to agree on the design of the non-clinical GLP toxicology and biodistribution studies that are required to support a first-in-human clinical trial for VCN-11.

In March 2021, preclinical data obtained with VCN-11 was published, showing that VCN-11 induced 450 times more cytotoxicity in tumor cells than in normal cells. VCN confirmed VCN-11 hyaluronidase production by measuring the activity of the PH20 enzyme with a hyaluronic acid-degradation assay, and by measuring PH20 activity in VCN-11 infected tumors in vivo. VCN-11 evaded NAbs from different sources and tumor level were demonstrated in the presence of high levels of NAbs in vivo, whereas the control virus without ABD was neutralized. VCN-11 showed a low toxicity profile in athymic nude mice and Syrian hamsters, allowing treatments with high doses and fractionated administrations without major toxicities (up to 1.2×10^{11} vp/mouse and 7.5×10^{11} vp/hamster). VCN-11 increased ALT levels on day 3 within an acceptable range that returned to normal levels by day 9. Fractionated intravenous administration of VCN-11 (splitting the dose into two portions administered 4 h apart) appeared to improve VCN-11 circulation kinetics and increase tumor levels. VCN-11 showed antitumor efficacy in the presence of NAbs against Ad5 and itself.

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In May 2022, we announced an upcoming oral presentation on VCN-11 at the 25th Annual Meeting of the American Society of Gene & Cell Therapy (ASGCT). The presentation will include preclinical results showcasing the potential of VCN-11 to balance safety, with no major toxicities observed, and effectively target tumors after intravenous re-administration, even in the presence of high level NABs.

Intellectual Property

All of our programs are supported by growing patent estates. In total, Synthetic Biologics has over 95 U.S. and foreign patents and over 70 U.S. and foreign patents pending. VCN Biosciences, through assignment or exclusive licenses, controls over 25 U.S. and foreign patents and over 15 U.S. and foreign patents pending.

The SYN-004 (ribaxamase) program is supported by IP that is assigned to Synthetic Biologics, namely U.S. patents and foreign patents (in most major markets, e.g. Europe (including Germany, Great Britain and France), Japan, China and Canada, among others) and U.S. and foreign patents pending (in most major markets, e.g. Europe (including Germany, Great Britain and France), Japan, China and Canada, among others). For instance, U.S. Patent Nos. 8,894,994 and 9,587,234, which include claims to compositions of matter and pharmaceutical compositions of beta-lactamases, including SYN-004 (ribaxamase), have patent terms to at least 2031. Further, U.S. Patent 9,301,995 and 9,301,996, both of which will expire in at least 2031, cover various uses of beta-lactamases, including SYN-004 (ribaxamase), in protecting the microbiome, and U.S. Patent Nos. 9,290,754, 9,376,673, 9,404,103, 9,464,280, and 9,695,409 which will expire in at least 2035, covers further beta-lactamase compositions of matter related to SYN-004 (ribaxamase).

The SYN-020 (oral intestinal alkaline phosphatase (IAP)) program is supported by IP that is assigned to Synthetic Biologics, namely U.S. and foreign patent applications (in many major markets, e.g. Europe, China, Japan, Korea, Canada, and Australia). These patent applications, which cover various formulations, medical uses and manufacture of SYN-020, are expected to expire in 2038-2040, if granted, and without taking potential patent term extensions or patent term adjustment into account.

The VCN-01 and VCN-11 programs are supported by patents and patent applications that are assigned to VCN Biosciences or exclusively licensed from Fundacio Privada Institut d'Investigacio Biomedica de Bellvitge (IDIBELL), Institut Catala d'Oncologia (ICO), and Hospital Sant Joan De Deu Barcelona. The patents and patent applications include U.S. patents and foreign patents (in most major markets, e.g. Europe, China, Japan, Korea, Canada, Israel, Mexico, Russia, and Australia) and U.S. and foreign patents pending (in most major markets, e.g. Europe, China, Korea, Canada, Mexico, and India). The patents and patent applications cover compositions of matter and pharmaceutical compositions of oncolytic adenoviruses and various medical uses of the same. For instance, U.S. Patent No. 10,316,065, which expires in 2030 without taking potential patent term extensions or patent term adjustment into account, provides composition of matter and pharmaceutical composition coverage for a genus of engineered oncolytic adenovirus suitable for the treatment of solid tumors. Other patents and patent applications, if granted, will provide protection to 2037 without taking potential patent term extensions or patent term adjustment into account.

Our goal is to (i) obtain, maintain, and enforce patent protection for our products, formulations, processes, methods, and other proprietary technologies, (ii) preserve our trade secrets, and (iii) operate without infringing on the proprietary rights of other parties worldwide. We seek, where appropriate, the broadest intellectual property protection for product candidates, proprietary information, and proprietary technology through a combination of contractual arrangements and patents.

Critical Accounting Estimates

The condensed consolidated financial statements are prepared in conformity with U.S. GAAP, which requires the use of estimates, judgments and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities at the date of the condensed consolidated financial statements, and the reported amounts of revenues and expenses in the periods presented. We believe that the accounting estimates employed are appropriate and resulting balances are reasonable; however, due to inherent uncertainties in making estimates, actual results may differ from the original estimates, requiring adjustments to these balances in future periods. The critical accounting estimates that affect the condensed consolidated financial statements and the judgments and assumptions used are consistent with those described under Part II, Item 7 of our 2021 Form 10-K.

Business Combination

The Company accounts for acquisitions using the acquisition method of accounting, which requires that all identifiable assets acquired, and liabilities assumed be recorded at their estimated fair values. The excess of the fair value of purchase consideration over the fair values of identifiable assets and liabilities is recorded as goodwill. When determining the fair values of assets acquired and liabilities assumed, management makes significant estimates and assumptions. Critical estimates in valuing certain intangible assets include but are not limited to future expected cash flows from acquired patented technology. Management's estimates of fair value are based upon assumptions believed to be reasonable, but are inherently uncertain and unpredictable and, as a result, actual results may differ from

The Company classifies intangible assets into two categories: (1) intangible assets with indefinite lives not subject to amortization and (2) goodwill. Intangible assets that are deemed to have indefinite lives, including goodwill, are reviewed for impairment annually, or more frequently if events or changes in circumstances indicate that the asset might be impaired. The impairment test for indefinite-lived intangibles, other than goodwill, consists of a comparison of the fair value of the intangible asset with its carrying amount. If the carrying amount exceeds the fair value, an impairment charge is recognized in an amount equal to that excess. Indefinite-lived intangible assets, such as goodwill, are not amortized. The Company tests the carrying amounts of goodwill for recoverability on an annual basis or when events or changes in circumstances indicate evidence a potential impairment exists, using a fair value-based test. Pursuant to ASU 2017-04, the Company must record a goodwill impairment charge if a reporting unit's carrying value exceeds its fair value.

In-process research and development, or IPR&D, assets are considered to be indefinite-lived until the completion or abandonment of the associated research and development projects. IPR&D assets represent the fair value assigned to technologies that the Company acquires, which at the time of acquisition have not reached technological feasibility and have no alternative future use. During the period that the assets are considered indefinite-lived, they are tested for impairment on an annual basis, or more frequently if the Company becomes aware of any events occurring or changes in circumstances that indicate that the fair value of the IPR&D assets are less than their carrying amounts. If and when development is complete, which generally occurs upon regulatory approval and the ability to commercialize products associated with the IPR&D assets, these assets are then deemed definite-lived and are amortized based on their estimated useful lives at that point in time. If development is terminated or abandoned, the Company may have a full or partial impairment charge related to the IPR&D assets, calculated as the excess of carrying value of the IPR&D assets over fair value.

Contingent Consideration

Consideration paid in a business combination may include potential future payments that are contingent upon the acquired business achieving certain milestones in the future ("contingent consideration"). Contingent consideration liabilities are measured at their estimated fair value as of the date of acquisition, with subsequent changes in fair value recorded in the consolidated statements of operations. The Company estimates the fair value of the contingent consideration as of the acquisition date using the estimated future cash outflows based on the probability of meeting future milestones. The milestone payments will be made upon the achievement of clinical and commercialization milestones as well as single low digit royalty payments and payments upon receipt of sublicensing income. Subsequent to the date of acquisition, the Company reassesses the actual consideration earned and the probability-weighted future earn-out payments at each balance sheet date. Any adjustment to the contingent consideration liability will be recorded in the consolidated statements of operations. Contingent consideration liabilities expected to be settled within 12 months after the balance sheet date are presented in current liabilities, with the non-current portion recorded under long term liabilities in the consolidated balance sheets.

Results of Operations

Three Months Ended March 31, 2022 and 2021

General and Administrative Expenses

General and administrative expenses increased to \$1.7 million for the three months ended March 31, 2022, from \$1.4 million for the three months ended March 31, 2021. This increase of 17% primarily comprised of increased consulting and legal costs related to the VCN acquisition, higher insurance costs, audit fees, and public relations expenses and VCN administrative expenses not included in prior year. The charge related to stock-based compensation expense was \$85,000 for the three months ended March 31, 2022, compared to \$82,000 the three months ended March 31, 2021.

[Table of Contents](#)*Research and Development Expenses*

Research and development expenses increase to \$2.6 million for the three months ended March 31, 2022, from approximately \$1.1 million for the three months ended March 31, 2021. This increase of 132% is primarily the result of higher manufacturing expense for SYN-020, costs incurred related to our Phase 1a clinical trial of SYN-020 and the Phase 1b/2a clinical trial of SYN-004 (ribaxamase) in allogeneic HCT recipients and VCN research expenses related to VCN-01 not incurred in the prior year. We anticipate research and development expense to increase as we plan for and initiate enrollment for our phase 2 clinical trial for VCN-01 in PDAC, phase 2/3 clinical trial in retinoblastoma, expand GMP manufacturing activities for VCN-01 and SYN-020, and continue with supporting our VCN-11 and other preclinical and discovery initiatives. The charge related to stock-based compensation expense was \$28,000 for the three months ended March 31, 2022, compared to \$19,000 related to stock-based compensation expense for the three months ended March 31, 2021.

The following table sets forth our research and development expenses directly related to our therapeutic areas for the three months ended March 31, 2022 and 2021. These direct expenses were external costs associated with preclinical studies and clinical trials. Indirect research and development expenses related to employee costs, facilities, stock-based compensation and research and development support services that are not directly allocated to specific product candidates.

Therapeutic Areas	March 31, 2022	March 31, 2021
SYN-020	\$ 659	\$ 172
Ribaxamase	376	148
VCN-01	60	—
SYN-010	—	3
Other therapeutic areas	53	—
Total direct costs	1,148	323
Total indirect costs	1,449	794
Total Research and Development	\$ 2,597	\$ 1,117

Other Income/Expense

Other expense was \$21,068 for the three months ended March 31, 2022 compared to other income of \$347 for the three months ended March 31, 2021. Other expense is primarily comprised of exchange loss of \$22,607, offset by interest income of \$1,539. Other income for the three months ended March 31, 2021 is primarily comprised of interest income.

Net Loss Attributable to Common Stockholders

Our net loss attributable to common stockholders was approximately \$4.3 million, or \$0.03 per basic and dilutive common share for the three months ended March 31, 2022, compared to a net loss of approximately \$11.5 million, or \$0.13 per basic common share and dilutive common share for the three months ended March 31, 2021. Net loss attributable to common stockholders for the three months ended March 31, 2021 excludes net loss attributable to non-controlling interest of \$1,000 and includes the accretion of the Series B preferred discount of \$1.5 million on converted shares, Series A Preferred Stock accrued dividends of \$24,000 and the deemed dividend for the effect of the Series A preferred shares price adjustment of \$7.4 million.

Liquidity and Capital Resources

As of March 31, 2022, the Company has a significant accumulated deficit, and with the exception of the three months ended June 30, 2010 and the three months ended December 31, 2017, the Company has experienced significant losses and incurred negative cash flows since inception. The Company expects to continue incurring losses for the foreseeable future, with the recognition of revenue being contingent on successful phase 3 clinical trials and requisite approvals by the FDA or foreign equivalents. Historically, the Company has financed its operations primarily through public and private sales of its common stock and a private placement of its preferred stock, and it expects to continue to seek to obtain required capital in a similar manner. The Company has spent, and expects to continue to spend, a substantial amount of funds in connection with implementing its business strategy, including planned product development efforts, clinical trials and research and discovery efforts.

Cash and cash equivalents totaled approximately \$56.7 million as of March 31, 2022, which includes the net proceeds from sales of its Common Stock in “at-the-market” (ATM) equity offerings during 2021 and cash proceeds of approximately through the exercise of a portion of the October 2018 warrants. With these additional sources of liquidity, we believe we will be able to fund our operations through the next twelve months from the issuance date of these financial statements. Management believes its plan, which includes the additional testing of SYN-004 (ribaxamase) and the advancement of VCN-01 will allow us to meet our financial obligations, further advance key products, and maintain our planned operations for at least one year from the issuance date of these consolidated financial statements. However, the amount of capital needed by us will also depend upon whether we develop SYN-004 and/or SYN-020 internally or we our-license or partner such development. If necessary, the Company may attempt to utilize the ATM or seek to raise additional capital on the open market, neither of which is guaranteed. Use of the ATM is limited by certain restrictions and management’s plan does not rely on additional capital from either of these sources. If the Company is not able to obtain additional capital (which is not assured at this time), our long-term business plan may not be accomplished and we may be forced to cease certain development activities. More specifically, the completion of any later stage clinical trial will require significant financing or a significant partnership.

The full impact of the COVID-19 outbreak continues to evolve as of the date of this report. As such, it is uncertain as to the full magnitude that the pandemic will have on our financial condition, liquidity, and future results of operations. We are actively monitoring the global situation and its potential impact on our financial condition, liquidity, operations, suppliers, industry, and workforce. Given the daily evolution of the COVID-19 outbreak and the global responses to curb its spread, we are not able to estimate the future effects of the COVID-19 outbreak on our results of operations, financial condition, or liquidity.

Although we are experiencing limited, if any, adverse impact to our financial stability stemming from the global economic slowdown, the overall disruption of global healthcare systems and other risks and uncertainties associated with the COVID-19 pandemic, including uncertainty regarding our clinical trial timelines, our business, financial condition, results of operations and growth prospects could be materially adversely affected.

Historically, we have financed our operations primarily through public and private sales of our securities, and we expect to continue to seek and obtain additional capital in a similar manner. During the year ended December 31, 2021, our only source of cash was from the exercise of the 2018 Warrants and sales of our common stock through the Original ATM Sales Agreement and the Amended and Restated ATM Sales Agreement discussed above.

There can be no assurance that we will be able to continue to raise funds through the sale of shares of common stock through the Amended and Restated ATM Sales Agreement. If we raise funds by selling additional shares of common stock or other securities convertible into common stock, the ownership interest of our existing stockholders will be diluted. If we are not able to obtain funding for future clinical trials when needed, we will be unable to carry out our business plan and we will be forced to delay the initiation of future clinical trials until such time as we obtain adequate financing.

We have committed, and expect to continue to commit, substantial capital in order to implement our business strategy, including our planned product development efforts, preparation for our planned clinical trials, and performance of clinical trials and our research and discovery efforts. We believe our cash position of \$54.9 million at the end of April 2022 is sufficient to fund our operations through at least the end of the fourth quarter of 2023, including continuation of our ongoing Phase 1b/2a clinical study of SYN-004 (ribaxamase) in allogeneic HCT recipients for the prevention of aGVHD, as well as our planned Phase 1 clinical programs for SYN-020 and to fund our committed obligations under the Purchase Agreement for the VCN Acquisition.

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Following the anticipated completion of our ongoing Phase 1b/2a clinical study of SYN-004 (ribaxamase) in allogeneic HCT recipients, the Phase 1 SAD and MAD clinical studies, we will need to obtain additional funds for future clinical trials. We anticipate that our future clinical trials will be much larger in size and require larger cash expenditures than the aforementioned clinical programs. We do not have any committed sources of financing for future clinical trials at this time, and it is uncertain whether additional funding will be available when we need it on terms that will be acceptable to us, or at all.

As the COVID-19 coronavirus continues to spread around the globe, we have experienced disruptions that impacted our business and clinical trials, including halting the enrollment of new patients in our previous Phase 2b investigator-sponsored clinical trial of SYN-010 and postponement of clinical site initiation of the Phase 1b/2a clinical trial of SYN-004. The full impact of the COVID-19 outbreak continues to evolve as of the date of this report. As such, it is uncertain as to the full magnitude that the pandemic will have on our financial condition, liquidity, and future results of operations. We are actively monitoring the global situation and its potential impact on our financial condition, liquidity, operations, suppliers, industry, and workforce. Given the daily evolution of the COVID-19 outbreak and the global responses to curb its spread, we are not able to estimate the future effects of the COVID-19 outbreak on our results of operations, financial condition, or liquidity.

Off-Balance Sheet Arrangements

During the three months ended March 31, 2022, we did not have, and we do not currently have, any off-balance sheet arrangements, as defined under SEC rules.

Contractual Obligations

Leases

At the inception of a contract we determine if the arrangement is, or contains, a lease. Right-of-use (“ROU”) assets represent our right to use an underlying asset for the lease term and lease liabilities represent our obligation to make lease payments arising from the lease. ROU assets and liabilities are recognized at the commencement date based on the present value of lease payments over the lease term.

We have made certain accounting policy elections whereby we (i) do not recognize ROU assets or lease liabilities for short-term leases (those with original terms of 12-months or less) and (ii) combine lease and non-lease elements of our operating leases. ROU assets are included in other noncurrent assets and lease liabilities are included in other current and non-current liabilities in our condensed consolidated balance sheets. As of March 31, 2022, we did not have any material finance leases.

ITEM 3. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK.

The primary objective of our investment activities is to preserve our capital to fund operations. We also seek to maximize income from our investments without assuming significant risk. Our exposure to market risk is confined to our cash and cash equivalents. As of March 31, 2022, our cash and cash equivalents consisted primarily of investments in treasury securities. We do not engage in any hedging activities against changes in interest rates. Due to the short-term duration of our investment portfolio and the low risk profile of our investments, we would not expect our operating results or cash flows to be affected to any significant degree by the effect of a sudden change in market interest rates or credit conditions on our securities portfolio. We may, however, require additional financing to fund future obligations and no assurance can be given that the terms of future sources of financing will not expose us to material market risk.

ITEM 4. CONTROLS AND PROCEDURES.

(a) Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our Chief Executive Officer, evaluated the effectiveness of our disclosure controls and procedures as of March 31, 2022. The term “disclosure controls and procedures,” as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act, means controls and other procedures of a company that are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the SEC’s rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the Company’s management, including its principal executive and principal financial officers, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure. We have adopted and maintain disclosure controls and procedures (as defined Rules 13a-15(e) and 15d-15(e) under the Exchange Act) that are designed to provide reasonable assurance that information required to be disclosed in the reports filed under the Exchange Act, such as this Quarterly Report on Form 10-Q, is collected, recorded, processed, summarized and reported within the time periods specified in the rules of the SEC. The Company’s disclosure controls and procedures are also designed to ensure that such information is accumulated and communicated to management to allow timely decisions regarding required disclosure. Management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. During the course of the quarter, we identified a material weakness in our controls relating to accounting and disclosure for non-routine transactions, as described below. Based on the evaluation of our disclosure controls and procedures as of the end of the period covered by this report and upon that discovery, our Chief Executive Office concluded that our disclosure controls and procedures were not effective at a level that provides reasonable assurance as of the last day of the period covered by this report.

(b) Changes in Internal Control over Financial Reporting

During the course of the review for this Quarterly Report, we identified a material weakness in our controls relating to accounting and disclosure controls for non-routine transactions. Specifically, the controls related to the review of internal and externally prepared reports and analysis utilized in the financial reporting process and the related income tax implication of the non-routine transactions.

In order to remediate this material weakness, we plan to implement the following steps to improve the overall processes of identifying and reviewing non-routine transactions:

- Perform additional internal review processes to ensure the appropriate accounting and disclosure of non-routine transactions.

Should additional changes to the remediation plan be warranted, management will modify the planned measures accordingly. In conjunction with the acquisition of VCN, we are currently in the process of integrating VCN's policies, processes, people, technology, and operations into the consolidated company, and integrating VCN's operations into our system of internal control over financial reporting. As permitted by the Securities and Exchange Commission, we expect to exclude VCN from the assessment of internal control over financial reporting the year ending December 31, 2022.

PART II—OTHER INFORMATION

ITEM 1. LEGAL PROCEEDINGS.

From time to time we may become involved in legal proceedings or be subject to claims arising in the ordinary course of our business. We are not presently a party to any legal proceedings that, if determined adversely to us, would individually or taken together have a material adverse effect on our business, operating results, financial condition or cash flows. Regardless of the outcome, litigation can have an adverse impact on us because of defense and settlement costs, diversion of management resources and other factors.

ITEM 1A. RISK FACTORS.

The following information updates, and should be read in conjunction with, the information disclosed in Part I, Item 1A, "Risk Factors," contained in our 2021 Form 10-K. Except as disclosed below, there have been no material changes from the risk factors disclosed in our 2021 Form 10-K.

RISKS RELATING TO OUR BUSINESS

We will need to raise additional capital to operate our business and our failure to obtain funding when needed may force us to delay, reduce or eliminate certain of our development programs or commercialization efforts.

During the three months ended March 31, 2022, our operating activities used net cash of approximately \$10.5 million and our cash and cash equivalents were approximately 54.9 million at the end of April 2022. With the exception of the three months ended June 30, 2010 and the three months ended December 31, 2017, we have experienced significant losses since inception and have a significant accumulated deficit. As of March 31, 2022, our accumulated deficit totaled approximately \$275.6 million on a consolidated basis. Pursuant to the Purchase Agreement, we have agreed to use reasonable efforts to commercialize VCN-01 and we agreed as a post-closing covenant to commit to fund VCN's research and development programs, including but not limited to VCN-01 PDAC phase 2 clinical trial, VCN-01 RB trial and necessary G&A within a budgetary plan of approximately \$27.8 million over the next three years. We expect to incur additional operating losses in the future and therefore expect our cumulative losses to increase. With the exception of the quarter ended June 30, 2010, and limited laboratory revenues from Adeona Clinical Laboratory, which we sold in March 2012, we have generated very minimal revenues. We do not expect to derive revenue from any source in the near future until we or our potential partners successfully commercialize our products. We expect our expenses to increase in connection with our anticipated activities, particularly as we continue research and development, initiate and conduct clinical trials, and seek marketing approval for our product candidates. Until such time as we receive approval from the FDA and other regulatory authorities for our product candidates, we will not be permitted to sell our products and therefore will not have product revenues from the sale of products. For the foreseeable future we will have to fund all of our operations and capital expenditures from equity and debt offerings, cash on hand, licensing and collaboration fees and grants, if any.

We will need to raise additional capital to fund our operations and meet our current timelines and we cannot be certain that funding will be available on acceptable terms on a timely basis, or at all. Based on our current plans, our cash and cash equivalents will be sufficient to complete our planned later stage clinical trials of VCN-01 (our proposed clinical trials in PDAC and retinoblastoma), Phase 1a/2a clinical trial of SYN-004, our Phase 1 multiple-ascending dose clinical trials of SYN-020, but may not be sufficient additional trials of SYN-020 or SYN-004, which are expected to require significant cash expenditures. In addition, based on the significant anticipated cost of a Phase 3 clinical program in a broad indication for SYN-004, we expect it will not be feasible for us to initiate and complete this trial at this time without a partner given the capital constraints tied to our current market cap and share price. Further development of VCN's product candidates will require additional funding. To the extent that we raise additional funds by issuing equity securities, our stockholders may experience significant dilution. Any debt financing, if available, may involve restrictive covenants that may impact our ability to conduct our business and also have a dilutive effect on our stockholders. A failure otherwise to secure additional funds when needed in the future whether through an equity or debt financing or a sufficient amount of capital without a strategic partnership could result in us being unable to complete planned preclinical and clinical trials or obtain approval of our product candidates from the FDA and other regulatory authorities. In addition, we could be forced to delay, discontinue or curtail product development, forego sales and marketing efforts, and forego licensing in attractive business opportunities. Our ability to raise capital through the sale of securities may be limited by the rules of the SEC and NYSE American that place limits on the number and dollar amount of securities that may be sold. There can be no assurances that we will be able to raise the funds needed, especially in light of the fact that our ability to sell securities registered on our registration statement on Form S-3 will be limited until such time the market value of our voting securities held by non-affiliates is \$75 million or more. We also may be required to seek collaborators for our product candidates at an earlier stage than otherwise would be desirable and on terms that are less favorable than might otherwise be available.

We expect to seek to raise additional capital in the future, which may be dilutive to stockholders or impose operational restrictions.

We expect to seek to raise additional capital in the future to help fund development of our proposed products. If we raise additional capital through the issuance of equity or of debt securities, the percentage ownership of our current stockholders will be reduced. We may also enter into strategic transactions, issue equity as consideration for acquisitions or part of license issue fees to our licensors, compensate consultants or settle outstanding payables using equity that may be dilutive. We are authorized to issue 200,000,000 shares of common stock, of which 158,437,840 shares of common stock were issued and outstanding as of March 16, 2022. At March 16, 2022, we had reserved 12,800,241 shares of common stock for issuance upon exercise of our outstanding options and warrants. In addition, at such date, we had 200,000 shares of our common stock reserved for future issuance under our equity incentive plans. If all of these securities were to be exercised, the total number of shares of our common stock that we would be required to issue is 12,800,241, which in addition to the 158,437,840 shares issued and outstanding, would leave 28,759,591 authorized but unissued shares of common stock. As a result of our limited number of authorized and unissued shares of common stock, we may have insufficient shares of common stock available to issue in connection with any future equity financing transactions or strategic transactions we may seek to undertake. At our 2021 Annual Meeting of Shareholders, we sought shareholder approval of an amendment to our Articles of Incorporation, as amended, to increase our authorized number of shares of common stock, which approval was not obtained. Accordingly, we anticipate taking steps, when appropriate, to increase our number of available shares which may have the effect of facilitating such transactions; however, there can be no assurance that we will be successful in obtaining the required approval for any such action.

In order to raise additional capital, we may in the future offer additional shares of our common stock or other securities convertible into or exchangeable for our common stock at prices that may not be the same as the price per share paid by existing stockholders, thereby subjecting such stockholders to dilution. Our stockholders may experience additional dilution in net book value per share and any additional equity securities may have rights, preferences and privileges senior to those of the holders of our common stock.

We may sell shares or other securities in any other offering at a price per share that is less than the price per share paid by existing stockholders, and investors purchasing shares or other securities in the future could have rights superior to existing stockholders. In the event that we sell shares or other securities at prices below the exercise price of the warrants that we issued in our October 2018 offering, the price protection anti-dilution provisions of the warrant provide that the exercise price of the warrants sold in our October 2018 offering is to be reduced which may result in additional warrant exercises and additional dilution to stockholders as was the case in 2020 and during the first quarter of 2021 when we utilized our at-the-market facility and the warrant exercise price was reduced. The price per share at which we sell additional shares of our common stock, or securities convertible or exchangeable into common stock, in future transactions may be higher or lower than the price per share paid by existing stockholders.

We have identified a material weakness in our internal controls, and we cannot provide assurances that this weakness will be effectively remediated or that additional material weaknesses will not occur in the future. In addition, we are not yet required to perform an assessment of internal controls for VCN.

If our internal control over financial reporting or our disclosure controls and procedures are not effective, we may not be able to accurately report our financial results, prevent fraud, or file our periodic reports in a timely manner, which may cause investors to lose confidence in our reported financial information and may lead to a decline in our stock price.

Our management is responsible for establishing and maintaining adequate internal control over our financial reporting, as defined in Rule 13a-15(f) under the Exchange Act. During the second quarter of 2022, we identified a material weakness in our controls over financial reporting related to the accounting for non-routine transactions. Specifically, the controls related to the review of internal and externally prepared reports and analysis utilized in the financial reporting process and the related income tax implication of the non-routine transactions. Although management believes that the control deficiencies will be remediated by the end of the fiscal year there can be no assurance that the deficiency will be remediated at such time or that the internal control over financial reporting, as modified, will enable us to identify or avoid material weaknesses in the future. In addition, the material weakness will not be considered remediated until the applicable controls operate for a sufficient period of time and management has concluded, through testing, that these controls are designed and operating effectively.

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As permitted by the SEC, we are permitted to exclude VCN from the assessment of internal control over financial reporting the year ending December 31, 2022. In conjunction with the acquisition of VCN, we are currently in the process of integrating VCN's policies, processes, people, technology, and operations into the consolidated company, and integrating VCN's operations into our system of internal control over financial reporting; however, we cannot assure you that such integration will be successful to enable us to identify or avoid material weaknesses in the future.

ITEM 2. UNREGISTERED SALES OF EQUITY SECURITIES AND USE OF PROCEEDS.

We did not sell any equity securities during the quarter ended March 31, 2022 in transactions that were not registered under the Securities Act other than as previously disclosed in our filings with the SEC.

ITEM 3. DEFAULTS UPON SENIOR SECURITIES.

Not applicable.

ITEM 4. MINE SAFETY DISCLOSURES.

Not applicable.

ITEM 5. OTHER INFORMATION.

Not applicable

ITEM 6. EXHIBITS

The exhibits filed or furnished as part of this Quarterly Report on Form 10-Q are set forth on the Exhibit Index, which Exhibit Index is incorporated herein by reference.

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 the undersigned thereunto duly authorized.

SYNTHETIC BIOLOGICS, INC.

By: /s/ Steven A. Shallcross

Steven A. Shallcross

Chief Executive Officer, Chief Financial Officer

(Principal Executive Officer, Principal Financial Officer and Principal Accounting Officer)

Date: May 16, 2022

EXHIBIT INDEX

Exhibit Number	Exhibit Title
1.1	Amended and Restated At Market Issuance Sales Agreement dated February 9, 2021 by and among Synthetic Biologics, Inc. and B. Riley Securities, Inc. and A.G.P./Alliance Global Partners (Incorporated by reference to Exhibit 1.1 of the Registrant's Current Report on Form 8-K filed February 10, 2021, File No. 001-12584.)
2.2	Amendment dated March 9, 2022 to Share Purchase Agreement dated December 41, 2021 by and among Synthetic Biologics, Inc., VCN Biosciences, S.L. ("VCN"), and each of the shareholders of VCN (Incorporated by reference to Exhibit 2.2 of the Registrant's Current Report on Form 8-K filed March 11, 2022, File No. 001-12584)
3.1	Certificate of Incorporation, as amended (Incorporated by reference to (i) Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed October 16, 2008, File No. 001-12584 , (ii) Exhibit 3.1 of the Registrant's Quarterly Report on Form 10-Q for the quarterly period ended June 30, 2001 filed August 14, 2001, File No. 001-12584 ; and (iii) Exhibits 3.1 , 4.1 and 4.2 of the Registrant's Quarterly Report on Form 10-Q for the quarterly period ended June 30, 1998 filed August 14, 1998, File No. 001-12584.)
3.2	Articles of Merger (Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed October 19, 2009, File No. 001-12584.)
3.3	Certificate of Merger filed with the Secretary of State of Delaware (Incorporated by reference to Exhibit 3.2 of the Registrant's Current Report on Form 8-K filed October 19, 2009, File No. 001-12584.)
3.4	Articles of Incorporation filed with the Nevada Secretary of State (Incorporated by reference to Exhibit 3.3 of the Registrant's Current Report on Form 8-K filed October 19, 2009, File No. 001-12584.)
3.5	Amended and Restated Bylaws Adopted and Effective October 31, 2011 (Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed November 2, 2011, File No. 001-12584.)
3.6	Certificate of Amendment to Articles of Incorporation (Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed February 16, 2012, File No. 001-12584.)
3.7	Certificate of Amendment to Certificate of Incorporation. (Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed May 18, 2015, File No. 001-12584.)
3.8	Certificate of Amendment to Certificate of Incorporation. (Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed September 8, 2017, File No. 001-12584.)
3.9	Certificate of Designations for Series A Preferred Stock to Certificate of Incorporation (Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed September 12, 2017, File No. 001-12584.)
3.10	Certificate of Change Pursuant to NRS 78.209 (Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed August 13, 2018, File No. 001-12584.)
3.11	Certificate of Amendment to Articles of Incorporation (Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed September 26, 2018, File No. 001-12584.)
3.12	Certificate of Designations for Series B Preferred Stock to Certificate of Incorporation (Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed October 15, 2018, File No. 001-12584.)
3.13	Certificate of Amendment to Certificate of Designations for Series B Preferred Stock to Certificate of Incorporation (Incorporated by reference to Exhibit 3.2 of the Registrant's Current Report on Form 8-K filed October 15, 2018, File No. 001-12584.)

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3.14	Certificate of Amendment to the Certificate of Designation for the Series A Convertible Preferred Stock (Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K/A filed on February 1, 2021 File No. 001-12584.)
10.1 +	Employment Agreement effective January 3, 2022 between Synthetic Biologics, Inc. and Steve Shallcross (Incorporated by reference to Exhibit 10.1 of the Registrant's Current Report on Form 8-K filed on January 4, 2022 File No. 001-12584).
10.2+	Employment Agreement effective March 22, 2022 between Synthetic Biologics, Inc. and Frank Tufaro (Incorporated by reference to Exhibit 10.1 of the Registrant's Current Report on Form 8-K filed on March 23, 2022 File No. 001-12584).
31.1	Certification of Principal Executive Officer and Principal Financial Officer pursuant to Rule 13a-14(a)/15d-14(a)*
32.1	Certification of Principal Executive Officer and 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*
101.SCH	Inline XBRL Taxonomy Extension Schema*
101.CAL	Inline XBRL Taxonomy Extension Calculation Linkbase*
101.DEF	Inline XBRL Taxonomy Extension Definition Linkbase*
101.LAB	Inline XBRL Taxonomy Extension Label Linkbase*
101.PRE	Inline XBRL Taxonomy Extension Presentation Linkbase*
104	Cover Page Interactive Data File (formatted in XBRL in Exhibit 101)

*Filed herewith.

+ Management contract or compensatory plan or arrangement required to be identified pursuant to Item 15(a)(3) of this report.

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

I, Steven A. Shallcross, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Synthetic Biologics, 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 16, 2022

By: /s/ Steven A. Shallcross

Name: Steven A. Shallcross
Chief Executive Officer, Chief Financial Officer
(Principal Executive Officer, Principal Financial
Officer and Principal Accounting Officer)

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

Pursuant to 18 U.S.C. § 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, the undersigned officer of Synthetic Biologics, Inc. (the “Registrant”) hereby certifies, to such officer’s knowledge, that:

- (1) the accompanying Quarterly Report on Form 10-Q of the Registrant for the quarter ended March 31, 2022 (the “Report”) fully complies with the requirements of Section 13(a) or Section 15(d), as applicable, 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 Registrant.

Date: May 16, 2022

By: /s/ Steven A. Shallcross

Name: Steven A. Shallcross
Chief Executive Officer, Chief Financial Officer
(Principal Executive Officer, Principal Financial Officer and Principal Accounting Officer)
