UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K/A
Amendment No. 1

☒ ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACTOF 1934

For the fiscal year ended December 31, 2021

OR

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

For the transition period from to

Commission File Number: 001-38022

MATINAS BIOPHARMA HOLDINGS, INC.
(Exact name of registrant as specified in its charter)

Delaware	**No. 46-3011414**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**

1545 Route 206 South, Suite 302
Bedminster, New Jersey 07921
(Address of principal executive offices) (Zip Code)

908-484-8805
(Registrant's telephone number, including area code)

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

Title of Each Class	Trading Symbol	Name of Each Exchange on Which Registered
Common Stock, par value $0.0001	MTNB	NYSE American

Securities registered pursuant to Section 12(g) of the Act: None.

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.

Yes □ No ☒

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act.

Yes □ No ☒

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.

Yes ☒ No □

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted 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 emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.:

Large accelerated filer	□	Accelerated filer	□
Non-accelerated filer	☒	Smaller reporting company	☒

Emerging growth company □

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

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

The aggregate market value of the voting and non-voting common equity held by non-affiliates computed by reference to the price at which the common equity was sold on June 30, 2021 was approximately $160.0 million.

As of March 4, 2022, there were 216,864,526 shares of the registrant's common stock, $0.0001 par value, outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

None.

Explanatory Note

This Amendment No. 1 (the "Amendment") to the Annual Report on Form 10-K of Matinas BioPharma Holdings Corp. (the "Company") for the fiscal year ended December 31, 2021, originally filed with the Securities and Exchange Commission (the "SEC") on March 8, 2022 (the "Original Filing"), is being filed solely to correct an administrative error in the content of Item 8, Financial Statements and Supplementary Data in the Original Filing ("Item 8"). Item 8 incorrectly identified EisnerAmper LLP's PCAOB ID as 247. The correct PCAOB ID for EisnerAmper LLP is 274.

Except as described above, no other information included in the Original Filing is being amended or updated by this Amendment, and this Amendment does not purport to reflect any information or events subsequent to the Original Filing.

Pursuant to Rule 12b-15 under the Securities Exchange Act of 1934, as amended (the "Exchange Act"), this Amendment also contains new certifications pursuant to Sections 302 and 906 of the Sarbanes-Oxley Act of 2002, which are attached hereto.

MATINAS BIOPHARMA HOLDINGS, INC.

Annual Report on Form 10-K
Amendment No. 1

Fiscal Year Ended December 31, 2021

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Item 8. Financial Statements And Supplementary Data

Our financial statements, together with the independent registered public accounting firm report thereon, are incorporated by reference from the applicable information set forth in Part IV Item 15, "Exhibits, Financial Statement Schedules" of this Annual Report on Form 10-K which includes the report of EisnerAmper LLP (PCAOB ID: 274).

Part IV

Item 15. Exhibits And Financial Statement Schedules

Exhibit No.	Description
23.1	Consent of EisnerAmper LLP***
31.1	Certification of President and Chief Executive Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002*
31.2	Certification of Acting Chief Financial Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002*
32.1	Section 1350 Certifications**
101	The following financial information from the Annual Report on Form 10-K for the fiscal year ended December 31, 2021, formatted in XBRL (eXtensible Business Reporting Language), is filed electronically herewith: (i) Consolidated Balance Sheets as of December 31, 2021 and 2020; (ii) Consolidated Statements of Operations and Comprehensive Loss for the Years Ended December 31, 2021 and 2020; (iii) Consolidated Statement of Changes in Stockholders' Equity (Deficit) for the Years Ended December 31, 2021 and 2020; (iv) Consolidated Statements of Cash Flows for the Years Ended December 31, 2021 and 2020; and (v) Notes to Consolidated Financial Statements.*
104	The cover page from this Annual Report on Form 10-K, formatted as Inline XBRL.

* Filed herewith.
** Furnished herewith.
*** Previously Filed

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Act, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized, in the city of Bedminster, State of New Jersey on March 11, 2022.

MATINAS BIOPHARMA HOLDINGS, INC.

By: */s/ Jerome D. Jabbour*
Name: Jerome D. Jabbour
Title: Chief Executive Officer

By: */s/ Keith A. Kucinski*
Name: Keith A. Kucinski
Title: Chief Financial Officer

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Person	Capacity	Date
/s/ Jerome D. Jabbour Jerome D. Jabbour	Chief Executive Officer and Director (Principal Executive Officer)	March 11, 2022
/s/ Keith A. Kucinski Keith A. Kucinski	Chief Financial Officer (Principal Financial and Accounting Officer)	March 11, 2022
/s/ Herbert Conrad Herbert Conrad	Chairman of the Board	March 11, 2022
/s/ Kathryn Corzo Kathryn Corzo	Director	March 11, 2022
/s/ Eric Ende Eric Ende	Director	March 11, 2022
/s/ Natasha Giordano Natasha Giordano	Director	March 11, 2022
/s/ James S. Scibetta James S. Scibetta	Director	March 11, 2022
/s/ Matthew A. Wikler Matthew A. Wikler	Director	March 11, 2022

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Stockholders of
Matinas BioPharma Holdings, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Matinas BioPharma Holdings, Inc. and Subsidiaries as of December 31, 2021 and 2020 and the related consolidated statements of operations and comprehensive loss, changes in stockholders' equity, and cash flows for each of the years in the two-year period ended December 31, 2021, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2021, and the results of their operations and their cash flows for each of the years in the two-year period ended December 31, 2021, in conformity with accounting principles generally accepted in the United States of America.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) ("PCAOB") and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matter

The critical audit matter communicated below is a matter arising from the current period audit of the financial statements that was communicated or required to be communicated to the audit committee and that: (1) relate to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of the critical audit matter does not alter in any way our opinion on the financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

Accruals for research and development expenses

As disclosed in the consolidated statements of operations, for the year ended December 31, 2021, the Company incurred significant research and development ("R&D") expenses, which amounted to approximately $14.6 million. At December 31, 2021, the Company had accrued $1.3 million for R&D expenses on the consolidated balance sheet. A large amount of the Company's R&D expenses are service fees paid to contract research organizations ("CROs") and contract manufacturing organizations ("CMOs"). The R&D activities with these CROs and CMOs are documented in contractual agreements and are typically performed over an extended period, and there may be several milestones of the services in one agreement. Therefore, the allocation of the service expenses based on the progress of the R&D projects and the milestones completed for the appropriate financial reporting period involved judgement and estimation.

We identified management's estimate of accruals for R&D expenses as a critical audit matter due to the significance of these expenses to the financial statements and the subjectivity involved in estimating the progress of the R&D projects and service fees accrued for the completion of milestones by the CROs and CMOs. As a result, auditor judgement and additional testing were required to perform procedures and evaluate audit evidence related to the accruals for R&D expenses.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. Our audit procedures related to the accruals for R&D expenses included the following, among others, (i) we obtained an understanding of management's process and evaluated the design of controls related to the accrual process for R&D expenses; (ii) we read selected research agreements to evaluate whether the progress and the completion of milestones reported by the representatives of the CROs and CMOs and the corresponding service fees are based on the respective contractual terms, (iii) we sent confirmations to CROs and CMOs, on a sample basis, to confirm the amount of the total R&D service fees incurred for the year and the amounts of outstanding payables under the terms of the contracts, and (iv) we selected projects from the open contract list at year end and made inquiries of the Company research personnel regarding the project status, and we also inspected invoices received subsequent to year-end and additional documents and correspondence with the CROs and CMOs, supporting management's estimate of R&D expenditures.

/s/ EisnerAmper LLP

We have served as the Company's auditor since 2011.

EISNERAMPER LLP
Iselin, New Jersey
March 8, 2022

Matinas BioPharma Holdings, Inc.
Consolidated Balance Sheets

	December 31, 2021	December 31, 2020
ASSETS:		
Current assets:		
Cash and cash equivalents	$ 21,029,806	$ 12,432,481
Marketable securities	28,592,049	46,246,573
Restricted cash	50,000	136,000
Prepaid expenses and other current assets	1,321,466	2,739,791
Total current assets	50,993,321	61,554,845
Non-current assets:		
Leasehold improvements and equipment - net	1,537,728	1,523,950
Operating lease right-of-use assets - net	4,218,890	3,276,639
Finance lease right-of-use assets - net	22,270	58,007
In-process research and development	3,017,377	3,017,377
Goodwill	1,336,488	1,336,488
Restricted cash - security deposits	200,000	200,000
Total non-current assets	10,332,753	9,412,461
Total assets	$ 61,326,074	$ 70,967,306
LIABILITIES AND STOCKHOLDERS' EQUITY:		
Current liabilities:		
Accounts payable	$ 938,270	$ 349,941
Accrued expenses and other liabilities	2,850,888	2,795,329
Operating lease liabilities - current	538,546	391,498
Financing lease liabilities - current	21,039	30,853
Total current liabilities	4,348,743	3,567,621
Non-current liabilities:		
Deferred tax liability	341,265	341,265
Operating lease liabilities - net of current portion	4,140,387	3,304,063
Financing lease liabilities - net of current portion	2,621	23,660
Total non-current liabilities	4,484,273	3,668,988
Total liabilities	8,833,016	7,236,609
Stockholders' equity:		
Series B Convertible preferred stock, stated value $1,000 per share, 8,000 shares authorized as of December 31, 2021 and 2020, respectively; 0 and 4,361 shares issued and outstanding as of December 31, 2021 and 2020, respectively	-	3,797,705
Common stock par value $0.0001 per share, 500,000,000 shares authorized at December 31, 2021 and 2020, respectively; 216,269,450 and 200,113,431 issued and outstanding as of December 31, 2021 and 2020, respectively	21,627	20,010
Additional paid-in capital	184,251,138	167,192,003
Accumulated deficit	(131,634,208)	(107,507,193)
Accumulated other comprehensive (loss)/income	(145,499)	228,172
Total stockholders' equity	52,493,058	63,730,697
Total liabilities and stockholders' equity	$ 61,326,074	$ 70,967,306

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

Matinas BioPharma Holdings, Inc.
Consolidated Statements of Operations and Comprehensive Loss

	For the Year Ended December 31,	
	2021	**2020**
Revenue:		
Contract research revenue	$ 33,333	$ 158,333
Costs and Expenses:		
Research and development	14,583,283	14,358,918
General and administrative	10,184,805	10,005,967
Total costs and expenses	24,768,088	24,364,885
Loss from operations	(24,734,755)	(24,206,552)
Sale of New Jersey net operating loss	1,328,470	1,073,289
Other income, net	122,870	686,425
Net loss	$ (23,283,415)	$ (22,446,838)
Preferred stock series B accumulated dividends	(395,799)	(793,442)
Net loss attributable to common shareholders	$ (23,679,214)	$ (23,240,280)
Net loss attributable to common shareholders per share – basic and diluted	$ (0.11)	$ (0.12)
Weighted average common shares outstanding:		
Basic and diluted	210,178,332	196,894,628
Other comprehensive (loss)/income, net of tax		
Net unrealized (loss)/gain on securities available-for-sale	(373,671)	237,537
Reclassification of realized gain on securities available-for-sale to net loss	-	(8,485)
Other comprehensive (loss)/income, net of tax	(373,671)	229,052
Comprehensive loss attributable to shareholders	$ (23,657,086)	$ (22,217,786)

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

Matinas BioPharma Holdings, Inc.
Consolidated Statements of Changes in Stockholders' Equity

	Redeemable Convertible Preferred Stock B		Common Stock		Additional Paid - in	Accumulated	Accumulated Other Comprehensive	Total Stockholders'
	Shares	Amount	Shares	Amount	Capital	Deficit	(Loss)/Income	Equity
Balance, December 31, 2019	4,577	$ 3,985,805	163,156,984	$ 16,315	$ 113,427,897	$ (84,377,555)	$ (880)	$ 33,051,582
Stock-based compensation	-	-	-	-	4,184,141	-	-	4,184,141
Issuance of common stock as compensation for services	-	-	379,385	38	390,604	-	-	390,642
Issuance of common stock in exchange for preferred shares B	(216)	(188,100)	432,000	43	188,057	-	-	-
Issuance of common stock in public offering, net of stock issuance costs ($3,308,790)	-	-	32,260,000	3,226	46,700,984	-	-	46,704,210
Issuance of common stock in exchange for Options	-	-	782,073	79	820,248	-	-	820,327
Issuance of common stock in exchange for Warrants	-	-	1,737,389	172	797,409	-	-	797,581
Stock dividends	-	-	1,365,600	137	682,663	(682,800)	-	-
Other comprehensive income	-	-	-	-	-		229,052	229,052
Net loss	-	-	-	-	-	(22,446,838)	-	(22,446,838)
Balance, December 31, 2020	4,361	$ 3,797,705	200,113,431	$ 20,010	$ 167,192,003	$ (107,507,193)	$ 228,172	$ 63,730,697
Stock-based compensation	-	-	-	-	4,192,082	-	-	4,192,082
Issuance of common stock as compensation for services	-	-	31,769	4	31,748	-	-	31,752
Issuance of common stock in exchange for preferred shares B	(4,361)	(3,797,705)	8,722,000	873	3,796,832	-	-	-
Issuance of common stock in public offering, net of stock issuance costs ($172,592)	-	-	3,023,147	302	5,580,169	-	-	5,580,471
Issuance of common stock in exchange for Options	-	-	1,076,946	107	1,415,035	-	-	1,415,142
Issuance of common stock in exchange for Warrants	-	-	114,957	12	(12)	-	-	-
Issuance of common stock pursuant to the Aquarius Merger	-	-	1,500,000	150	1,199,850	-	-	1,200,000
Stock dividends	-	-	1,687,200	169	843,431	(843,600)	-	-
Other comprehensive (loss)	-	-	-	-	-	-	(373,671)	(373,671)
Net loss	-	-	-	-	-	(23,283,415)	-	(23,283,415)
Balance, December 31, 2021	-	$ -	216,269,450	$ 21,627	$ 184,251,138	$ (131,634,208)	$ (145,499)	$ 52,493,058

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

Matinas BioPharma Holdings, Inc.
Consolidated Statements of Cash Flows

	For the Year Ended December 31,	
	2021	**2020**
Cash flows from operating activities:		
Net loss	$ (23,283,415)	$ (22,446,838)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization	244,395	231,058
Loss on disposal of equipment	2,207	-
Stock-based compensation expense	4,292,355	4,564,787
Amortization of operating lease right-of-use assets	501,359	484,568
Amortization of finance lease right-of-use assets	35,737	58,961
Amortization of bond discount	250,453	239,831
Realized gain on sale of marketable securities	-	8,485
Stock issued pursuant to the Aquarius Merger Agreement charged to Research and Development	1,200,000	-
Changes in operating assets and liabilities:		
Operating lease liabilities	(460,239)	(423,741)
Prepaid expenses and other current assets	1,349,804	(611,397)
Accounts payable	588,329	(329,369)
Accrued expenses and other liabilities	55,560	855,819
Net cash used in operating activities	(15,223,455)	(17,367,836)
Cash flows from investing activities:		
Purchases of marketable securities	(23,194,600)	(72,106,359)
Proceeds from sales of marketable securities	40,225,000	31,445,156
Purchases of leasehold improvements and equipment	(260,380)	(5,749)
Net cash provided by/(used in) investing activities	16,770,020	(40,666,952)
Cash flows from financing activities:		
Net proceeds from public offering of common stock	5,580,471	46,704,210
Proceeds from exercise of warrants	-	797,581
Proceeds from exercise of options	1,415,142	599,713
Payments of capital lease liability – principal	(30,853)	(54,673)
Net cash provided by financing activities	6,964,760	48,046,831
Net increase/(decrease) in cash, cash equivalents and restricted cash	8,511,325	(9,987,957)
Cash, cash equivalents and restricted cash at beginning of period	12,768,481	22,756,438
Cash, cash equivalents and restricted cash at end of period	$ 21,279,806	$ 12,768,481
Supplemental non-cash financing and investing activities:		
Unrealized (loss)/gain on marketable securities	$ (373,671)	$ 229,052
Cashless exercise of warrants	$ 12	$ -
Stock dividends issued	$ 843,600	$ 682,800
Non-cash prepaid from exercise of options	$ -	$ 220,614
Preferred stock conversion into common stock - series B	$ 3,797,705	$ 188,100
Unearned restricted stock grants	$ -	$ 68,521
Right-of-use asset in exchange from liabilities from operating lease	$ 1,443,610	$ -

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

Note 1 – Description of Business

Matinas BioPharma Holdings Inc. ("Holdings") is a Delaware corporation formed in 2013. Holdings is the parent company of Matinas BioPharma, Inc. ("BioPharma"), and Matinas BioPharma Nanotechnologies, Inc. ("Nanotechnologies," formerly known as Aquarius Biotechnologies, Inc.), its operating subsidiaries ("Nanotechnologies", and together with "Holdings" and "BioPharma" or "the Company"). The Company is a clinical-stage biopharmaceutical company with a focus on identifying and developing novel pharmaceutical products.

Note 2 – Liquidity and Plan of Operations

The Company has experienced net losses and negative cash flows from operations each period since its inception. Through December 31, 2021, the Company had an accumulated deficit of approximately $131.6 million. The Company's net loss for the years ended December 31, 2021 and 2020 were approximately $23.3 million and $22.4 million, respectively.

The Company has been engaged in developing LYPDISO (formerly MAT9001) as well as its lipid nanocrystal ("LNC") platform delivery technology and a pipeline of associated product candidates, including MAT2203 and MAT2501, since 2011. To date, the Company has not obtained regulatory approval for any of its product candidates nor generated any revenue from product sales, and the Company expects to incur significant expenses to complete development of its product candidates. The Company may never be able to obtain regulatory approval for the marketing of any of its product candidates in any indication in the United States or internationally and there can be no assurance that the Company will generate revenues or ever achieve profitability.

Assuming the Company obtains Food and Drug Administration ("FDA") approval for one or more of its product candidates, the Company expects that its expenses will continue to increase once the Company reaches commercial launch. The Company also expects that its research and development expenses will continue to increase as it moves forward with additional clinical studies for its current product candidates and development of additional product candidates. As a result, the Company expects to continue to incur substantial losses for the foreseeable future, and that these losses will be increasing.

To continue to fund operations, during January 2021, the Company sold 3,023,147 shares of common stock under its At-The-Market Sales Agreement with BTIG, LLC, generating gross proceeds of approximately $5.8 million and net proceeds of approximately $5.6 million. In addition, on January 14, 2020, the Company completed an underwritten public offering of 32,600,000 shares of common stock, generating gross cash proceeds of approximately $50.0 million and net proceeds of approximately $46.7 million. (See Note 12 – Stockholders' Equity).

As of December 31, 2021, the Company had cash and cash equivalents of approximately $21.0 million, marketable securities of approximately $28.6 million and restricted cash of approximately $0.3 million. The Company believes the cash and cash equivalents and marketable securities on hand are sufficient to fund planned operations through 2023.

Note 3 – Summary of Significant Accounting Policies

Basis of presentation and principles of consolidation

The accompanying audited consolidated financial statements include the consolidated accounts of Holdings and its wholly owned subsidiaries, BioPharma, and Nanotechnologies. The accompanying consolidated financial statements have been prepared in accordance with accounting principles generally accepted in the United States of America ("U.S. GAAP") and reflect the operations of the Company and its wholly owned subsidiaries. All intercompany transactions have been eliminated in consolidation.

COVID-19

In March 2020, the World Health Organization declared COVID-19 a global pandemic. This contagious disease outbreak, which has continued to spread, and any related adverse public health developments, has adversely affected workforces, economics, and financial markets globally, potentially leading to an economic downturn.

The Company has been actively monitoring the COVID-19 pandemic and its impact globally. The financial results for the year ended December 31, 2021 were not significantly impacted by COVID-19. However, the Company cannot predict the impact of the progression of the COVID-19 pandemic on future results or the Company's ability to raise capital due to a variety of factors, including but not limited to the continued good health of Company employees, the ability of suppliers to continue to operate and deliver, the ability of the Company to maintain operations, any further government and/or public actions taken in response to the pandemic and ultimately the length of the pandemic.

Use of estimates

The preparation of consolidated financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities at the date of the financial statements and the reported amounts of revenue and expenses during the reporting period. Actual results could differ from those estimates.

Significant items subject to such estimates and assumptions include, but are not limited to, the Company's research and development expenses, the assessment of the impairment of goodwill and intangible assets, level 3 fair value measurement of financial instruments, income tax valuations, the determination of stock-based compensation and contingent consideration.

Segment and geographic information

Operating segments are defined as components of an enterprise about which separate discrete information is available for evaluation by the chief operating decision maker, or decision-making group, in deciding how to allocate resources and in assessing performance. The Company views its operations and manages its business in one operating and reporting segment.

Cash, cash equivalents and restricted cash

The Company considers all highly liquid financial instruments with original maturities of three months or less when purchased to be cash and cash equivalents and all investments with maturities of greater than three months from date of purchase are classified as marketable securities. Cash and cash equivalents consisted of cash in bank checking and savings accounts, money market funds and short-term U.S. treasury bonds that mature within three months of settlement date. The Company presents restricted cash with cash and cash equivalents in the Consolidated Statements of Cash Flows. Restricted cash represents funds the Company is required to set aside to cover building operating leases and other purposes. For a complete disclosure of the Company's cash, cash equivalents and restricted cash, see Note 4 – Cash, Cash Equivalents, Restricted Cash and Marketable Securities.

Marketable Securities

Marketable securities, all of which are available-for-sale, consist of U.S. treasury bonds, U.S. government notes, corporate debt securities and state and municipal bonds. Marketable securities are carried at fair value, with unrealized gains and losses reported as accumulated other comprehensive (loss)/income, except for losses from impairments which are determined to be other-than-temporary. Realized gains and losses and declines in value judged to be other-than-temporary are included in the determination of net loss and are included in other income, net. Fair values are based on quoted market prices at the reporting date. Interest and dividends on available-for-sale securities are included in other income, net. For a complete disclosure of the Company's marketable securities, see Note 4 – Cash, Cash Equivalents, Restricted Cash and Marketable Securities.

Concentration of credit risk

The Company's financial instruments that are exposed to concentrations of credit risk consist primarily of cash, cash equivalents, restricted cash and marketable securities. The Company's investment policy is to invest only in institutions that meet high credit quality standards and establishes limits on the amount and time to maturity of investments with any individual counterparty. Balances are maintained at U.S. financial institutions and are insured by the Federal Deposit Insurance Corporation ("FDIC") up to regulatory limits. The Company has not experienced any credit losses associated with its balances in such accounts.

Leasehold improvements and equipment

Equipment and leasehold improvements are stated at cost less accumulated depreciation and amortization. Depreciation on equipment is computed using the straight-line method over the estimated useful lives of the assets, which range from three to ten years. Capitalized costs associated with leasehold improvements are amortized on a straight-line basis over the lesser of the estimated useful life of the asset or the remaining term of the lease.

Goodwill and other intangible assets

Goodwill is recorded when consideration paid for an acquired entity exceeds the fair value of the net assets acquired. Goodwill is not amortized but rather is assessed for impairment at least annually on a reporting unit basis, or more frequently when events and circumstances indicate the goodwill may be impaired. U.S. GAAP provides that the Company has the option to perform a qualitative assessment to determine whether it is more-likely-than-not that the fair value of a reporting unit is less than its carrying amount. If the Company determine this is the case, the Company can perform further analysis to identify and measure the amount of goodwill impairment loss to be recognized, if any.

A reporting unit is an operating segment, or one level below an operating segment. Historically, the Company has conducted its business in a single operating segment and reporting unit. For the years ended December 31, 2021 and 2020, the Company assessed goodwill impairment by performing a qualitative test for its reporting unit. As part of the qualitative review, the Company considered its cash position and its ability to obtain additional financing in the near term to meet its operational and strategic goals and substantiate the value of its business. Based on the results of the Company's assessment, it was determined that it is more-likely-than-not that the fair value of the reporting unit is greater than its carrying amount. There were no impairments of goodwill during the years ended December 31, 2021 and 2020. If a nonrecurring fair value measurement for a goodwill impairment was required, sufficient information will be provided to permit reconciliation of the fair value of the asset categorized within the fair value hierarchy as level 3 to the amounts presented in the statement of financial position.

Indefinite lived intangible assets are composed of in-process research and development ("IPR&D") and represent projects acquired in a business combination that have not reached technological feasibility or that lack regulatory approval at the time of acquisition. These IPR&D assets are reviewed for impairment annually, or sooner if events or changes in circumstances indicate that the carrying amount of the asset may not be recoverable, and upon establishment of technological feasibility or regulatory approval. An impairment loss, if any, is calculated by comparing the fair value of the asset to its carrying value. If the asset's carrying value exceeds its fair value, an impairment loss is recorded for the difference and its carrying value is reduced accordingly. Similar to the impairment test for goodwill, the Company may perform a qualitative approach for testing indefinite-lived intangible assets for impairment. The Company used the qualitative approach and concluded that it was more-likely-than-not that its indefinite-lived assets were not impaired during the years ended December 31, 2021 and 2020.

Leases

The Financial Accounting Standards Board (the "FASB") Accounting Standards Codification ("ASC") Topic 842, "Leases", establishes a right-of-use ("ROU") model that requires a lessee to recognize a ROU asset and lease liability on the balance sheet for all leases with a term longer than 12 months. Leases will be classified as either finance or operating, with classification affecting the pattern and classification of expense recognition in the income statement. Lessor accounting under the new standard is substantially unchanged. Additional qualitative and quantitative disclosures are also required.

Preferred stock dividends

Subject to provisions detailed more fully in Note 12, Stockholders' Equity, shares of Series B Preferred Stock earned dividends at rates of 10%, 15% and 20% once per year on the first, second and third anniversary, respectively, of June 19, 2018. The dividends were paid when earned to the holders of the Series B Preferred Stock in the form of shares of the Company's common stock.

Income taxes

Deferred taxes are provided on a liability method whereby deferred tax assets are recognized for deductible temporary differences and operating loss and tax credit carry forwards and deferred tax liabilities are recognized for taxable temporary differences. Temporary differences are the differences between the reported amounts of assets and liabilities and their tax bases. Deferred tax assets are reduced by a valuation allowance when, in the opinion of management, it is more likely than not that some portion or all of the deferred tax assets will not be realized. Deferred tax assets and liabilities are adjusted for the effects of changes in tax laws and rates.

The Company adopted the provisions of Accounting Standard Codification 740-10 and has analyzed its filing positions in 2021 and 2020 in jurisdictions where it may be obligated to file returns. The Company believes that its income tax filing position and deductions will be sustained on audit and does not anticipate any adjustments that will result in a material change to its financial position. Therefore, no reserves for uncertain income tax positions have been recorded. The Company's policy is to recognize interest and/or penalties related to income tax matters in income tax expense. The Company had no accrual for interest or penalties as of December 31, 2021.

Since the Company incurred net operating losses in every tax year since inception, the 2014 through 2020 income tax returns are subject to examination and adjustments by the IRS for at least three years following the year in which the tax attributes are utilized.

Fair Value Measurements

As defined in ASC 820 "Fair Value Measurement", fair value measurements should be disclosed separately by three levels of the fair value hierarchy. For assets and liabilities recorded at fair value, it is the Company's policy to maximize the use of observable inputs (quoted prices in active markets) and minimized the use of unobservable inputs (the Company's assumptions) when developing fair value measurements, in accordance with the established fair value hierarchy. For a complete disclosure of the Company's fair value measurements, see Note 5 – Fair Value Measurements.

Stock-based compensation

Stock-based compensation to employees consist of stock option grants and restricted shares that are recognized in the consolidated statement of operations based on their fair values at the date of grant.

The Company accounts for equity instruments issued to non-employees in accordance with the provisions of ASC Topic 505, subtopic 50, *Equity-Based Payments to Non-Employees* based upon the fair-value of the underlying instrument. The equity instruments, consisting of stock options granted to consultants, are valued using the Black-Scholes valuation model. The Company calculates the fair value of option grants utilizing the Black-Scholes pricing model and estimates the fair value of restricted stock based upon the estimated fair value or the common stock. The amount of stock-based compensation recognized during a period is based on the value of the portion of the awards that are ultimately expected to vest. The Company accounts for forfeitures as they occur. The term "forfeitures" is distinct from "cancellations" or "expirations" and represents only the unvested portion of the surrendered stock option or warrant.

The resulting stock-based compensation expense for both employee and non-employee awards is generally recognized on a straight-line basis over the requisite service period of the award.

Basic and diluted net loss per common share

Net loss per share information is determined using the two-class method, which includes the weighted-average number of shares of common stock outstanding during the period and other securities that participate in dividends (a "participating security"). The Company considered its Preferred Stock to be participating securities because they included rights to participate in dividends with the common stock.

Under the two-class method, basic net loss per share attributable to common stockholders is computed by dividing the net income attributable to common stockholders by the weighted-average number of shares of common stock outstanding during the period. The net loss attributable to common stockholders is calculated by adjusting the net loss of the Company for the accretion on the Preferred Stock. Net losses are not allocated to preferred stockholders as they do not have an obligation to share in the Company's net losses. In periods with net income attributable to common stockholders, the Company would allocate net income first to preferred stockholders based on dividend rights under the Company's certificate of incorporation and then to preferred and common stockholders based on ownership interests. Diluted net loss per share attributable to common stockholders is computed using the more dilutive of (1) the two-class method or (2) the if-converted method.

During the years ended December 31, 2021 and 2020, diluted earnings per common share is the same as basic earnings per common share because, as the Company incurred a net loss during each period presented, the potentially dilutive securities from the assumed exercise of all outstanding stock options, warrants and conversion of preferred stock, would have an anti-dilutive effect. The reconciliation of the diluted shares as of December 31, 2021 and 2020 are as follows (in thousands):

Schedule of Anti-dilutive Securities

	As of December 31,	
	2021	**2020**
Stock options	28,184	22,551
Preferred Stock and accrued dividend upon conversion	-	8,722
Warrants	988	1,328
Total	29,172	32,601

Revenue recognition

Pursuant to Topic 606, the Company recognizes revenue to depict the transfer of promised goods or services to a customer in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. To achieve this core principle, Topic 606 outlines a five-step process for recognizing revenue from customer contracts that includes i) identification of the contract with a customer, ii) identification of the performance obligations in the contract, iii) determining the transaction price, iv) allocating the transaction price to the separate performance obligations in the contract, and v) recognizing revenue associated with performance obligations as they are satisfied.

At contract inception, the Company assesses the goods or services promised within each contract and assess whether each promised good or service is distinct and determine those that are performance obligations. The Company then recognizes as revenue the amount of the transaction price that is allocated to the respective performance obligation when the performance obligation is satisfied.

For the years ended December 31, 2020, the Company's revenues primarily consist of a research grant to provide research and development services to the Cystic Fibrosis Foundation ("CFF"). The grant contract has a single performance obligation that is recognized over time as the services are performed. There are no contract assets or liabilities associated with this grant. The Company had approximately $125 thousand of CFF research grant revenue for the year ended December 31, 2020.

On December 12, 2019, the Company entered into a feasibility study agreement (the "Agreement") with Genentech, Inc. ("Genentech"). This feasibility study will involve the development of oral formulations using the Company's LNC platform delivery technology, which enables the development of a wide range of difficult-to-deliver molecules. Under the terms of the Agreement, Genentech paid the Company a total of $100 thousand for three molecules, or approximately $33 thousand per molecule, which will be recognized upon the Company fulfilling its obligations for each molecule under the Agreement. The Agreement has a single performance obligation that is recognized over time as the services are performed. There are no contract assets or liabilities associated with this Agreement. As certain Agreement performance obligations in this agreement were completed, disaggregation of revenue is not required. As of December 31, 2021, the Company completed the first and second of the three molecules and the Company recognized approximately $33 thousand of Genentech revenue for the years ended December 31, 2021 and 2020, respectively. The Company is scheduled to complete the remaining molecule during 2022.

Collaboration Agreements

The Company assess whether its collaboration agreements are subject to ASC Topic 808, *Collaborative Arrangements* (Topic 808) based on whether they involve joint operating activities and whether both parties have active participation in the arrangement and are exposed to significant risks and rewards. To the extent that the arrangement falls within the scope of Topic 808, the Company will apply by analogy the unit of account guidance under Topic 606 to identify distinct performance obligations, and then determine whether a customer relationship exists for each distinct performance obligation. If the Company determines a performance obligation within the arrangement is with a customer, the Company applies the guidance in Topic 606. If a portion of a distinct bundle of goods or services within an arrangement is not with a customer, then the unit of account is not within the scope of Topic 606, and the recognition and measurement of that unit of account shall be based on analogy to authoritative accounting literature or, if there is no appropriate analogy, a reasonable, rational, and consistently applied accounting policy election.

The terms of such arrangements typically include payments to the Company for one or more of the following: up-front fees; development and regulatory payments; product supply services; research and development cost reimbursements; profit-sharing arrangements; and royalties on certain products if they are successfully commercialized. As part of the accounting for these arrangements, the Company develops assumptions that require judgment to determine the standalone selling price for each performance obligation identified in the contract. These key assumptions may include forecasted revenues, clinical development timelines and costs, reimbursement rates for personnel costs, discount rates and probabilities of technical and regulatory success.

Up-front License Fees: If the license to the Company's intellectual property is determined to be distinct from the other performance obligations identified in the arrangement, the Company would recognize revenues from nonrefundable up-front fees allocated to the license when the license is transferred to the licensee and the licensee is able to use and benefit from the license, which generally would occur at or near the inception of the contract. For licenses that are bundled with other promises, the Company would utilize judgment to assess the nature of the combined performance obligation to determine whether the combined performance obligation is satisfied over time or at a point in time and, if over time, the appropriate method of measuring progress for purposes of recognizing revenues from nonrefundable up-front fees. The Company will evaluate the measure of progress at the end of each reporting period and, if necessary, adjust the measure of performance and related revenue recognition.

Research and Development Milestone Payments: At the inception of each arrangement that includes development milestone payments, the Company will evaluate whether the milestones are considered probable of being reached and estimate the amount to be included in the transaction price using the most likely amount method. If it is probable that a significant revenue reversal would not occur, the associated milestone value is included in the transaction price. Milestone payments that are not within the Company's or the licensee's control, such as regulatory approvals, are not considered probable of being achieved until uncertainty associated with the approvals has been resolved. The transaction price is then allocated to each performance obligation, on a relative standalone selling price basis, for which the Company will recognize revenue as or when the performance obligations under the contract are satisfied. At the end of each subsequent reporting period, the Company re-evaluates the probability of achieving such development and regulatory milestones and any related variable consideration constraint, and if necessary, adjust the Company's estimate of the overall transaction price. Any such adjustments are recorded on a cumulative catch-up basis.

Research and Development Cost Reimbursements: The Company's collaboration arrangements may include promises of future clinical development and drug safety services, as well as participation on certain joint committees. When such services are provided to a customer or partner, and they are distinct from the licenses provided to the Company's collaboration partners, these promises are accounted for as a separate performance obligation which the Company estimates using internal development costs incurred and projections through the term of the arrangements. The Company records revenues for these services as the performance obligations are satisfied over time based on measure of progress. However, if the Company concludes that its collaboration partner is not a customer for those collaborative research and development activities, it presents such payments as a reduction of research and development expenses.

Research and Development Arrangement: Under the terms of our research and development agreement with the CFF Agreement, the Company did not account for this arrangement in accordance with Topic 606. However, the Company has determined that it is a partner under a collaboration agreement as it shares in the risks and rewards that would be received if the product is successful and commercialized. Therefore the funds received under the terms of this agreement will be recorded as reimbursements of research and development costs and reduce the research and development expenses in the Company's Statements of Operations and Comprehensive Income/(Loss). The Company records the reimbursements for certain materials and other research and development costs associated with the agreement when it is probable that a significant reversal in the amount of cumulative costs have been recognized. As of December 31, 2021 and 2020, the Company recognized approximately $2.2 million and $0.1 million, respectively, of reimbursed research and development costs associated with the CFF Agreement. For a complete disclosure of the CFF Agreement, see Note 9 – Collaboration Agreements, License and other Research and Development Agreements.

Research and development expenses

Research and development expenses primarily consist of costs associated with the preclinical and clinical development of our product candidate portfolio, including the following:

- external research and development expenses incurred under arrangements with third parties, such as contract research organizations ("CROs") and other vendors and contract manufacturing organizations ("CMOs") for the production of drug substance and drug product; and

- employee-related expenses, including salaries, benefits and share-based compensation expense.

Research and development expenses also include costs of acquired product licenses and related technology rights where there is no alternative future use, costs of prototypes used in research and development, consultant fees and amounts paid to certain of our collaborative partners.

All research and development expenses are charged to operations as incurred in accordance with FASB ASC Topic 730, Research and Development. The Company accounts for non-refundable advance payments for goods and services that will be used in future research and development activities as expenses when the service has been performed or when the goods have been received, rather than when the payment is made.

Accrued Research and Development Expenses

As part of the process of preparing the Company's financial statements, the Company is required to estimate its accrued expenses. This process involves reviewing quotations and contracts, identifying services that have been performed on the Company's behalf and estimating the level of service performed and the associated cost incurred for the service when the Company has not yet been invoiced or otherwise notified of the actual cost. Certain of the Company's service providers invoice the Company monthly in arrears for services performed or when contractual milestones are met. The Company makes estimates of its accrued expenses as of each balance sheet date in its financial statements based on facts and circumstances known to the Company at that time. The Company periodically confirms the accuracy of its estimates with the service providers and adjust if necessary. The significant estimates in the Company's accrued research and development expenses are related to expenses incurred with respect to CROs, CMOs and other vendors in connection with research and development and manufacturing activities.

The Company bases its expense related to CROs and CMOs on its estimates of the services received and efforts expended pursuant to quotations and contracts with such vendors that conduct research and development and manufacturing activities on its behalf. The financial terms of these agreements are subject to negotiation, vary from contract to contract and may result in uneven payment flows. There may be instances in which payments made to the Company's vendors will exceed the level of services provided and result in a prepayment of the applicable research and development or manufacturing expense. In accruing service fees, the Company estimates the time period over which services will be performed and the level of effort to be expended in each period. If the actual timing of the performance of services or the level of effort varies from its estimate, the Company adjust the accrual or prepaid expense accordingly. Although the Company does not expect its estimates to be materially different from amounts actually incurred, the Company's understanding of the status and timing of services performed relative to the actual status and timing of services performed may vary and could result in us reporting amounts that are too high or too low in any particular period. There have been no material changes in estimates for the periods presented.

Patent expenses

Legal fees and other direct costs incurred in obtaining and protecting patents are also expensed as incurred and are included in general and administrative expenses in the consolidated statements of operations.

Other comprehensive income/(loss)

Other comprehensive income/(loss) consists of net gains/(losses) and unrealized losses on marketable securities available-for-sale and is presented in the Consolidated Statements of Operations.

Recently adopted accounting pronouncements

In December 2019, the FASB Issued Accounting Standard Update 2019-12, "Income Taxes, (Topic 740): Simplifying the Accounting for Income Taxes". This standard removes certain exceptions to the general principles and improves consistent application of and simplify GAAP for other areas of Topic 740 by clarifying and amending existing guidance. This standard is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2020. The Company adopted the new standard effective January 1, 2021 with no material impact on the Company's consolidated financial statements.

Note 4 – Cash, Cash Equivalents, Restricted Cash and Marketable Securities

The Company considers all highly liquid financial instruments with original maturities of three months or less when purchased to be cash and cash equivalents and all investments with maturities of greater than three months from date of purchase are classified as marketable securities. Cash and cash equivalents consisted of cash in bank checking and savings accounts, money market funds and short-term U.S. treasury bonds that mature within three months of settlement date.

Cash, Cash Equivalents and Restricted Cash

The Company presents restricted cash with cash and cash equivalents in the Consolidated Statements of Cash Flows. Restricted cash represents funds the Company is required to set aside to cover building operating leases and other purposes.

The following table provides a reconciliation of cash, cash equivalents and restricted cash reported in the Consolidated Balance Sheets to the total of the amounts in the Consolidated Statements of Cash Flows as of December 31, 2021, December 31, 2020 and December 31, 2019 (in thousands):

	December 31, 2021	December 31, 2020	December 31, 2019
Cash and cash equivalents	$ 21,030	$ 12,432	$ 22,170
Restricted cash included in current/long term assets	250	336	586
Cash, cash equivalents and restricted cash in the statements of cash flows	$ 21,280	$ 12,768	$ 22,756

Marketable Securities

The Company has classified its investments in marketable securities as available-for-sale and as a current asset. The Company's investments in marketable securities are carried at fair value, with unrealized gains and losses included as a separate component of stockholders' equity. Unrealized gains and losses are classified as other comprehensive (loss)/income and costs are determined on a specific identification basis. Realized gains and losses from our marketable securities are recorded in other income, net. For the years ended December 31, 2021 and 2020, the Company recorded unrealized (losses)/gains of approximately ($374) thousand and $238 thousand, respectively, and reclassed approximately $0 and $9 thousand to net realized loss from operations from the sale of certain securities during 2021 and 2020, respectively. As of December 31, 2021 and 2020, the Company had net accumulated unrealized losses of approximately $145 thousand and net accumulated unrealized gains of approximately $228 thousand, respectively.

The following tables summarizes the Company's marketable securities for the year ended December 31, 2021 consisted of the following (in thousands):

	Amortized Cost	Unrealized Gain	Unrealized (Loss)	Fair Value
U.S. Government Notes	$ 19,395	$ 2	$ (120)	$ 19,277
Corporate Debt Securities	9,092	—	(27)	9,065
State and Municipal Bonds	250	—	—	250
Total marketable securities	$ 28,737	$ 2	$ (147)	$ 28,592

Maturities of debt securities classified as available-for-sale were as follows at December 31, 2021 (in thousands):

	Fair Value	Net Carrying Amount
Due within one year	$ 8,257	$ 8,310
Due after one year through five years	20,335	20,402
	$ 28,592	$ 28,712

The following tables summarizes the Company's marketable securities for the year ended December 31, 2020 consisted of the following (in thousands):

	Amortized Cost	Unrealized Gain	Unrealized (Loss)	Fair Value
U.S. Treasury Bonds	$ 18,293	$ 136	$ —	$ 18,429
U.S. Government Notes	22,148	82	—	22,230
Corporate Debt Securities	4,303	3	—	4,306
State and Municipal Bonds	1,275	7	—	1,282
Total marketable securities	$ 46,019	$ 228	$ —	$ 46,247

Maturities of debt securities classified as available-for-sale were as follows at December 31, 2020 (in thousands):

	Fair Value	Net Carrying Amount
Due within one year	$ 31,438	$ 31,602
Due after one year through five years	14,809	14,845
	$ 46,247	$ 46,447

The Company determined that the unrealized (losses) and gains are deemed to be temporary as of December 31, 2021 and 2020. Unrealized (losses) and gains generally are the result of increases in the risk premiums required by market participants rather than an adverse change in cash flows for a fundamental weakness in the credit quality of the issuer or underlying assets. The Company has the ability and intent to hold these investments until maturity. The Company does not consider the investment in marketable securities to be other-than-temporarily impaired at December 31, 2021 and 2020.

Note 5 - Fair Value Measurements

The Company uses the fair value hierarchy to measure the value of its financial instruments. The fair value hierarchy is based on inputs to valuation techniques that are used to measure fair value that are either observable or unobservable. Observable inputs reflect assumptions market participants would use in pricing an asset or liability based on market data obtained from independent sources, while unobservable inputs reflect a reporting entity's pricing based upon its own market assumptions. The basis for fair value measurements for each level within the hierarchy is described below:

- Level 1 – Quoted prices for identical assets or liabilities in active markets.
- Level 2 – Quoted prices for identical or similar assets and liabilities in markets that are not active; or other model-derived valuations whose inputs are directly or indirectly observable or whose significant value drivers are observable.
- Level 3 – Valuations derived from valuation techniques in which one or more significant inputs to the valuation model are unobservable and for which assumptions are used based on management estimates.

The Company utilizes valuation techniques that maximize the use of observable inputs and minimize the use of unobservable inputs to the extent possible as well as considers counterparty credit risk in its assessment of fair value.

The carrying amounts of certain cash and cash equivalents, current portion of restricted cash, marketable securities, prepaid expenses and other current assets, accounts payable, current portion of lease liability and accrued expenses approximate fair value due to the short-term nature of these instruments.

A summary of the assets and liabilities carried at fair value in accordance with the hierarchy defined above is as follows (in thousands):

		Fair Value Hierarchy		
December 31, 2021	**Total**	**(Level 1)**	**(Level 2)**	**(Level 3)**
Assets				
Marketable Securities:				
U.S. Government Notes	$ 19,277	$ —	$ 19,277	$ —
Corporate Debt Securities	9,065	—	9,065	—
State and Municipal Bonds	250	—	250	—
Total	$ 28,592	$ —	$ 28,592	$ —

		Fair Value Hierarchy		
December 31, 2020	**Total**	**(Level 1)**	**(Level 2)**	**(Level 3)**
Assets				
Marketable Securities:				
U.S. Treasury Bonds	$ 18,429	$ 18,429	$ —	$ —
U.S. Government Notes	22,230	—	22,230	—
Corporate Debt Securities	4,306	—	4,306	—
State and Municipal Bonds	1,282	—	1,282	—
Total	$ 46,247	$ 18,429	$ 27,818	$ —

U.S. treasury bonds are classified within Level 1 of the fair value hierarchy because they are valued using quoted market prices for identical assets in active markets. Marketable securities consisting of U.S. government notes, corporate debt securities and state and municipal bonds are classified as Level 2 and are valued using quoted market prices in markets that are not active.

Note 6 – Leasehold Improvements and Equipment

Leasehold improvements and equipment, summarized by major category, consist of the following for the years ended December 31, 2021 and 2020 (in thousands):

	December 30, 2021	December 31, 2020
Equipment	$ 1,640	$ 1,443
Leasehold improvements	935	878
Total	2,575	2,321
Less: accumulated depreciation and amortization	1,037	797
Leasehold improvements and equipment, net	$ 1,538	$ 1,524

Depreciation and amortization expense for the years ended December 31, 2021 and 2020 was approximately $244 thousand and $231 thousand, respectively. During the years ended December 31, 2021 and 2020, the Company purchased equipment and leasehold improvements of approximately $260 thousand and $6 thousand, respectively. During the year ended December 31, 2021, the Company recorded an asset write-off of approximately $6 thousand, including $4 thousand of related accumulated depreciation. The Company had no asset write-offs during the year ended December 31, 2020.

Note 7 – Accrued Expenses and Other Liabilities

Accrued expenses and other liabilities, summarized by major category, consist of the following for years ended December 31, 2021 and 2020 (in thousands):

	As of December 31,	
	2021	2020
Payroll and incentives	$ 1,343	$ 1,094
General and administrative expenses	195	280
Research and development expenses	381	778
Deferred revenue and other deferred liabilities *	932	643
Total	$ 2,851	$ 2,795

* At December 31, 2021, the balance included approximately $899 thousand related to the CFF Agreement's deferred liability and approximately $33 thousand is deferred revenue related to the Genentech feasibility study agreement. At December 31, 2020, the balance included approximately $577 thousand related to the CFF Agreement's deferred liability and approximately $67 thousand of deferred revenue related to the Genentech feasibility study agreement.

Note 8 – Leases

The Company has various lease agreements with terms up to 10 years, including leases of office space, a laboratory and manufacturing facility, and various equipment. Some leases include purchase, termination or extension options for one or more years. These options are included in the lease term when it is reasonably certain that the option will be exercised.

Operating lease obligations

On November 1, 2013, the Company entered into a 7-year lease for office space in Bedminster, New Jersey which commenced in June 2014 at a monthly rent of approximately $13,000, increasing to approximately $14,000 per month toward the end of the term.

On September 23, 2020, the Company entered into an amendment to the Bedminster lease. Pursuant to the amendment, the Company leased an additional 3,034 rentable square feet ("Expansion Premises"). The amendment became effective upon delivery to the Company of the Expansion Premises, which occurred on August 1, 2021, and extends the term of the lease for seven years from such date. There is no renewal option, no security deposit, no residual value or significant restrictions or covenants other than those customary in such arrangements. Except as expressly provided, all other terms, covenants, conditions and agreements as set forth in the lease will remain unchanged and in full force and effect.

On December 15, 2016, the Company entered into a 10-year, 3-month lease to consolidate our locations while expanding our laboratory and manufacturing facilities. The lease began August 2017. The monthly rent will start at approximately $43,000 increasing to approximately $64,000 in the final year. To obtain the laboratory and facility site, the Company was obligated to provide an initial security deposit of $586,000. This deposit was subsequently reduced and is currently $200,000 at December 31, 2021.

The assets and liabilities from operating and finance leases are recognized at the lease commencement date based on the present value of remaining lease payments over the lease term using the Company's incremental borrowing rates or implicit rates, when readily determinable. Short-term leases, which have an initial term of 12 months or less, are not recorded on the balance sheet.

The Company's operating leases do not provide an implicit rate that can readily be determined. Therefore, the Company uses a discount rate based on its incremental borrowing rate, which is determined using the average of borrowing rates explicitly stated in the Company's finance leases.

The Company incurred lease expense for its operating leases of approximately $852 thousand and $814 thousand for the years ended December 31, 2021 and 2020. The Company incurred amortization expense on its operating lease right-of-use assets of approximately $501 thousand and $485 thousand for the years ended December 31, 2021 and 2020, respectively.

Finance Leases

The Company incurred interest expense on its finance leases of approximately $3 thousand and $7 thousand for the years ended December 31, 2021 and 2020, respectively. The Company incurred amortization expense on its finance lease right-of-use assets of approximately $36 thousand and $59 thousand for the years ended December 31, 2021 and 2020, respectively.

The following table presents information about the amount and timing of liabilities arising from the Company's operating leases and finance leases as of December 31, 2021 (in thousands):

Maturity of Lease Liabilities	Operating Lease Liabilities	Finance Lease Liabilities
2022	$ 883	$ 22
2023	922	2
2024	962	-
2025	1,004	-
2026	1,046	-
Thereafter	1,112	-
Total undiscounted operating lease payments	$ 5,929	$ 24
Less: Imputed interest	1,250	-
Present value of operating lease liabilities	$ 4,679	$ 24
Weighted average remaining lease term in years	6.1	0.9
Weighted average discount rate	7.8%	7.8%

The following table presents information about the amount and timing of liabilities arising from the Company's operating and finance leases as of December 31, 2020 (in thousands):

Maturity of Lease Liabilities	Operating Lease Liabilities	Finance Lease Liabilities
2021	$ 685	$ 34
2022	645	19
2023	677	2
2024	710	-
2025	745	-
Thereafter	1,458	-
Total undiscounted operating lease payments	$ 4,920	$ 55
Less: Imputed interest	1,224	-
Present value of operating lease liabilities	$ 3,696	$ 55
Weighted average remaining lease term in years	6.7	1.7
Weighted average discount rate	8.4%	8.1%

Note 9 - Collaboration Agreements, License and Other Research and Development Agreements

Cystic Fibrosis Foundation Therapeutics Development Award

On November 19, 2020, the Company entered into an award agreement (the "Agreement") with CFF, pursuant to which it received a Therapeutics Development Award of up to $4.2 million (the "Award") (of which $484,249 had been previously received) to support the preclinical development (the "Development Program") of the Company's MAT2501 product candidate (the "Product"), a LNC oral formulation of the broad-spectrum aminoglycoside amikacin, for the treatment of pulmonary non-tubercular mycobacteria infections and other pulmonary diseases (the "Field"). On November 19, 2021, the Company and CFF entered into an Amendment to the Agreement which added an additional milestone payment in the amount of $321 thousand. The milestone payment was invoiced and the payment was received in the fourth quarter of 2021.

The first payment under the Agreement, in the amount of $650 thousand, became due upon execution of the Agreement. The Company invoiced the CFF in November 2020 and payment was subsequently received in February 2021. During 2021, the Company invoiced and received $2.5 million related to Agreement and the related deferred liability balance of $899 thousand is included in accrued expense and other current liabilities. The remainder of the Award will be paid to the Company upon the achievement of certain milestones related to the development program and progress of the Development Program, as set forth in the Agreement.

If the Company ceases to use commercially reasonable efforts directed to the development of MAT2501 in the Field, (an "Interruption") and fails to resume the development of the Product after receiving from CFF notice of an Interruption, then the Company must either repay the amount of the Award actually received by the Company, or grant to CFF (1) an exclusive (even as to the Company), worldwide, perpetual, sublicensable license under technology developed under the Agreement that covers the Product for use in treating infections in CF patients (the "CF Field"), and (2) a non-exclusive, worldwide license under certain background intellectual property covering the Product, to the extent necessary to commercialize the Product in the CF Field.

Pursuant to the terms of the Agreement, the Company is obligated to make royalty payments to CFF contingent upon commercialization of the Product in the Field up to a maximum of five (5) times the Award or approximately $21.2 million (the "Royalty Cap"), payable in three equal annual installments following the first commercial sale of the Product, the first of which is due within 90 days following the first commercial sale of the Product. The Company may also be obligated to make a payment to CFF if the Company transfers, sells or licenses the Product in the CF Field, or if the Company enters into a change of control transaction which will be applied against the Royalty Cap. In addition, the Company is also obligated to make up the two royalty payments of CFF of the approximately $4.2 million each, due in the calendar years in which specific net sales milestones are achieved.

The term of the Agreement commenced on November 19, 2020 and expires on the earlier of the date on which the Company has paid CFF all of the fixed royalty payments set forth therein, the effective date of any license granted to CFF following an Interruption, or upon earlier termination of the Agreement. Either CFF or the Company may terminate the agreement for cause, which includes the Company's material failure to achieve certain development milestones. The Company's payment obligations survive the termination of the Agreement.

The Company concluded that the CFF award is in the scope of ASC 808. Accordingly, as discussed in Note 3, the award amounts received from CFF upon achievement of certain milestones are recognized as credits to research and development expenses in the period the Development Program's expenses are incurred. During the years ended December 31, 2021 and 2020, the Company recognized $2.2 million and $0.1 million, respectively, as credits to research and development expenses related to the CFF award. In addition, the Company concluded under the guidance in ASC 730 that it does not have an obligation to repay funds received once related research and development expenses are incurred.

Genentech Feasibility Study Agreement

On December 12, 2019, the Company entered into a feasibility study agreement (the "Agreement") with Genentech, Inc. ("Genentech"). This feasibility study agreement will involve the development of oral formulations using the Company's LNC platform delivery technology, which enables the development of a wide range of difficult-to-deliver molecules. Under the terms of the Agreement, Genentech shall pay to the Company a total of $100.0 thousand for three molecules, or approximately $33 thousand per molecule, which will be recognized upon the Company fulfilling its obligations for each molecule under the Agreement. On December 13, 2019, per Genentech's request, the Company billed Genentech for the total $100 thousand and recorded the upfront consideration as deferred revenue, which is recorded in accrued expenses on the consolidated balance sheets, and will recognize it over the term of the contract performance obligation period. As of December 31, 2021, the Company completed the first and second of the three molecules and the Company recognized approximately $33 thousand of Genentech revenue for the years ended December 31, 2021 and 2020, respectively. The Company is scheduled to complete the remaining molecule during 2022.

Other Research and development agreements

The Company has financial obligations resulting from Cooperative Research and Development Agreements ("CRADAs") entered into with the with the National Institute of Allergy and Infectious Diseases ("NIH") as follows:

- On February 19, 2016, the Company agreed to provide funds in the amount of $200,000 per year under a CRADA to support NIH investigators in the conduct of clinical research to investigate the safety, efficacy, and pharmacokinetics of LNC platform drug products in patients with fungal, bacterial, or viral infections. The initial term of the CRADA was three years. On April 16, 2019, the Company renewed the CRADA for an additional three years with an annual funding commitment of $200,000.

- On April 2, 2019, the Company agreed to provide funds in the amount of $157,405 per year under a CRADA to support NIH investigators in the conduct of clinical research to investigate the safety, efficacy, and pharmacokinetics of LNC platform drug products in patients with fungal, bacterial, or viral infections. The term of the CRADA is three years.

License agreement

Through the acquisition of Aquarius, the Company acquired a license from Rutgers University, The State University of New Jersey (successor in interest to the University of Medicine and Dentistry of New Jersey) for the LNC platform delivery technology. The Second Amended and Restated Exclusive License Agreement provides for, among other things, the payment of (1) royalties on a tiered basis between low single digits and the mid-single digits of net sales of products using such licensed technology, (2) a one-time sales milestone fee of $100,000 when and if sales of products using the licensed technology reach the specified sales threshold and (3) an annual license fee of $50,000 over the term of the license agreement.

Note 10 – Commitments

Royalty payment rights

On September 12, 2016 the Company conducted a final closing of a private placement offering to accredited investors of shares of the Company's Series A Preferred Stock. As part of this offer, the investors received royalty payment rights if and when the Company generates sales of its MAT2203 or MAT2501 product candidates. Pursuant to the terms of the Series A Certificate of Designation, the Company may be required to pay royalties of up to $35 million per year. If and when the Company obtains FDA or the European Medicines Agency ("EMA") approval of MAT2203 and/or MAT2501, which the Company does not expect to occur before 2023, if ever, and/or if the Company generates sales of such products, or the Company receives any proceeds from the licensing or other disposition of MAT2203 or MAT2501, the Company is required to pay to the holders of the Series A Preferred Stock, subject to certain vesting requirements, in the aggregate, a royalty (the "Royalty Payment Rights") equal to (i) 4.5% of Net Sales (as defined in the Series A Certificate of Designation), subject in all cases to a cap of $25 million per calendar year, and (ii) 7.5% of Licensing Proceeds (as defined in the Series A Certificate of Designation), subject in all cases to a cap of $10 million per calendar year. The Royalty Payment Rights will expire when the patents covering the applicable product expire, which is currently expected to be in 2033.

Employment agreements

The Company also has employment agreements with certain employees which require the funding of a specific level of payments, if certain events, such as a change in control, termination without cause or retirement, occur.

Other normal business operating agreements

In addition, in the course of normal business operations, the Company enters into agreements with contract service providers to assist in the performance of research & development and manufacturing activities. Expenditures to these third parties represent significant costs in clinical development and may require upfront payments and long-term commitments of cash. Subject to required notice periods and obligations under binding purchase orders, the Company can elect to discontinue the work under these agreements at any time.

Note 11 – Income Taxes

The Company utilizes the liability method of accounting for deferred income taxes. Under this method, deferred tax liabilities and assets are recognized for the expected future tax consequences of temporary differences between the carrying amounts and the tax basis of assets and liabilities. A valuation allowance is established against deferred tax assets when, based on the weight of available evidence, it is more likely than not that some or all of the deferred tax assets will not be realized. The Company's policy is to record interest and penalties on uncertain tax positions as income tax expense. As of December 31, 2021 and 2020, the Company does not believe any material uncertain tax positions were present. Accordingly, interest and penalties have not been accrued due to an uncertain tax position.

The components of the income tax provision are as follows (in thousands):

	Year Ended December 31,	
	2021	**2020**
Current expense (benefit):		
Federal	$ -	$ -
State	-	-
Foreign	-	-
Total current expense (benefit):	$ -	$ -
Deferred expense (benefit):		
Federal	$ -	$ -
State	-	-
Foreign	-	-
Total deferred expense (benefit):	$ -	$ -
Total income tax expense (benefit):	$ -	$ -

Deferred income taxes reflect the net effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. A reconciliation of the statutory U.S. federal rate to the Company's effective tax rate is as follows:

	Year Ended December 31,	
	2021	2020
Income at US Statutory Rate	21.00%	21.00%
State Taxes, net of Federal benefit	1.97%	2.95%
Permanent Differences	(0.82)%	(1.28)%
Tax Credits	2.16%	0.75%
Valuation Allowance	(25.21)%	(24.53)%
Discrete items	0.91%	1.11%
Effective income tax rate	0.00%	0.00%

The Company has no current income taxes payable other than certain state minimum taxes which are included in general and administrative expenses.

Significant components of the Company's deferred tax assets (liabilities) for 2021 and 2020 consist of the following (in thousands):

	Year Ended December 31,	
	2021	2020
Share-based Compensation	$ 3,575	$ 3,220
Depreciation and Amortization	166	(119)
Accrued Liability	377	307
Net Operating Loss Carry-forwards	24,076	19,927
R&D Credit Carryforwards	3,207	2,264
Other	(1)	(10)
IPR&D	(848)	(848)
ROU Asset	(1,186)	(921)
ROU Liability	1,315	1,045
Total Deferred tax assets	$ 30,681	$ 24,865
Valuation allowance	(31,023)	(25,206)
Net deferred tax asset (liability)	$ (341)	$ (341)

On March 27, 2020, the Coronavirus Aid, Relief, and Economic Security (CARES) Act was signed into law making several changes to the Internal Revenue Code. The changes include but are not limited to: allowing companies to carryback certain net operating losses, and increasing the amount of net operating loss carryforwards that corporations can use to offset taxable income. The tax law changes in the Act did not have a material impact on the Company's income tax provision.

In assessing the realizability of deferred tax assets, the Company considers whether it is more likely than not that some portion or all of the deferred tax assets will not be realized. The ultimate realization of deferred tax assets is dependent upon the generation of taxable income during the periods in which the temporary differences representing net future deductible amounts become deductible, and is impacted by the Company's ability to carryforward losses to years in which the Company has taxable income. Due to the Company's history of losses and lack of other positive evidence to support taxable income, the Company has recorded a valuation allowance against those deferred tax assets that are not expected to be realized. The valuation allowances were approximately $31.0 million, $25.2 million and $19.7 million as of December 31, 2021, 2020 and 2019, respectively, representing increases of approximately $5.8 million and $5.5 million for the years ending December 31, 2021 and 2020, respectively.

As of December 31, 2021, the Company had Federal net operating loss carryforwards of approximately $38.1 million which will begin to expire in 2032. In addition, the Company has federal net operating loss carryforwards of approximately $63.3 million which have an indefinite carryforward period. The Company also had federal and state research and development tax credit carryforwards of approximately $3.2 million. The federal net operating loss and tax credit carryforwards will expire at various dates beginning in 2033, if not utilized. The difference between the statutory tax rate and the effective tax rate is primarily attributable to the valuation allowance offsetting deferred tax assets.

Utilization of the net operating losses and general business tax credits carryforwards may be subject to a substantial limitation under Sections 382 and 383 of the Internal Revenue Code of 1986 due to changes in ownership of the Company that have occurred previously or that could occur in the future. These ownership changes may limit the amount of net operating losses and general business tax credits carryforwards that can be utilized annually to offset future taxable income and tax, respectively. In general, an ownership change, as defined by Section 382, results from transactions increasing the ownership of certain stockholders or public groups in the stock of a corporation by more than 50 percentage points over a three-year period. The Company has not completed a study to determine whether it had undergone an ownership change since the Company's inception

Sale of net operating losses (NOLs)

The Company recognized approximately $1.3 million and $1.1 million for the years ended December 31, 2021 and 2020, respectively, in connection with the sale of certain State of New Jersey Net Operating Losses ("NOL") and Research and Development ("R&D") tax credits to a third party under the New Jersey Technology Business Tax Certificate Transfer Program. In addition, the Tax Cuts and Jobs Act, signed into law on December 22, 2017 imposes significant additional limitations on the deductibility of interest and limits NOL deductions to 80% of net taxable income for losses arising in taxable years beginning after December 31, 2017. This NOL limitation was suspended for years 2018 through 2020 as a result of the CARES Act.

Note 12 – Stockholders' Equity

At-The-Market Equity Offering

On July 2, 2020, the Company entered into an At-The-Market ("ATM") Sales Agreement (the "Sales Agreement") with BTIG, LLC ("BTIG"), pursuant to which the Company may offer and sell, from time to time, through BTIG, as sales agent and/or principal, shares of its common stock having an aggregate offering price of up to $50,000,000, subject to certain limitations on the amount of common stock that may be offered and sold by the Company set forth in the Sales Agreement. BTIG will be paid a 3% commission on the gross proceeds from each sale. The Company may terminate the Sales Agreement at any time; BTIG may terminate the Sales Agreement in certain limited circumstances. During 2021, BTIG sold 3,023,147 shares of the Company's common stock generating gross proceeds of approximately $5.8 million and net proceeds of approximately $5.6 million, after deducting BTIG's commission on gross proceeds. During 2020, the Company did not sell any shares of its common stock under the ATM Sales Agreement.

Common Stock

On September 3, 2021, the Company issued 1,500,000 unregistered shares of its common stock pursuant to the Agreement and Plan of Merger by and among the Company, Saffron Merger Sub, Inc., Aquarius Biotechnologies Inc. ("Aquarius"), and J Carl Craft, as holder representative, dated January 19, 2015, as subsequently amended on September 3, 2021 (the "Aquarius Merger Agreement"), to the holders of Aquarius Biotechnologies Inc., as defined in the Aquarius Merger Agreement. The shares were issued in place of certain milestone payments previously included under the Aquarius Merger Agreement upon the achievement of specified development milestones. The Company recorded a $1.2 million research and development expense related to the issuance of the 1,500,000 shares based on the closing price of the Company's common stock of $0.80 on the date of issuance.

On January 14, 2020, the Company closed on an underwritten public offering of 32,260,000 shares of its common stock at a purchase price of $1.55 per share. The Company generated gross proceeds of approximately $50.0 million and net proceeds of approximately $46.7 million, after deducting underwriting discounts and commissions and other estimated offering expenses. In addition, the Company granted the underwriters a 30-day option to purchase up to approximately 4.8 million additional shares of its common stock on the same terms and conditions. No additional shares of the Company's common stock were sold pursuant to this option.

Preferred Stock

In accordance with the Certificate of Incorporation, the Company is authorized to issue 10,000,000 preferred shares at a par value of $0.001. In connection with a private placement of Series A Preferred Stock, on July 26, 2016, the Company filed the Series A Certificate of Designation with the Secretary of the State of Delaware to designate the preferences, rights and limitations of the Series A Preferred Stock. Pursuant to the Series A Certificate of Designation, the Company designated 1,600,000 shares of the Company's previously undesignated preferred shares as Series A Preferred Stock. In connection with a public offering of Series B Preferred Stock, on June 19, 2018, the Company filed the Series B Certificate of Designation with the Secretary of the State of Delaware to designate the preferences, rights and limitations of the Series B Preferred Stock. Pursuant to the Series B Certificate of Designation, the Company designated 8,000 shares of the Company's previously undesignated preferred shares as Series B Preferred Stock.

Series B Preferred Stock

During 2021 and prior to June 19, 2021, 143 shares of Series B Preferred Stock were converted by shareholders resulting in the issuance of 286,000 shares of common stock. On June 19, 2021, all 4,218 remaining shares of Series B Preferred Stock were automatically converted into 2,000 shares of the Company's common stock resulting in the issuance of 8,436,000 shares of common stock. As of December 31, 2021 and December 31, 2020, there were 0 and 4,361 shares of Series B Preferred stock outstanding, respectively.

Conversion:

Prior to the automatic conversion of Series B Preferred Stock on June 19, 2021, and subject to certain ownership limitations, each share of Series B Preferred Stock was convertible into shares of the Company's common stock at any time at the option of the holder at an initial conversion price of $0.50 per share subject to adjustment for reverse splits, stock combinations and similar changes as provided in the Certificate of Designation. Based on the conversion price and number of shares outstanding on June 19, 2021, the Series B Preferred Stock were converted into 8,436,000 shares of common stock.

Dividends:

Subject to certain ownership limitations, holders of the Series B Preferred Stock received dividends paid in the Company's common stock as follows: (i) a number of shares of common stock equal to 10% of the shares of common stock underlying the Series B Preferred Stock then held by such holder on June 19, 2019, (ii) a number of shares of common stock equal to 15% of the shares of common stock underlying the Series B Preferred Stock then held by such holder on June 19, 2020 and (iii) a number of shares of common stock equal to 20% of the shares of common stock underlying the Series B Preferred Stock then held by such holder on June 19, 2021. Based on an accounting of the holders of record of Series B Preferred Stock on June 19, 2021 and 2020, the Company made dividend payments totaling 1,687,200 and 1,365,600 shares of common stock, respectively.

Warrants

All warrants issued by the Company are exercisable immediately upon issuance and have a five-year term. The warrants may be exercised at any time in whole or in part upon payment of the applicable exercise price until expiration. No fractional shares will be issued upon the exercise of the warrants. The exercise price and the number of shares purchasable upon the exercise of the warrants are subject to adjustment upon the occurrence of certain events, which include stock dividends, stock splits, combinations and reclassifications of the Company's capital stock or other similar changes to the equity structure of the Company. The warrants do not have a redemption feature. They may be exercised on a cashless basis at the holder's option.

The warrants are classified as equity instruments.

As of December 31, 2021, the Company had outstanding warrants to purchase an aggregate of 988,000 shares of common stock at exercise prices ranging from $0.50 to $0.75 per share, and with expiration dates between December 31, 2022 and June 21, 2023. A summary of warrants outstanding as of December 31, 2021 and 2020 is presented below, all of which are fully vested (in thousands):

	Shares
Outstanding at December 31, 2019	5,397
Issued	-
Exercised	(2,549)
Tendered	-
Expired	(1,493)
Outstanding at December 31, 2020	1,328*
Issued	-
Exercised	(320)**
Tendered	-
Expired	(20)
Outstanding at December 31, 2021	988***

* Weighted average exercise price for outstanding warrants is $0.55.
** Converted into approximately 115 thousand shares of common stock.
*** Weighted average exercise price for outstanding warrants is $0.56.

Note 13 – Accumulated Other Comprehensive (Loss)/Income

The following table summarizes the changes in accumulated other comprehensive (loss)/income by components during the years ended December 31, 2021 and 2020 (in thousands):

	Net Unrealized (Losses)/Gains on Available-for-Sale Securities	Accumulated Other Comprehensive (Loss)/Gain
Balance, December 31, 2019	$ (1)	$ (1)
Net unrealized gain on securities available-for-sale	237	237
Reclassification of realized gain on securities available-for-sale to net loss	(8)	(8)
Net current period other comprehensive gain	229	229
Balance, December 31, 2020	$ 228	$ 228
Net unrealized loss on securities available-for-sale	(373)	(373)
Net current period other comprehensive loss	(374)	(374)
Balance, December 31, 2021	$ (146)	$ (146)

All components of accumulated other comprehensive (loss)/income are net of tax.

Note 14 – Stock-based Compensation

The Company's Amended and Restated 2013 Equity Compensation Plan (the "Plan") provides for the granting of incentive stock options, nonqualified stock options, restricted stock units, performance units, and stock purchase rights. Options under the Plan may be granted at prices not less than 100% of the fair value of the shares on the date of grant as determined by the Compensation Committee of the Board of Directors. The Compensation Committee determines the period over which the options become exercisable subject to certain restrictions as defined in the Plan, with the current outstanding options generally vesting over three or four years. The term of the options is no longer than ten years. As of December 31, 2021, the Company had 36,952,460 shares of common stock authorized for issuance under the Plan.

With the approval of the Board of Directors and a majority of shareholders, effective May 8, 2014, the Plan was amended and restated. The amendment provides for an automatic increase in the number of shares of common stock available for issuance under the Plan each January (with Board approval), commencing January 1, 2015 in an amount up to four percent (4%) of the total number of shares of common stock outstanding on the preceding December 31st.

The Company recognized stock-based compensation expense (options and restricted share grants) in its consolidated statements of operations as follows (in thousands):

	Year Ended December 31,	
	2021	2020
Research and Development	$ 1,870	$ 1,897
General and Administrative	2,422	2,668
Total	$ 4,292	$ 4,565

The following table contains information about the Company's stock plan at December 31, 2020:

Schedule of Equity Compensation Plan by Arrangements

	Awards Reserved for Issuance	Awards Issued & Exercised	Awards Available for Grant
2013 Equity Compensation Plan (in thousands)	36,952*	32,669**	4,283

* Increased by 8,005 thousand on January 1, 2021, representing 4% of the total number of shares of common stock outstanding on December 31, 2020.
** Includes both stock grants and option grants

The following table summarizes the Company' stock option activity and related information for the period from January 1, 2020 to December 31, 2021 (options in thousands):

	Number of Options	Weighted Average Exercise Price	Weighted Average Contractual Term in Years
Outstanding at December 31, 2019	17,529	$ 1.11	6.2
Granted	6,501	$ 1.59	
Exercised	(826)	0.74	
Forfeited	(72)	$ 1.11	
Cancelled	-	-	
Expired	(581)	$ 1.25	
Outstanding at December 31, 2020	22,551	$ 1.26	6.9
Granted	10,976	$ 1.11	
Exercised	(1,077)	$ 0.60	
Forfeited	(2,824)	$ 1.08	
Cancelled	-	-	
Expired	(1,441)	$ 1.98	
Outstanding at December 31, 2021	28,184	$ 1.21	7.2

The following table summarizes outstanding options at December 31, 2021, by their exercise price (options in thousands):

Range of Exercise Prices	Number Outstanding	Weighted Average Exercise Price Per Share
$0.41 - $0.69	1,935	$ 0.49
$0.74 - $1.12	15,940	$ 0.93
$1.24 - $1.61	6,525	$ 1.35
$2.27 - $3.32	3,784	$ 2.50
	28,184	$ 1.21

As of December 31, 2021, the number of vested shares underlying outstanding options was 14,625,397 at a weighted average exercise price of $1.20. The aggregate intrinsic value of in-the-money options outstanding as of December 31, 2021 was $2.5 million. The aggregate intrinsic value is calculated as the difference between the Company's closing stock price of $1.01 on December 31, 2021, and the exercise price of options, multiplied by the number of options. As of December 31, 2021, there was approximately $11.7 million of total unrecognized share-based compensation. Such costs are expected to be recognized over a weighted average period of approximately 2.9 years.

All outstanding options expire ten years from date of grant. Options granted to employees prior to 2018 vest in equal monthly installments over three years. Beginning in 2018, options granted to employees vest over four years, with 25% of the shares vesting on the first annual anniversary of grant and the remaining shares vesting in 36 equal monthly installments over the following 3 years. A portion of options granted to consultants vests over four years, with the remaining vesting being based upon the achievement of certain performance milestones, which are tied to either financing or drug development initiatives.

During the years ended December 31, 2021 and 2020, the Company granted restricted stock awards for 31,769 and 379,385 shares of common stock, respectively. These awards are typically granted to members of the Board of Directors as payment in lieu of cash fees or as payment to a vendor pursuant to a consulting agreement. The Company values restricted stock awards at the fair market value on the date of grant. The Company recorded the value of these restricted awards as general and administrative expense of approximately $100 thousand and $292 thousand in the consolidated statement of operations for the years ended December 31, 2021 and 2020, respectively.

The Company recognizes compensation expense for stock option awards and restricted stock awards on a straight-line basis over the applicable service period of the award. The service period is generally the vesting period, with the exception of awards granted subject to a vendor's consulting agreement, whereby the award vesting period and the service period defined pursuant to the terms of the consulting agreement may be different. Beginning January 1, 2020, stock options issued to consultants are recorded at fair value on the date of grant and the award is recognized as an expense on a straight-line basis over the requisite service period. The following weighted-average assumptions were used to calculate share-based compensation for the comparative periods presented:

	For the Year Ended December 31,	
	2021	**2020**
Volatility	98.4% -101.6%	100.5% - 107.4%
Risk-free interest rate	0.47% - 1.28%	0.34% - 1.74%
Dividend yield	0.0%	0.0%
Expected life	6.0 years	6.0 years

The Company does not have sufficient historical information to develop reasonable expectations about future exercise patterns and post-vesting employment termination behavior. Hence, the Company uses the "simplified method" described in Staff Accounting Bulletin (SAB) 107 to estimated the expected term of share option grants.

The expected stock price volatility assumption is based the Company's historical stock price volatility.

Note 15 – Subsequent Events

None

Exhibit 31.1

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER

I, Jerome D. Jabbour, certify that:

1. I have reviewed this annual report on Form 10-K/A for the year ended December 31, 2021 of Matinas BioPharma Holdings, 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: March 11, 2022

/s/ Jerome D. Jabbour

Jerome D. Jabbour
Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER

I, Keith A. Kucinski, certify that:

1. I have reviewed this annual report on Form 10-K/A for the year ended December 31, 2021 of Matinas BioPharma Holdings, 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: March 11, 2022

/s/ Keith A. Kucinski

Keith A. Kucinski
Chief Financial Officer
(Principal Financial and Accounting Officer)

Exhibit 32.1

CERTIFICATION OF
THE PRINCIPAL EXECUTIVE OFFICER AND PRINCIPAL FINANCIAL OFFICER
PURSUANT TO RULE 13a-14(b)
OF THE SECURITIES EXCHANGE ACT OF 1934 AND 18 U.S.C. SECTION 1350

In connection with the Annual Report on Form 10-K/A of Matinas BioPharma Holdings, Inc. (the "Company") for the fiscal year ended December 31, 2021 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned, Jerome D. Jabbour, Chief Executive Officer of the Company, and Keith A. Kucinski, Chief Financial Officer of the Company, hereby certify, to the knowledge of the undersigned, pursuant to 18 U.S.C. Section 1350, that:

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

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

Date: March 11, 2022

/s/ Jerome D. Jabbour
Jerome D. Jabbour
Chief Executive Officer
(Principal Executive Officer)

Date: March 11, 2022

/s/ Keith A. Kucinski
Keith A. Kucinski
Chief Financial Officer
(Principal Financial and Accounting Officer)

This Certification is being furnished solely to accompany the Report pursuant to 18 U.S.C. § 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, and shall not be deemed "filed" by the Company for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, and shall not be incorporated by reference into any filing of the Company under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, whether made before or after the date of this Report, irrespective of any general incorporation language contained in such filing.

A signed original of this written statement required by Section 906 of the Sarbanes-Oxley Act of 2002 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.