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

FORM 10-Q

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

For the quarterly period ended September 30, 2022

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)

(Former Name, Former Address and Former Fiscal Year, if Changed Since Last Report)

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

Title of Each Class	Trading Symbol(s)	Name of Each Exchange on Which Registered
Common Stock	MTNB	NYSE American

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

Yes ☒ No □

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files).

Yes ☒ No □

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

Large accelerated filer	□	Accelerated filer	□
Non-accelerated Filer	☒	Smaller reporting company	☒
		Emerging growth company	□

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

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

As of October 31, 2022, there were 216,864,526 shares of the registrant's common stock, $0.0001 par value, outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

None.

MATINAS BIOPHARMA HOLDINGS, INC.
Form 10-Q
Quarter Ended September 30, 2022

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Matinas BioPharma Holdings, Inc.
Condensed Consolidated Balance Sheets

	September 30, 2022 (Unaudited)	December 31, 2021 (Audited)
ASSETS:		
Current assets:		
Cash and cash equivalents	$ 11,175,838	$ 21,029,806
Marketable debt securities	21,875,015	28,592,049
Restricted cash – security deposit	50,000	50,000
Prepaid expenses and other current assets	3,997,798	1,321,466
Total current assets	37,098,651	50,993,321
Non-current assets:		
Leasehold improvements and equipment – net	2,144,102	1,537,728
Operating lease right-of-use assets – net	3,742,019	4,218,890
Finance lease right-of-use assets – net	7,026	22,270
In-process research and development	3,017,377	3,017,377
Goodwill	1,336,488	1,336,488
Restricted cash – security deposit	200,000	200,000
Total non-current assets	10,447,012	10,332,753
Total assets	$ 47,545,663	$ 61,326,074
LIABILITIES AND STOCKHOLDERS' EQUITY:		
Current liabilities:		
Accounts payable	$ 656,717	$ 938,270
Accrued expenses	3,696,932	2,850,888
Operating lease liabilities – current	540,076	538,546
Financing lease liabilities – current	7,860	21,039
Total current liabilities	4,901,585	4,348,743
Non-current liabilities:		
Deferred tax liability	341,265	341,265
Operating lease liabilities – net of current portion	3,683,949	4,140,387
Financing lease liabilities – net of current portion	-	2,621
Total non-current liabilities	4,025,214	4,484,273
Total liabilities	8,926,799	8,833,016
Stockholders' equity:		
Common stock par value $0.0001 per share, 500,000,000 shares authorized at September 30, 2022 and December 31, 2021; 216,864,526 and 216,269,450 issued and outstanding as of September 30, 2022 and December 31, 2021, respectively	21,685	21,627
Additional paid-in capital	188,529,404	184,251,138
Accumulated deficit	(148,996,657)	(131,634,208)
Accumulated other comprehensive loss	(935,568)	(145,499)
Total stockholders' equity	38,618,864	52,493,058
Total liabilities and stockholders' equity	$ 47,545,663	$ 61,326,074

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

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

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	**2021**	**2022**	**2021**
Revenue:				
Research and development	$ 1,062,500	$ -	$ 2,125,000	$ 33,333
Costs and expenses:				
Research and development	3,706,828	4,621,255	12,811,462	10,343,451
General and administrative	2,818,252	2,256,689	8,423,868	7,710,625
Total costs and expenses	6,525,080	6,877,944	21,235,330	18,054,076
Loss from operations	(5,462,580)	(6,877,944)	(19,110,330)	(18,020,743)
Sale of New Jersey net operating loss & tax credits	-	-	1,734,133	1,328,470
Other income, net	988	41,394	13,748	108,298
Net loss	$ (5,461,592)	$ (6,836,550)	$ (17,362,449)	$ (16,583,975)
Preferred stock series B accumulated dividends	-	-	-	(395,799)
Net loss attributable to common shareholders	$ (5,461,592)	$ (6,836,550)	$ (17,362,449)	$ (16,979,774)
Net loss available for common shareholders per share – basic and diluted	$ (0.03)	$ (0.03)	$ (0.08)	$ (0.08)
Weighted average common shares outstanding:				
Basic and diluted	216,864,526	215,179,949	216,792,083	208,130,431
Other comprehensive loss, net of tax				
Unrealized loss on securities available-for-sale	(181,152)	(52,837)	(790,069)	(229,766)
Other comprehensive loss, net of tax	(181,152)	(52,837)	(790,069)	(229,766)
Comprehensive loss attributable to shareholders	$ (5,642,744)	$ (6,889,387)	$ (18,152,518)	$ (16,813,741)

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

Matinas BioPharma Holdings, Inc.
Condensed Consolidated Statements of Stockholders' Equity
Unaudited

	Common Stock		Additional Paid – in	Accumulated	Accumulated Other Comprehensive	Total Stockholders'
	Shares	Amount	Capital	Deficit	Loss	Equity
Balance, December 31, 2021	216,269,450	$ 21,627	$ 184,251,138	$ (131,634,208)	$ (145,499)	$ 52,493,058
Stock-based compensation	-	-	3,887,682	-	-	3,887,682
Issuance of common stock in exchange for options	195,076	18	99,423	-	-	99,441
Issuance of common stock pursuant to license agreement amendment	400,000	40	291,160	-	-	291,200
Other comprehensive loss	-	-	-	-	(790,069)	(790,069)
Net loss	-	-	-	(17,362,449)	-	(17,362,449)
Balance, September 30, 2022	216,864,526	$ 21,685	$ 188,529,404	$ (148,996,657)	$ (935,568)	$ 38,618,864

	Common Stock		Additional Paid – in	Accumulated	Accumulated Other Comprehensive	Total Stockholders'
	Shares	Amount	Capital	Deficit	Loss	Equity
Balance, June 30, 2022	216,864,526	$ 21,685	$ 187,116,333	$ (143,535,065)	$ (754,416)	$ 42,848,537
Stock-based compensation	-	-	1,413,070	-	-	1,413,070
Other comprehensive loss	-	-	-	-	(181,152)	(181,152)
Net loss	-	-	-	(5,461,592)	-	(5,461,592)
Balance, September 30, 2022	216,864,526	$ 21,685	$ 188,529,404	$ (148,996,657)	$ (935,568)	$ 38,618,864

	Redeemable Convertible Preferred Stock B		Common Stock		Additional Paid - in	Accumulated	Accumulated Other Comprehensive	Total Stockholders'
	Shares	Amount	Shares	Amount	Capital	Deficit	Income (loss)	Equity
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	-	-	-	-	3,132,351	-	-	3,132,351
Issuance of common stock as compensation for services	-	-	23,910	3	23,811	-	-	23,814
Issuance of common stock in exchange for preferred stock	(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	-	-	1,062,883	106	1,400,552	-	-	1,400,658
Issuance of common stock in exchange for warrants	-	-	114,957	12	(12)	-	-	-
Issuance of common stock pursuant to the Aquarius Merger Agreement	-	-	1,500,000	150	1,199,850	-	-	1,200,000
Stock dividend	-	-	1,687,200	169	843,431	(843,600)	-	-
Other comprehensive loss	-	-	-	-	-	-	(229,766)	(229,766)
Net loss	-	-	-	-	-	(16,583,975)	-	(16,583,975)
Balance, September 30, 2021	-	$ -	216,247,528	$ 21,625	$ 183,168,987	$ (124,934,768)	$ (1,594)	$ 58,254,250

	Redeemable Convertible Preferred Stock B		Common Stock		Additional Paid - in	Accumulated	Accumulated Other Comprehensive	Total Stockholders'
	Shares	Amount	Shares	Amount	Capital	Deficit	Income (loss)	Equity
Balance, June 30, 2021	-	$ -	214,627,522	$ 21,462	$ 180,929,263	$ (118,098,218)	$ 51,243	$ 62,903,750
Stock-based compensation	-	-	-	-	1,031,949	-	-	1,031,949
Issuance of common stock as compensation for services	-	-	6,106	1	7,937	-	-	7,938
Issuance of common stock in exchange for Warrants	-	-	113,900	12	(12)	-	-	-
Issuance of common stock pursuant to the Aquarius Merger Agreement	-	-	1,500,000	150	1,199,850	-	-	1,200,000
Other comprehensive loss	-	-	-	-	-	-	(52,837)	(52,837)
Net loss	-	-	-	-	-	(6,836,550)	-	(6,836,550)
Balance, September 30, 2021	-	$ -	216,247,528	$ 21,625	$ 183,168,987	$ (124,934,768)	$ (1,594)	$ 58,254,250

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

Matinas BioPharma Holdings, Inc.
Condensed Consolidated Statements of Cash Flow
Unaudited

	Nine Months Ended September 30,	
	2022	**2021**
Cash flows from operating activities:		
Net loss	$ (17,362,449)	$ (16,583,975)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization	244,024	179,421
Stock based compensation expense	3,887,682	3,217,497
Amortization of operating lease right-of-use assets	412,909	367,661
Amortization of finance lease right-of-use assets	15,244	29,300
Amortization of bond discount	157,553	172,227
Stock issued pursuant to license agreement amendment	291,200	-
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	(390,945)	(335,833)
Prepaid expenses and other current assets	(2,676,332)	77,333
Accounts payable	(281,553)	312,057
Accrued expenses and other liabilities	846,044	98,574
Net cash used in operating activities	(14,856,622)	(11,265,738)
Cash flows from investing activities:		
Purchase of marketable debt securities	(9,480,588)	(17,787,465)
Proceeds from sales of marketable debt securities	15,250,000	34,725,000
Purchases of leasehold improvements and equipment	(850,399)	(224,188)
Net cash provided by investing activities	4,919,013	16,713,347
Cash flows from financing activities:		
Net proceeds from public offering of common stock	-	5,580,471
Proceeds from exercise of options	99,441	1,400,658
Payments of finance lease liability – principal	(15,800)	(24,459)
Net cash provided by financing activities	83,641	6,956,670
Net (decrease)/increase in cash, cash equivalents and restricted cash	(9,853,968)	12,404,279
Cash, cash equivalents and restricted cash at beginning of period	21,279,806	12,768,481
Cash, cash equivalents and restricted cash at end of period	$ 11,425,838	$ 25,172,760
Supplemental non-cash financing and investing activities:		
Unrealized loss on securities for sale	$ (790,069)	$ (229,766)
Preferred stock conversion into common stock - Series B	$ -	$ 3,797,705
Unearned restricted stock grants	$ -	$ 7,189
Stock dividends issued	$ -	$ 843,600
Right of use asset in exchange from liabilities from operating lease	$ (63,964)	$ 1,443,610
Cashless exercise of warrants	$ -	$ 12

The accompanying notes are an integral part of these condensed 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", "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 September 30, 2022, the Company had an accumulated deficit of approximately $149.0 million. The Company's net loss was approximately $17.4 million for the nine months ended September 30, 2022.

The Company has been engaged in developing 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.

If the Company obtains U.S. 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.

As of September 30, 2022, the Company had cash and cash equivalents of approximately $11.2 million, marketable debt securities of approximately $21.9 million and restricted cash of approximately $0.3 million. The Company believes the cash and cash equivalents and marketable debt 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 unaudited condensed consolidated financial statements include the consolidated accounts of Holdings and its wholly owned subsidiaries, BioPharma, and Nanotechnologies. The accompanying unaudited condensed consolidated financial statements have been prepared in accordance with accounting principles generally accepted in the United States ("U.S. GAAP") and reflect the operations of the Company and its wholly owned subsidiaries. All intercompany transactions have been eliminated in consolidation.

The Company's significant accounting policies are described in Note 3 within the Company's Notes to Consolidated Financial Statements included in the Company's 2021 Form 10-K.

The Company's management has considered all recent accounting pronouncements issued and believes that these recent pronouncements will not have a material effect on the Company's financial statements.

COVID-19

Since its emergence in 2019, COVID-19 has continued to spread and has adversely affected workforces, economies, and financial markets globally, and has and may continue to cause economic downturns.

The Company's financial results for the three and nine months ended September 30, 2022 were not significantly impacted by COVID-19. However, the Company cannot predict the impact of the progression of COVID-19 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 service providers and suppliers to continue to operate and deliver, the ability of the Company to maintain operations, and any further government and/or public actions taken in response to COVID-19.

Note 4 – Cash, Cash Equivalents, Restricted Cash and Marketable Debt 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 debt 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 Condensed Consolidated Statements of Cash Flows. Restricted cash at both September 30, 2022 and December 31, 2021 of $250 thousand represents funds the Company is required to set aside as collateral, primarily for one of the Company's operating leases and other purposes.

The following table provides a reconciliation of cash, cash equivalents and restricted cash reported in the Condensed Consolidated Balance Sheets to the total of the amounts in the Condensed Consolidated Statements of Cash Flows as of September 30, 2022, December 31, 2021, September 30, 2021 and December 31, 2020:

	September 30, 2022	December 31, 2021	September 30, 2021	December 31, 2020
Cash and cash equivalents	$ 11,176	$ 21,030	$ 24,923	$ 12,432
Restricted cash included in current/non-current assets	250	250	250	336
Cash, cash equivalents and restricted cash in the statement of cash flows	$ 11,426	$ 21,280	$ 25,173	$ 12,768

Marketable Debt Securities

The Company has classified its investments in marketable debt securities as available-for-sale and as a current asset. The Company's investments in marketable debt securities are carried at fair value, with unrealized gains and losses included as a separate component of stockholders' equity. Unrealized losses and gains are classified as other comprehensive (loss)/income and costs are determined on a specific identification basis. Realized gains and losses from our marketable debt securities are recorded in other income, net. For the three and nine months ended September 30, 2022, the Company recorded unrealized losses of $181 thousand and $790 thousand, respectively. For the three and nine months ended September 30, 2021, the Company recorded unrealized losses of $53 thousand and $230 thousand, respectively. As of September 30, 2022 and December 31, 2021, the Company had net accumulated unrealized losses of $936 thousand and $145 thousand, respectively.

The following tables summarizes the Company's marketable debt securities as of September 30, 2022:

	Amortized Cost	Unrealized Gain	Unrealized (Loss)	Fair Value
U.S. Treasury Bonds	$ 991	$ —	$ (36)	$ 955
U.S. Government Notes	16,342	—	(784)	15,558
Corporate Debt Securities	5,478	—	(116)	5,362
Total marketable debt securities	$ 22,811	$ —	$ (936)	$ 21,875

Maturities of debt securities classified as available-for-sale were as follows at September 30, 2022:

	Fair Value
Due within one year	$ 10,349
Due after one year through five years	11,526
	$ 21,875

The following tables summarizes the Company's marketable debt securities as of December 31, 2021:

	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 debt securities	$ 28,737	$ 2	$ (147)	$ 28,592

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

	Fair Value
Due within one year	$ 8,257
Due after one year through five years	20,335
	$ 28,592

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 cash equivalents, current portion of restricted cash, prepaid expenses and other current assets, accounts payable, current portion of lease liabilities 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:

		Fair Value Hierarchy		
September 30, 2022	**Total**	**(Level 1)**	**(Level 2)**	**(Level 3)**
Assets				
Marketable Debt Securities:				
U.S. Treasury Bonds	$ 955	$ 955	$ —	$ —
U.S. Government Notes	15,558	—	15,558	—
Corporate Debt Securities	5,362	—	5,362	—
Total	$ 21,875	$ 955	$ 20,920	$ —

		Fair Value Hierarchy		
December 31, 2021	**Total**	**(Level 1)**	**(Level 2)**	**(Level 3)**
Assets				
Marketable Debt 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	$ —

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 debt 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 as of September 30, 2022 and December 31, 2021:

	September 30, 2022	**December 31, 2021**
Equipment	$ 2,269	$ 1,640
Leasehold improvements	1,156	935
Total	3,425	2,575
Less: accumulated depreciation and amortization	1,281	1,037
Leasehold improvements and equipment, net	$ 2,144	$ 1,538

Depreciation and amortization expense for the three and nine months ended September 30, 2022 was $89 thousand and $244 thousand, respectively, and for the three and nine months ended September 30, 2021 was $62 thousand and $179 thousand, respectively. During the nine months ended September 30, 2022 the Company purchased leasehold improvements of $221 thousand, and equipment of $629 thousand. During the nine months ended September 30, 2021 the Company purchased leasehold improvements of $57 thousand, and equipment of approximately $167 thousand.

Note 7 – Accrued Expenses and Other Liabilities

Accrued Expenses, summarized by major category, as of September 30, 2022 and December 31, 2021 consist of the following:

	September 30, 2022	December 31, 2021
Payroll and incentives	$ 1,462	$ 1,343
Deferred revenue *	1,408	33
Research and development expenses	334	381
General and administrative expenses	299	195
Other deferred liabilities **	194	899
Total	$ 3,697	$ 2,851

* At September 30, 2022, the balance included $1,375 thousand related to an exclusive research collaboration with BioNTech SE (the "BioNTech Agreement") and $33 thousand is related to a feasibility study agreement with Genentech, Inc. (the "Genentech Agreement"), which is expected to be recognized by December 31, 2022. At December 31, 2021, the balance of $33 thousand was related to the Genentech Agreement. The balance of the BioNTech Agreement will be recognized evenly over the next six months. (See Note 9 – Revenue Recognition, Collaboration Agreements and Other).

** At September 30, 2022 and December 31, 2021, the balances of $194 thousand and $899 thousand, respectively, related to an award agreement with the Cystic Fibrosis Foundation (the "CFF Agreement). (See Note 9 – Revenue Recognition, Collaboration Agreements and Other).

Note 8 – Leases

The Company has various lease agreements , 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.

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 implicit rates, therefore the Company utilized a discount rate based on its incremental borrowing rate to record the lease obligations. The Company's finance leases provide readily determinable implicit rates.

Operating lease obligations

On September 13, 2022, the Company entered into an amendment to the operating lease agreement for its administrative office space in Bedminster, New Jersey which extends the term of the lease until June 30, 2029. Before this amendment, the lease term was scheduled to expire on July 31, 2028. (See Note 8 – Leases within the Company's Notes to Consolidated Financial Statements included in the Company's 2021 Form 10-K.)

The Company incurred lease expense for its operating leases of $194 thousand and $646 thousand for the three and nine months ended September 30, 2022, respectively, and $219 thousand and $626 thousand for the three and nine months ended September 30, 2021, respectively. The Company incurred amortization expense on its operating lease right-of-use assets of $138 thousand and $413 thousand for the three and nine months ended September 30, 2022, respectively, and $125 thousand and $368 thousand for the three and nine months ended September 30, 2021, respectively.

Finance Leases

The Company incurred interest expense on its finance leases of $0 and $1 thousand for the three and nine months ended September 30, 2022, respectively, and $1 thousand and $3 thousand for the three and nine months ended September 30, 2021, respectively. The Company incurred amortization expense on its finance lease right-of-use assets of $3 thousand and $15 thousand for the three and nine months ended September 30, 2022, respectively, and $9 thousand and $29 thousand for the three and nine months ended September 30, 2021, 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 September 30, 2022:

Maturity of Lease Liabilities	Operating Lease Liabilities	Finance Lease Liabilities
Remainder of 2022	$ 225	$ 6
2023	916	2
2024	956	-
2025	998	-
2026	1,040	-
Thereafter	1,355	-
Total undiscounted operating lease payments	$ 5,490	$ 8
Less: Imputed interest	1,266	-
Present value of operating lease liabilities	$ 4,224	$ 8
Weighted average remaining lease term in years	5.6	0.5
Weighted average discount rate	9.2%	7.0%

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:

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%

Note 9 – Revenue Recognition, Collaboration Agreements and Other

BioNTech Research Collaboration

On April 8, 2022, the Company entered into the BioNTech Agreement to evaluate the combination of mRNA formats utilizing the Company's proprietary LNC platform delivery technology. Under the terms of the BioNTech Agreement, the Company received an exclusivity fee in the amount of $2.75 million, and BioNTech SE will fund certain of the Company's research expenses to be incurred under the agreement. The parties have also commenced discussions on a potential option to license ("OTL") agreement for the Company's LNC platform delivery technology. The term of the agreement begins on the effective date and ends on the earlier of the execution of an OTL agreement by the parties, 12-months after the effective date and termination of the agreement.

The Company assessed the BioNTech Agreement under ASC 808 *Collaboration Arrangements* and ASC 606 *Revenue from Contracts with Customers* ("ASC 606") and concluded that the contract counterparty, BioNTech SE, is a customer based on the arrangement structure. The Company identified two material promises to deliver under the contract: (1) grant of an exclusive research license and (2) clinical research services. However, given the nature of the promises, the license and research services are not considered to be distinct from each other within the context of the contract. The Company therefore concluded that there is one combined performance obligation for both the license and research services.

The $2.75 million license fee was recorded as deferred revenue and is being recognized over the term of the contract performance obligation period, which the Company has concluded to be 12 months after the execution of the contract. The clinical research services are being invoiced as service revenue is earned on a monthly basis during the term of the contract.

As of September 30, 2022, the Company recognized approximately $2.1 million of contract research revenue from the BioNTech Agreement. For the three and nine months ended September 30, 2022, $688 thousand and $1.4 million of the contract research revenue was recognized from the license fee and $375 thousand and $750 thousand was earned from the monthly clinical research services performed by the Company. As of September 30, 2022, approximately $1.4 million of the license fee is included in deferred revenue within accrued expenses.

Cystic Fibrosis Foundation Therapeutics Development Award

On November 19, 2020, the Company entered into an award agreement (the "CFF Agreement") with the Cystic Fibrosis Foundation ("CFF"), pursuant to which it received a Therapeutics Development Award of up to $4.2 million (the "Award") (of which $484 thousand had been previously received) to support the preclinical development (the "Development Program") of the Company's MAT2501 product candidate. On November 19, 2021, the Company and CFF entered into an Amendment to the CFF Agreement which added an additional milestone payment in the amount of $321 thousand, which was received in the fourth quarter of 2021.

As of September 30, 2022, the Company has received approximately $3.6 million of the $4.5 million commitment, including the Amendment's additional milestone payment, and a related deferred liability balance of $194 thousand and $899 thousand is included in accrued expenses at September 30, 2022 and December 31, 2021, respectively. The remainder of the Award will be paid to the Company upon the achievement of certain milestones related to progress of the Development Program, as set forth in the CFF Agreement.

Genentech Feasibility Study Agreement

On December 12, 2019, the Company entered into the Genentech Agreement which involves the development of oral formulations using the Company's LNC platform delivery technology. Under the terms of the Genentech Agreement, Genentech paid the Company a total of $100 thousand for the development of three molecules, or $33 thousand per molecule, which is being recognized upon the Company fulfilling its obligations for each molecule under the Genentech Agreement. The Company recorded the upfront consideration as deferred revenue, which is included in accrued expenses on the consolidated balance sheets. As of December 31, 2021, the Company completed its obligations related to the first and second of the three molecules. During the three and nine months ended September 30, 2022, the Company did not complete its obligations related to the remaining molecule but expects to do so by December 31, 2022.

Note 10 – Income Taxes

Sale of net operating losses (NOLs) & tax credits

The Company recognized approximately $1.7 million and $1.3 million for the nine months ended September 30, 2022 and 2021, respectively, in connection with the sale of certain state net operating losses ("NOLs") and research and development tax credits to a third party under the New Jersey Technology Business Tax Certificate Transfer Program.

Note 11 – Stockholders' Equity

Common Stock

On February 8, 2022, the Company issued 400,000 unregistered shares of its common stock to Rutgers, The State University of New Jersey ("Rutgers"), as partial consideration pursuant to the Second Amended and Restated Exclusive License Agreement between the Company and Rutgers. The agreement provides for (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. There was also a reduction in the consideration paid to Rutgers in the event of a sublicense to a third party of the exclusive patent rights granted pursuant to the Agreement. The Company recorded a $291 thousand research and development expense related to the issuance of the 400,000 shares based on the closing price of the Company's common stock of $0.728 on the date of issuance.

For the nine months ended September 31, 2021, the Company sold 3,023,147 shares of its common stock under its At-The-Market Sales Agreement with BTIG, LLC, at an average price of $1.90, generating gross proceeds of approximately $5.8 million and net proceeds of approximately $5.6 million. No sales of the Company's common stock occurred during the nine months ended September 30, 2022.

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 September 30, 2022, 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, all of which are fully vested and with expiration dates between December 31, 2022 and June 21, 2023. The following table summarizes the changes in warrants outstanding during 2021 and for the nine months ended September 30, 2022:

	Shares
Outstanding at December 31, 2020	1,328
Issued	-
Exercised	(320)
Tendered	-
Expired	(20)
Outstanding at December 31, 2021	988
Issued	-
Exercised	-
Tendered	-
Expired	-
Outstanding at September 30, 2022	988*

* Weighted average exercise price for outstanding warrants is $0.56.

Basic and diluted net loss per common share

During the three and nine months ended September 30, 2022 and 2021, diluted loss per common share is the same as basic loss 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 and warrants, would have an anti-dilutive effect. The following outstanding shares of potentially dilutive securities were excluded from the computation of diluted net loss per share attributable to common shareholders because including them would have been anti-dilutive as of September 30, 2022 and 2021:

	As of September 30,	
	2022	2021
Stock options	27,782	22,242
Warrants	988	988
Total	28,770	23,230

Note 12 – Accumulated Other Comprehensive (Loss)/Income

The following table summarizes the changes in accumulated other comprehensive (loss)/income by component during the nine months ended September 30, 2022 and 2021:

	Net Unrealized (Losses)/Gains on Available-for-Sale Securities	Accumulated Other Comprehensive (Loss)/Income
Balance, December 31, 2021	$ (145)	$ (145)
Net unrealized loss on securities available-for-sale	(791)	(791)
Net current period other comprehensive loss	(791)	(791)
Balance, September 30, 2022	$ (936)	$ (936)
Balance, December 31, 2020	$ 228	$ 228
Net unrealized loss on securities available-for-sale	(230)	(230)
Net current period other comprehensive income	(230)	(230)
Balance, September 30, 2021	$ (2)	$ (2)

All components of accumulated other comprehensive income are net of tax.

Note 13 – 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. There were no significant modifications to the Plan during the nine months ended September 30, 2022 and 2021.

The following table contains information about the Company's stock plan at September 30, 2022:

	Awards Reserved for Issuance	Awards Issued & Exercised	Awards Available for Grant
2013 Equity Compensation Plan	45,603*	32,463**	13,140

* Increased by 8,651 thousand on January 1, 2022, representing 4% of the total number of shares of common stock outstanding on December 31, 2021.
** Includes both restricted stock grants and option grants

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

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Research and Development	$ 554	$ 467	$ 1,660	$ 1,411
General and Administrative	859	594	2,228	1,806
Total	$ 1,413	$ 1,061	$ 3,888	$ 3,217

As of September 30, 2022, total compensation costs related to unvested awards not yet recognized was approximately $8.1 million and the weighted-average periods over which the awards are expected to be recognized was 2.4 years.

Stock Options

The following table summarizes the activity for Company' stock options for the nine months ended September 30, 2022:

	Stock Options
Outstanding at December 31, 2021	28,184
Granted	1,095
Exercised	(195)
Forfeited	(165)
Cancelled	-
Expired	(1,137)
Outstanding at September 30, 2022	27,782

Restricted Stock Awards

During the nine months ended September 30, 2022 and 2021, the Company granted restricted stock awards for 0 and 8 thousand 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 the 2021 restricted awards as general and administrative expense of $29 thousand and $85 thousand for the three and nine months ended September 30, 2021, respectively. As of September 30, 2022, there was no unrecognized compensation costs related to restricted stock grants.

Note 14 – Commitments and Contingencies

On March 7, 2022, the Company entered into an agreement with Thermo Fisher Scientific to provide scale-up and commercial manufacturing capabilities for MAT2203. The estimated fees under the agreement, including capital equipment requirements, are approximately $7.7 million. The fees are expected to be incurred over a two-year period beginning in March 2022 through the first quarter of 2024. For the three and nine months ended September 30, 2022, the Company prepaid $2.0 million to Thermo Fisher Scientific for expenses to be incurred during beginning phases of the agreement activities. During the three and nine months ended September 30, 2022, the Company expensed $7 thousand and $45 thousand, respectively. At September 30, 2022, $1,955 thousand is included in prepaid expenses and other current assets.

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

The following discussion and analysis of our financial condition and results of operations should be read together with our financial statements and the related notes and the other financial information included elsewhere in this Quarterly Report on Form 10-Q. This discussion contains forward-looking statements that involve risks and uncertainties. Our actual results could differ materially from those anticipated in these forward-looking statements as a result of various factors, including those discussed below and elsewhere in this Quarterly Report on Form 10-Q, in our Annual Report on Form 10-K for the year ended December 31, 2021 and in other reports we file with the Securities and Exchange Commission, particularly those under "Risk Factors." Dollars in tabular format are presented in thousands, except per share data, or otherwise indicated.

CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

This report on Form 10-Q contains forward-looking statements made pursuant to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995 under Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. Forward-looking statements include statements with respect to our beliefs, plans, objectives, goals, expectations, anticipations, assumptions, estimates, intentions and future performance, and involve known and unknown risks, uncertainties and other factors, which may be beyond our control, including risks and uncertainties related to the impact of COVID-19, and which may cause our actual results, performance or achievements to be materially different from future results, performance or achievements expressed or implied by such forward-looking statements. All statements other than statements of historical fact are statements that could be forward-looking statements. You can identify these forward-looking statements through our use of words such as "may," "can," "anticipate," "assume," "should," "indicate," "would," "believe," "contemplate," "expect," "seek," "estimate," "continue," "plan," "point to," "project," "predict," "could," "intend," "target," "potential" and other similar words and expressions of the future.

There are a number of important factors that could cause the actual results to differ materially from those expressed in any forward-looking statement made by us. These factors include, but are not limited to:

- our ability to raise additional capital to fund our operations and to develop our product candidates;
- our anticipated timing for preclinical development, regulatory submissions, commencement and completion of clinical trials and product approvals;
- our history of operating losses in each year since inception and the expectation that we will continue to incur operating losses for the foreseeable future;
- our dependence on product candidates which are still in an early development stage;
- our reliance on our proprietary lipid nanocrystal (LNC) platform delivery technology, which is licensed to us by Rutgers University;
- our ability to manufacture GMP batches of our product candidates which are required for preclinical and clinical trials and, subsequently, if regulatory approval is obtained for any of our products, our ability to manufacture commercial quantities;
- our ability to complete required clinical trials for our lead product candidate and other product candidates and obtain approval from the FDA or other regulatory agents in different jurisdictions;
- our dependence on third parties, including third parties to manufacture our intermediates and final product formulations and third-party contract research organizations to conduct our clinical trials;
- our ability to maintain or protect the validity of our patents and other intellectual property;
- our ability to retain and recruit key personnel;
- our ability to internally develop new inventions and intellectual property;

- interpretations of current laws and the passages of future laws;
- our lack of a sales and marketing organization and our ability to commercialize products, if we obtain regulatory approval, whether alone or through potential future collaborators;
- our ability to successfully commercialize, and our expectations regarding future therapeutic and commercial potential with respect to, our product candidates;
- the accuracy of our estimates regarding expenses, ongoing losses, future revenue, capital requirements and our needs for or ability to obtain additional financing;
- developments and projections relating to our competitors or our industry;
- our operations, business and financial results may be adversely impacted by COVID-19; and
- the factors listed under the heading "Risk Factors" in our Annual Report on Form 10-K for the year ended December 31, 2021, elsewhere in this report and other reports that we file with the Securities and Exchange Commission.

All forward-looking statements are expressly qualified in their entirety by this cautionary notice. You are cautioned not to place undue reliance on any forward-looking statements, which speak only as of the date of this report or the date of the document incorporated by reference into this report. We have no obligation, and expressly disclaim any obligation, to update, revise or correct any of the forward- looking statements, whether as a result of new information, future events or otherwise. We have expressed our expectations, beliefs and projections in good faith, and we believe they have a reasonable basis. However, we cannot assure you that our expectations, beliefs or projections will result or be achieved or accomplished.

Overview

We are a clinical-stage biopharmaceutical company focused on redefining the intracellular delivery of nucleic acids and small molecules through our lipid nanocrystal (LNC) platform delivery technology. Our current pipeline consists of two potent anti-infective small molecules, MAT2203 (oral amphotericin B) and MAT2501 (oral amikacin). We are also expanding the application of our LNC platform through collaborations with well-respected pharmaceutical companies whose molecules and compounds benefit from the unique capabilities of our delivery technology, which can provide oral bioavailability and facilitate non-toxic and efficient intracellular delivery. We are intent on further expansion of our LNC platform, both internally and through external partnerships, into the field of nucleic acids where delivery into cells remains a critical element of therapeutic effect.

Key elements of our strategy include:

- Advancing our clinical stage assets based on our LNC platform delivery technology and continuing to expand utilization of this promising technology into areas of innovative medicine beyond small molecules, including nucleic acids (e.g. mRNA, DNA, ASOs) and proteins, both internally and through additional external collaborations and partnerships, including our feasibility study agreement with Genentech and exclusive research collaboration with BioNTech SE.
- Advancing MAT2203 toward NDA filing through the ongoing EnACT study for the treatment of cryptococcal meningitis, which highlights the safety and efficacy of this promising drug candidate, while also demonstrating the ability of our LNC platform technology to deliver potent medicines across the blood-brain barrier with oral administration.
- Progressing the development of MAT2501 through extensive preclinical toxicology and efficacy studies in NTM infections and completing a single ascending dose (SAD) pharmacokinetic study in healthy volunteers, all with the financial support of the CFF.

We have incurred losses for each period from our inception. For the nine months ended September 30, 2022 and 2021, our net loss was approximately $17.4 million and $16.6 million, respectively. We expect to incur significant expenses and operating losses over the next several years. Accordingly, we will need additional financing to support our continuing operations. We will seek to fund our operations through public or private equity offerings, debt financings, government or other third-party funding, collaborations and licensing arrangements. Adequate additional financing may not be available to us on acceptable terms, or at all. Our failure to raise capital as and when needed would impact our going concern and would have a negative impact on our financial condition and our ability to pursue our business strategy and continue as a going concern. We will need to generate significant revenues to achieve profitability, and we may never do so.

Financial Operations Overview

Revenue

During the three and nine months ended September 30, 2022, we generated approximately $1.1 million and $2.1 million, respectively, in contract research revenue resulting from the research collaboration with BioNTech SE and $0 and $33 thousand during the three and nine months ended September 30, 2021, respectively, resulting from the feasibility study agreement with Genentech Inc. Our ability to generate product revenue, which we do not expect to occur for many years, if ever, will depend heavily on the successful development and eventual commercialization of our early-stage product candidates.

Research and Development Expenses

Research and development expenses consist of costs incurred for the development of product candidates MAT2203 and MAT2501, and advancement of our LNC platform delivery technology, which include:

- the cost of conducting pre-clinical work;
- the cost of acquiring, developing and manufacturing pre-clinical and human clinical trial materials;
- costs for consultants and contractors associated with Chemistry and Manufacturing Controls (CMC), pre-clinical and clinical activities and regulatory operations;
- expenses incurred under agreements with contract research organizations, or CROs, including the National Institutes of Health (NIH), that conduct our pre-clinical or clinical trials;
- employee-related expenses, including salaries and stock-based compensation expense for those employees involved in the research and development process; and
- the reimbursement of certain expenses related to the CFF award agreement.

The table below summarizes our direct research and development expenses for our product candidates and development platform for the three and nine months ended September 30, 2022 and 2021. Our direct research and development expenses consist principally of external costs, such as fees paid to contractors, consultants, analytical laboratories and CROs and/or the NIH, in connection with our development work. We typically use our employee and infrastructure resources for manufacturing clinical trial materials, conducting product analysis, study protocol development and overseeing outside vendors. Included in "Internal staffing, overhead and other" below is the cost of laboratory space, supplies, research and development (R&D) employee costs (including stock-based compensation), travel and medical education.

	Three months ended September 30,		Nine months ended September 30,	
	2022	2021	2022	2021
Direct research and development expenses:				
Manufacturing process development	$ 417	$ 844	$ 1,988	$ 1,572
Preclinical trials	86	99	711	101
Clinical development	492	586	1,702	1,652
Regulatory	160	44	562	129
Internal staffing, overhead and other	2,552	3,048	7,848	6,889
Total research and development	$ 3,707	$ 4,621	$ 12,811	$ 10,343

Research and development activities are central to our business model. We expect our research and development expenses to increase because product candidates in later stages of clinical development generally have higher development costs than those in earlier stages of clinical development, primarily due to the increased size and duration of later-stage human trials. Our research and development expenses reflect the reimbursement of certain MAT2501 program expenses related to the CFF award agreement. In addition, we will look to strategically expand the use of our LNC platform delivery technology through additional development work. During 2022, we are focused on advancing our lead product candidate, MAT2203, to efficacy data in the treatment of cryptococcal meningitis (CM), accelerating the development of MAT2501 and also expanding application of our LNC platform delivery technology through both internal efforts and collaborations with third parties.

General and Administrative Expenses

General and administrative expenses consist principally of salaries and related costs for personnel in executive and finance functions. Other general and administrative expenses include facility costs, insurance, investor relations expenses, professional fees for legal, patent review, consulting and accounting/audit services. We anticipate that our general and administrative expenses during 2022 will remain relatively consistent with expenses incurred during 2021.

Sale of Net Operating Losses (NOLs) & Tax Credits

Income obtained from selling unused net operating losses (NOLs) and research and development tax credits under the New Jersey Technology Business Tax Certificate Transfer Program was approximately $1.7 million and $1.3 million for the nine months ended September 30, 2022 and 2021, respectively.

Other Income, net

Other income, net is largely comprised of interest income/(expense) and dividends.

Application of Critical Accounting Policies and Accounting Estimates

A critical accounting policy is one that is both important to the portrayal of our financial condition and results of operation and requires management's most difficult, subjective or complex judgments, often as a result of the need to make estimates about the effect of matters that are inherently uncertain.

For a description of our significant accounting policies, refer to "Note 3 – *Summary of Significant Accounting Policies*" in our 2021 Form 10-K. Of these policies, the following are considered critical to an understanding of our Unaudited Condensed Consolidated Financial Statements as they require the application of the most difficult, subjective and complex judgments: (i) Stock-based compensation, (ii) Fair value measurements, (iii) Research and development costs, (iv) Goodwill and other intangible assets, (v) Basic and diluted net loss per common share, and (vi) Revenue recognition.

Recent Accounting Pronouncements

Refer to "Note 3 – *Summary of Significant Accounting Policies"* in the Notes to Unaudited Condensed Consolidated Financial Statements for a discussion of recently adopted accounting pronouncements and their expected impact on our financial positions and results of operations.

Current Operating Trends

Our current R&D efforts are focused on advancing our lead LNC product candidates, MAT2203, through clinical development toward an initial indication for the treatment of CM, accelerating preclinical development of MAT2501 with the assistance of the CFF, and expanding application of our LNC platform delivery technology through collaborations with third parties. Our R&D expenses consist of manufacturing work and the cost of active pharmaceutical ingredients and excipients used in such work, fees paid to consultants for work related to clinical trial design and regulatory activities, fees paid to providers for conducting various clinical studies as well as for the analysis of the results of such studies, and for other medical research addressing the potential efficacy and safety of our drugs. We believe that significant investment in product development is a competitive necessity, and we plan to continue these investments in order to be in a position to realize the potential of our product candidates and proprietary technologies.

We expect that all of our R&D expenses in the near-term future will be incurred in support of our current and future preclinical and clinical development programs rather than technology development. These expenditures are subject to numerous uncertainties relating to timing and cost to completion. We test compounds in numerous preclinical studies for safety, toxicology and efficacy. At the appropriate time, subject to the approval of regulatory authorities, we expect to conduct early-stage clinical trials for each drug candidate. We anticipate funding these trials ourselves, and possibly with the assistance of federal grants, contracts or other agreements. As we obtain results from trials, we may elect to discontinue or delay clinical trials for certain products in order to focus our resources on more promising products. Completion of clinical trials may take several years, and the length of time generally varies substantially according to the type, complexity, novelty and intended use of a product candidate.

The commencement and completion of clinical trials for our products may be delayed by many factors, including lack of efficacy during clinical trials, unforeseen safety issues, slower than expected participant recruitment, lack of funding or government delays. In addition, we may encounter regulatory delays or rejections as a result of many factors, including results that do not support the intended safety or efficacy of our product candidates, perceived defects in the design of clinical trials and changes in regulatory policy during the period of product development. As a result of these risks and uncertainties, we are unable to accurately estimate the specific timing and costs of our clinical development programs or the timing of material cash inflows, if any, from our product candidates. Our business, financial condition and results of operations may be materially adversely affected by any delays in, or termination of, our clinical trials or a determination by the FDA that the results of our trials are inadequate to justify regulatory approval, insofar as cash in-flows from the relevant drug or program would be delayed or would not occur.

Results of Operations

Comparison of the three months ended September 30, 2022 to the three months ended September 30, 2021

The following tables summarizes our revenues and operating expenses for the periods presented:

	Three Months Ended September 30,	
	2022	**2021**
Revenues	$ 1,063	$ -
Expenses:		
Research and development	$ 3,707	$ 4,621
General and administrative	2,818	2,257
Operating Expenses	$ 6,525	$ 6,878

Revenues. During the three months ended September 30, 2022 we generated $1.1 million from the exclusive research collaboration with BioNTech SE and no revenue during the same period in 2021.

Research and Development expenses. Research and Development (R&D) expense for the three months ended September 30, 2022 and 2021 was approximately $3.7 million and $4.6 million, respectively. The decrease in R&D expenses was primarily due to the expense related to the issuance of common stock pursuant to the Aquarius Merger Agreement in 2021 and decreased manufacturing expenses partially offset by higher compensation expense related to increased head count in 2022.

General and Administrative expenses. General and administrative expense for the three months ended September 30, 2022 and 2021 was approximately $2.8 million and $2.3 million, respectively. The increase in general and administrative expense was primarily due to increased compensation expense related to increased head count.

Comparison of the nine months ended September 30, 2022 to the nine months ended September 30, 2021

	Nine Months Ended September 30,	
	2022	**2021**
Revenues	$ 2,125	$ 33
Expenses:		
Research and development	$ 12,811	$ 10,343
General and administrative	8,424	7,711
Operating Expenses	$ 21,235	$ 18,054
Sale of net operating losses (NOLs)	$ 1,734	$ 1,328

Revenues. During the nine months ended September 30, 2022 and 2021, we generated revenue of approximately $2.1 million and $33 thousand. The amount earned during the current year consists of contract research revenue resulting from the research collaboration with BioNTech SE while the amount earned during the prior year resulted from the feasibility study agreement with Genentech Inc.

Research and Development expenses. Research and Development (R&D) expense for the nine months ended September 30, 2022 and 2021 was approximately $12.8 million and $10.3 million, respectively. The increase in R&D expenses was primarily due to the increased clinical trials and manufacturing costs related to the advancement of our product candidates and higher compensation expense in 2022 partially offset by a non-recurring expense related to the Aquarius Merger Agreement in 2021.

General and Administrative expenses. General and administrative expense for the nine months ended September 30, 2022 and 2021 was approximately $8.4 million and $7.7 million, respectively. The increase in general and administrative expense was primarily due to higher compensation expense.

Sale of net operating losses (NOLs). The Company recognized approximately $1.7 million and $1.3 million for the nine months ended September 30, 2022 and 2021, respectively, in connection with the sale of state net operating losses and research and development tax credits to third parties under the New Jersey Technology Business Tax Certificate Transfer Program.

Liquidity and capital resources

Sources of Liquidity

We have funded our operations since inception through private placements and public offerings of our equity securities. As of September 30, 2022, we have raised a total of approximately $156.7 million in gross proceeds and approximately $143.9 million, net, from sales of our equity securities.

As of September 30, 2022, we had cash, cash equivalents and marketable debt securities totaling approximately $33.1 million.

Cash Flows

The following table sets forth the primary sources and uses of cash, cash equivalents and restricted cash for each of the periods set forth below:

	Nine Months Ended September 30,	
	2022	**2021**
Cash used in operating activities	$ (14,857)	$ (11,266)
Cash provided by investing activities	4,919	16,713
Cash provided by financing activities	84	6,957
Net (decrease)/increase in cash and cash equivalents and restricted cash	$ (9,854)	$ 12,404

Operating Activities

Net cash used in operating activities was approximately $14.9 million and $11.3 million for the nine months ended September 30, 2022 and 2021, respectively. Net losses of approximately $17.4 million and $16.6 million for the nine months ended September 30, 2022 and 2021, respectively, were partially offset by working capital adjustments due to the timing of receipts and payments in the ordinary course of business. We expect that there will be an increase in cash used in operations during the remainder of 2022 and into 2023 due to higher research and development expenses as we continue to move our product candidates and delivery platform forward in their development cycles.

Investing Activities

Approximately $4.9 million of net cash was provided by investing activities for the nine months ended September 30, 2022, while approximately $16.7 million of net cash was provided by investing activities for the nine months ended September 30, 2021. The decrease of cash provided by investing activities of approximately $11.8 million was primarily due to the approximately $19.5 million decrease in proceeds received from maturities of our marketable debt securities, offset by a decrease of approximately $8.3 million in purchases of marketable debt securities and the purchase of approximately $0.6 million of leasehold improvements and equipment as compared to the nine months ended September 30, 2021.

Financing Activities

Net cash provided by financing activities was approximately $0.1 million and $7.0 million for the nine months ended September 30, 2022 and 2021, respectively. The decrease of approximately $6.9 million is primarily due to the ATM sales during January 2021 of approximately $5.6 million, for which the Company did not have similar equity raises during the nine months ended September 30, 2022, and a decrease in the receipt of proceeds of approximately $1.3 million from the exercise of stock options.

Funding Requirements and Other Liquidity Matters

We expect to continue to incur significant expenses and increasing operating losses for the foreseeable future. We anticipate that our expenses will increase substantially if and as we:

- conduct further preclinical and clinical studies of MAT2203, our lead product candidate, even if such studies are primarily financed with non-dilutive funding from the NIH;
- support the conduct of further clinical studies of MAT2501, even if such studies are primarily financed with non-dilutive funding from the CFF;
- seek to discover and develop additional product candidates;
- seek regulatory approvals for any product candidates that successfully complete clinical trials;
- require the manufacture of larger quantities of product candidates for clinical development and potentially commercialization;

- maintain, expand and protect our intellectual property portfolio;
- hire additional clinical, quality control and scientific personnel; and
- add operational, financial and management information systems and personnel, including personnel to support our product development and planned future commercialization efforts and personnel and infrastructure necessary to help us comply with our obligations as a public company.

We expect that our existing cash and cash equivalents will be sufficient to fund our operating expenses and capital expenditures requirements through 2023.

Until such time, if ever, that we can generate product revenues sufficient to achieve profitability, we expect to finance our cash needs through a combination of public and private equity offerings, debt financings, government or other third-party funding, collaborations and licensing arrangements. We do not have any committed external source of funds other than limited grant funding from the CFF and NIH. To the extent that we raise additional capital through the sale of common stock, convertible securities or other equity securities, the ownership interest of our stockholders may be materially diluted, and the terms of these securities may include liquidation or other preferences that adversely affect your rights of our common stockholders. Debt financing and preferred equity financing, if available, would result in increased fixed payment obligations and may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures or declaring dividends, that could adversely impact our ability to conduct our business. Securing additional financing could require a substantial amount of time and attention from our management and may divert a disproportionate amount of their attention away from day-to-day activities, which may adversely affect our management's ability to oversee the development of our product candidates.

If we raise additional funds through collaborations, strategic alliances or marketing, distribution, or licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies, future revenue streams, research programs or product candidates or grant licenses on terms that may not be favorable to us. If we are unable to raise additional funds through equity or debt financings when needed, we may be required to delay, limit, reduce or terminate our product development or future commercialization efforts or grant rights to develop and market product candidates that we would otherwise prefer to develop and market ourselves.

Contractual Obligations and Commitments

On March 7, 2022, the Company entered into an agreement with Thermo Fisher Scientific to provide commercial manufacturing capabilities for MAT2203. The estimated fees under the agreement, including capital equipment requirements, are approximately $7.7 million. The fees are expected to be incurred over a two-year period beginning in March 2022 through the first quarter of 2024.

Off-Balance Sheet Arrangements

We did not have during the periods presented, and we do not currently have, any off-balance sheet arrangements, as defined under SEC rules, such as relationships with unconsolidated entities or financial partnerships, which are often referred to as structured finance or special purpose entities, established for the purpose of facilitating financing transactions that are not required to be reflected on our balance sheets.

Item 3. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Not applicable.

Item 4. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures.

Disclosure Controls and Procedures:

As of September 30, 2022, under the supervision and with the participation of our principal executive officer and principal financial officer we have evaluated, the effectiveness of the design and operation of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended (the "Exchange Act"). Based on that evaluation, our principal executive officer and principal financial officer concluded that our disclosure controls and procedures were effective at the reasonable assurance level as of September 30, 2022.

Our disclosure controls and procedures are designed to provide reasonable assurance that information required to be disclosed in the reports that we filed or submitted under the Exchange Act is recorded, processed, summarized and reported within time periods specified by the SEC's rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed in our reports filed under the Exchange Act is accumulated and communicated to our management, including principal executive officer and principal financial officer, as appropriate to allow timely decisions regarding required disclosure.

Changes in Internal Control Over Financial Reporting

There were no changes in our internal control over financial reporting identified in connection with the above evaluation that occurred during the third quarter of 2022 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

PART - II OTHER INFORMATION

Item 1. LEGAL PROCEEDSINGS

None.

Item 1A. RISK FACTORS

There were no material changes from the risk factors set forth under Part I, Item 1A., "Risk Factors" in our Annual Report on Form 10-K for the fiscal year ended December 31, 2021. You should carefully consider the risk factors contained in our Annual Report on Form 10-K for the fiscal year ended December 31, 2021 in addition to the other information set forth in this report which could materially affect our business, financial condition or future results. The risks and uncertainties described in this report and in our Annual Report on Form 10-K for the year ended December 31, 2021, as well as other reports and statements that we file with the SEC, are not the only risks and uncertainties facing us. Additional risks and uncertainties not currently known to us or that we currently deem to be immaterial may also have a material adverse effect on our financial position, results of operations or cash flows.

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

None.

Item 3. DEFAULTS UNDER SENIOR SECURITIES

None.

Item 4. MINE SAFETY DISCLOSURES

Not applicable.

Item 5. OTHER INFORMATION

None.

Item 6. EXHIBITS

See the Exhibit Index following the signature page to this Quarterly Report on Form 10-Q for a list of exhibits filed or furnished with this report, which Exhibit Index is incorporated herein by reference.

SIGNATURES

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

MATINAS BIOPHARMA HOLDINGS, INC.

BY:

/s/ Jerome D. Jabbour

Dated: November 2, 2022

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

/s/ Keith A. Kucinski

Dated: November 2, 2022

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

EXHIBIT INDEX

3.1	Certificate of Incorporation (incorporated by reference to Exhibit 3.1 to Amendment No. 1 to the Company's Registration Statement on Form S-1 filed with the SEC on February 7, 2014).
3.2	Bylaws (incorporated by reference to Exhibit 3.2 to Amendment No. 1 to the Company's Registration Statement on Form S-1 filed with the SEC on February 7, 2014).
3.3	Certificate of Amendment, dated October 29, 2015 to Certificate of Incorporation. (incorporated herein by reference to the Company's Current Report on Form 8-K filed with the SEC on November 5, 2015).
4.6	Description of Securities (incorporated herein by reference to the Company's Annual Report on Form 10-K filed with the SEC on March 8, 2022).
*†10.1	Consulting Agreement, dated August 8, 2022, by and between the Company and Raphael J. Mannino.
*31.1	Certification of Chief Executive Officer
*31.2	Certification of Chief Financial Officer
*32.1	Section 1350 Certifications
*101.1	Inline XBRL Instance Document.
*101.2	Inline XBRL Taxonomy Extension Schema Document.
*101.3	Inline XBRL Taxonomy Extension Calculation Linkbase Document.
*101.4	Inline XBRL Taxonomy Extension Definition Linkbase Document.
*101.5	Inline XBRL Taxonomy Extension Label Linkbase Document.
*101.6	Inline XBRL Taxonomy Extension Presentation Linkbase Document.
104	Cover Page Interactive Data File (embedded within the Inline XBRL document)

* Filed herewith.
† Indicates a management contract or compensation plan, contract or arrangement. Certain portions of this exhibit, that are not material and would likely cause competitive harm to the registrant if publicly disclosed, have been redacted pursuant to Item 601(b)(10) of Regulation S-K.

Exhibit 10.1

CERTAIN IDENTIFIED INFORMATION HAS BEEN EXCLUDED FROM THIS EXHIBIT BECAUSE IT IS NOT MATERIAL AND WOULD LIKELY CAUSE COMPETITIVE HARM TO THE REGISTRANT IF PUBLICLY DISCLOSED. THE OMISSIONS HAVE BEEN INDICATED BY "[***]."

CONSULTING AGREEMENT

THIS CONSULTING AGREEMENT (this "Consulting Agreement") is made and entered into between Matinas BioPharma Holdings, Inc. (the "Company"), and Dr. Raphael J. Mannino (the "Consultant"). The Company and the Consultant are referred to herein as the "Parties."

The Parties understand and agree that the Consultant may revoke his acceptance of this Consulting Agreement at any time within seven (7) business days following Consultant's execution and delivery of this Agreement. Provided that Consultant does not revoke or rescind his execution and acceptance of this Agreement, this Consulting Agreement shall become effective on upon Consultant's termination of employment with the Company (the "Effective Date").

RECITALS

WHEREAS, the Company is a clinical stage biopharmaceutical company;

WHEREAS, Consultant is the Chief Scientific Officer of the Company and has historical knowledge about the proprietary technology, products and management of the Company;

WHEREAS, the Consultant has notified the Company of his intent to retire from his position with the Company effective December 31, 2022;

WHEREAS, the Company desires to engage the Consultant to provide Services (as defined in Section 1 below) following his retirement; and

WHEREAS, Consultant is willing to provide such Services to the Company upon the terms and subject to the conditions set forth in this Consulting Agreement;

NOW THEREFORE, in consideration of the mutual covenants and agreements set forth herein, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Company and the Consultant hereby agree as follows:

1. Services. During the Term, as defined below, the Consultant shall make himself available, as reasonably necessary, to provide services as directed by the Chief Executive Officer of the Company, which may include, but not be limited to the following: [***], and such other services as requested by the Chief Executive Officer, at such times and locations as mutually agreed to by the Parties (the "Services"). Consultant agrees to perform the Services in a good and workmanlike manner and in accordance with those practices, methods and standards of care, skill and diligence normally provided by professional consultants in the performance of similar services.

2. Independent Contractor Status. The Parties acknowledge and agree that the Consultant's relationship with the Company is that of an independent contractor and nothing in this Consulting Agreement shall be construed as creating a partnership, joint venture or employer-employee relationship. The Consultant acknowledges that he will not be entitled to any of the benefits that the Company may make available to their employees, such as group insurance, vacation or retirement benefits. The Consultant acknowledges and agrees that he is free from the control and direction of the Company in the means and method of performance of the Services and that the Services are outside the usual course of business of the Company. The Consultant acknowledges and agrees that the Services he is providing may be conducted from wherever he believes is reasonably necessary and at times that are deemed reasonably necessary by the substance of the Services being provided. The Consultant acknowledges and agrees that he is not economically dependent on the consulting relationship which is the subject matter of this Consulting Agreement. The Consultant further acknowledges and agrees that: (i) he is responsible for providing the know-how necessary to perform the Services; (ii) he shall not engage or employ any workers to assist him in the Services; (iii) he is solely responsible for complying with all applicable local, state and federal laws governing self-employed individuals, including, but not limited to, obligations such as payment of federal and state taxes, social security, disability and other contributions attributable to performance of the Services; and (iv) he is solely responsible, and will indemnify and hold the Company and its parent companies, subsidiaries, affiliates, successors and assigns, and their respective directors, officers, members, managers, employees, and agents harmless, for any payment of taxes on compensation that the Consultant receives for the Services.

3. Term and Termination. The Sevices shall commence on January 1, 2023, and the term of this Consulting Agreement (the "Term") shall begin effective immediately (subject to revocation by the Consultant before the Effective Date) and shall continue until December 31, 2023, subject to earlier termination for Cause, as defined below. For purposes of this Consulting Agreement, "Cause" means the Consultant's: (i) material breach of any term or condition of this Agreement including but not limited to Sections 7, 8, 10, 11, 12, 13, 14, 15 of the Consulting Agreement; (ii) conviction of a felony for a crime of moral turpitude or (iii) engagement in fraud or embezzlement.

4. Fee. During the Term, the Company shall pay the Consultant a monthly fee of $15,000.00 for the Services (the "Fee"). The Consultant shall invoice the Company for this fee on a monthly basis at the beginning of each month. All invoices shall be paid within thirty (30) days of receipt. Additionally, the Company will reimburse the Consultant for reasonable out of pocket expenses approved in advance by the Company if greater than one hundred dollars ($100) and incurred in connection with providing the Services, supported by appropriate documentation.

5. Additional Consideration. Consultant shall receive a cash bonus award of $75,000 for his employment with the Company during the 2022 fiscal year, to be paid in 2023 simultaneous with any cash bonus awards given to Company employees for the 2022 fiscal year (which is expected to occur in the first quarter of 2023).

6. Stock Option Vesting. During the Term of this Agreement, Consultant's outstanding stock options shall continue to vest in accordance with their terms (provided, however, that in accordance with applicable law, options granted as incentive stock options shall cease to be treated as such and shall instead be treated as non-qualified stock options if not exercised within 3 months of the date of Consultant's retirement).

7. Confidentiality. The Consultant acknowledges that the Company possesses, or may in the future possess Confidential Information, as defined below, that has been disclosed to, or has otherwise become known to, the Consultant by virtue of his engagement by the Company. For purposes of this Consulting Agreement, "Confidential Information" means any trade secrets, proprietary information or confidential information of the Company and/or its respective affiliates (collectively "Company Entities"), including without limitation, data, client information, client lists and other financial information, in any and all forms of media whether now known or developed in the future. Confidential Information shall not include any information which (A) is or becomes generally available to the public other than as a result of the Consultant's breach of the Consultant's common law or contractual obligations to the Company; (B) becomes available to the public on a non-confidential basis from a source other than the Consultant, provided that such source is not bound by a confidentiality agreement with, or by other contractual, legal or fiduciary obligation of confidentiality to, the Company or any other party with respect to such information; or (C) has been or is subsequently independently conceived or developed without use of or reference to the Confidential Information. During the Term and at all times thereafter, the Consultant shall not disclose or use for his own benefit, or for the benefit of any other individual or entity, any Confidential Information, except in the good faith performance of the Services.

8. Defend Trade Secrets Act Whistleblower Immunity. The Consultant understands and acknowledges that he shall not be held criminally or civilly liable under any Federal or State trade secret law for the disclosure of a trade secret that (a) is made (i) in confidence to a federal, state, or local government official, either directly or indirectly, or to an attorney; and (ii) solely for the purpose of reporting or investigating a suspected violation of law; or (b) is made in a complaint or other document filed in a lawsuit or other proceeding, if such filing is made under seal. The Consultant further understands and acknowledges that if he files a lawsuit for retaliation by the Company for reporting a suspected violation of law, he may disclose the trade secret to his attorney and use the trade secret information in the court proceeding, if he files any document containing the trade secret under seal and does not disclose the trade secret, except pursuant to court order.

9. Ownership of Inventions. The Consultant agrees that all inventions, improvements, discoveries, methods, developments, ideas, data, information, works of authorship, improvements and suggestions, whether patentable or not, made, devised, conceived, developed or perfected by the Consultant alone or with any other person or persons during and in the course of the engagement of the Consultant by the Company and in connection with the Services, which are related to the products or services of the Company, or components thereof, or modified for use by, developed or under development for, or pertaining to the Company's business (including research and development) and any works of authorship, including but not limited to any and all reports, protocols, publications or compilations of data of every kind and description prepared or devised by the Consultant or under the Consultant's direction while performing Services and which relate to or arise out of the actual or demonstrably anticipated business activities of the Company (collectively referred to as "Developments"), are commissioned by the Company and considered "works made for hire" to the greatest extent permitted under the copyright laws of the United States and are the sole and exclusive property of the Company.

10. Return of Property. Upon termination of this Agreement or at such other reasonable times requested by the Company, the Consultant agrees to promptly deliver to the Company all Company property, regardless of the form or media, provided to the Consultant in connection with the Services or created by the Consultant in connection with the Services, and to refrain from making, retaining or distributing copies thereof except in connection with performance of the Services.

11. Non-Solicitation. During the Term (and any extension thereof), and for a six month period thereafter, the Consultant shall not, directly or indirectly, whether on behalf of himself or anyone else: (i) induce or attempt to induce a business associate of the Company to refrain from doing business with the Company; (ii) use for his benefit or disclose the name and/or requirements of any such business associate to any other person or persons, natural or corporate; or (iii) solicit any of the employees of the Company to leave the employ of the Company or hire anyone who is an employee of the Company or has worked for the Company during the previous 12 months.

12. Non-Competition. During the Term (and any extension thereof), and for a 3 year period thereafter, the Consultant shall not directly or indirectly (i) serve as a partner, principal, shareholder, licensor, licensee, employee, officer, director, manager, agent, representative, advisor, promoter, associate, investor, or otherwise for any Competitive Business (as defined below), (ii) build, design, finance, acquire, lease, operate, manage, control, invest in, work, or consult for or otherwise join, participate in, or affiliate himself with, any Competitive Business or (iii) take any preparatory steps with respect to any of the foregoing, each without the prior written consent of the Company. The foregoing covenant shall cover the Consultant's activities in every part of the world in which the Consultant provided services or had a material presence or influence. The foregoing shall not apply to the Consultant's ownership of shares in a publicly-traded entity in which the Consultant does not materially participate and in which the Consultant's ownership interest is one percent (1%) or less. "Competitive Business" means any business that is related to the lipid-based delivery of any pharmaceutical, chemical or biological molecule or compound or other matter reasonably related thereto, whether for research or commercial purposes.

13. Restrictions on Sale of Company Stock. Consultant hereby acknowledges, agrees and covenants that:

(A) Except as set forth in this Section 13(A), Consultant will not (i) offer, sell, contract to sell, pledge, transfer, grant any option to purchase or otherwise dispose of (collectively, a "Disposition") any shares of Company's common stock until March 31, 2023 and (ii) exercise or seek to exercise or effectuate in any manner any rights of any nature that Consultant has or may have hereafter to require Company to register under the Securities Act of 1933, as amended (the "Act"). Except to the extent such sales are restricted pursuant to Section 13(B) below, on or after March 31, 2023, Consultant may sell shares of Company common stock during each quarter over the next year as follows: (i) 250,000 shares on or after March 31, 2023; (ii) 250,000 shares on or after June 30, 2023; (iii) 250,000 shares on or after October 31, 2023; and (iv) 250,000 shares on or after December 31, 2023. Thereafter, the restrictions of this Section 6(A) shall no longer apply.

(B) In the event the Company wishes to consummate a financing transaction by June 30, 2023 to raise gross proceeds of at least $15 million and the investment bank or an investor in such transaction requires the directors and officers of the Company to enter into a lock-up agreement, Consultant hereby agrees to be bound by, and shall be deemed to have agreed to, the same lock-up terms as those to which the Company's directors and officers are required to adhere and at the request of the Company or such investment bank or investor Consultant shall execute and deliver a lock-up agreement in form and substance equivalent to that which is required to be executed by the Company's directors and officers. Notwithstanding anything herein to the contrary, in no event shall the aforementioned lock up period be for longer than 90 days.

14. Consultant General Release of Company. In consideration of the payment and benefits set forth in Sections 4, 5 and 6 above, Consultant (on his own behalf and on behalf of his heirs, executors, administrators, trustees, legal representatives, successors and assigns) hereby unconditionally and irrevocably releases, waives, discharges and gives up, to the full extent permitted by law, any and all Claims (as defined below) that Consultant may have against the Company arising on or prior to the date of Consultant's execution and delivery of this Agreement to Company. "Claims" means any and all actions, charges, controversies, demands, causes of action, suits, rights, and/or claims whatsoever for debts, sums of money, wages, salary, severance pay, expenses, commissions, fees, bonuses, unvested stock options and/or other equity compensation, vacation pay, sick pay, fees and costs, attorneys' fees, losses, penalties, damages, including damages for pain and suffering and emotional harm, arising, directly or indirectly, out of any promise, agreement, offer letter, contract, understanding, common law, tort, the laws, statutes, and/or regulations of the States of New Jersey, Florida, or any other state or municipality and the United States, including, but not limited to, federal and state wage and hour laws (to the extent waiveable), federal and state whistleblower laws, Title VII of the Civil Rights Act of 1964, the Civil Rights Act of 1991, the Equal Pay Act, the Lilly Ledbetter Fair Pay Act of 2009, the Americans with Disabilities Act, the Family and Medical Leave Act, the Employee Retirement Income Security Act (excluding COBRA), the Vietnam Era Veterans Readjustment Assistance Act, the Fair Credit Reporting Act, the Age Discrimination in Employment Act ("ADEA"), the Older Workers' Benefit Protection Act, the Occupational Safety and Health Act, the Sarbanes-Oxley Act of 2002, the federal False Claims Act, the New Jersey Law Against Discrimination, the New Jersey Family Leave Act, the New Jersey Civil Rights Act, the New Jersey Conscientious Employee Protection Act, the New Jersey False Claims Act, the Florida Civil Human Rights Act, the Florida ADIS Act, the Florida Wage Discrimination Law, the Florida Equal Pay Law, and the Florida Whistleblower Protection Law, as each may be amended from time to time, whether arising directly or indirectly from any act or omission, whether intentional or unintentional. This releases all Claims including those of which Consultant is not aware and those not mentioned in this Agreement. Consultant specifically releases any and all Claims arising out of Consultant's employment with Company or termination therefrom. Consultant expressly acknowledges and agrees that, by entering into this Agreement, Consultant is releasing and waiving any and all rights or Claims including, without limitation, Claims that Employee may have arising under ADEA, which have arisen on or before the date of Consultant's execution and delivery of this Agreement to Company.

15. Representations; Covenant not to Sue. Consultant hereby represents and warrants that (A) Consultant has not filed, caused or permitted to be filed any pending proceeding (nor has Consultant lodged a complaint with any governmental or quasi-governmental authority) against the Company, nor has Consultant agreed to do any of the foregoing, (B) Consultant has not assigned, transferred, sold, encumbered, pledged, hypothecated, mortgaged, distributed, or otherwise disposed of or conveyed to any third party any right or Claim against the Company that has been released in this Agreement, and (C) Consultant has not directly or indirectly assisted any third party in filing, causing or assisting to be filed, any Claim against any of the Company. Consultant covenants and agrees that Consultant shall not encourage or solicit or voluntarily assist or participate in any way in the filing, reporting or prosecution by himself or any third party of a proceeding or Claim against the Company arising on or prior to the date of Consultant's execution and delivery of this Agreement or with respect to any shareholders derivative, shareholder class action, corporate fraud, corporate waste or similar action at any time during the Term.

16. Certain Remedies**.** The Consultant acknowledges and agrees that the restrictions contained in Sections 9, 11, 12, 13 and 15 of this Agreement are reasonably necessary to protect the legitimate business interests of the Company, and that any violation of any of the restrictions will result in immediate and irreparable injury to the Company for which monetary damages will not be an adequate remedy. The Consultant further agrees that, in addition to enforcing this restriction, the Company may have other rights and remedies under common law or applicable laws relating to the protection of trade secrets. In the event of a breach or threatened breach by the Consultant of Sections 9, 11, 12, 13 and 15 of this Agreement, the Consultant agrees that the Company, in addition to any other legal and equitable remedies available to them, will be entitled to provisional and injunctive relief from an appropriate forum. The Consultant further agrees that no bond will be required to be posted by the Company in connection with any such application for provisional or injunctive relief. The Consultant acknowledges and agrees that the Company may pursue any remedy available to it, concurrently or consecutively in any order, and the pursuit of one such remedy will not be deemed to be an election of remedies or waiver of the right to pursue any other remedy.

17. Binding Agreement; Assignment. The rights and obligations of the parties under this Agreement inure to the benefit of and are binding upon the heirs, administrators, executors, successors, and assigns of the parties; provided that the obligations and duties of the Consultant hereunder may not be assigned or delegated. The Company may assign this Agreement without the Consultant's consent.

18. Waiver. No waiver by either party of any breach or non-performance of any provision or obligation of this Agreement shall be deemed to be a waiver of any preceding or succeeding breach of the same or any other provision of this Agreement.

19. Governing Law and Venue**.** This Agreement shall be governed, interpreted, and construed exclusively according to the laws of the State of New Jersey. The parties agree that the exclusive venue for the resolution of any dispute arising from this Agreement shall be in the state and federal courts located in the State of New Jersey.

20. Headings, References, Pronouns, Construction, etc. Captions and section headings used herein are for convenience only and are not a part of this Agreement and will not be used in construing it. All singular terms used herein include the plural and vice versa. All pronouns used herein are deemed to cover all genders. The language in this Agreement will be deemed the language chosen by the parties to express their mutual intent and no rule of strict construction will be applied against any party.

21. Entire Agreement. This Agreement constitutes the entire agreement of the parties with respect to the Services, and this Agreement may be modified only by an agreement in writing signed by both of the parties.

22. Severability. If any provision of this Agreement shall be invalid or unenforceable to any extent or in any application, then the remainder of this Agreement and of such term and condition, except to such extent or in such application, shall not be affected thereby, and each and every term and condition of this Agreement shall be valid and enforced to the fullest extent and in the broadest application permitted by law.

23. Counterparts. This Agreement may be executed in one or more counterparts, each of which will be deemed an original and all of which together will constitute one and the same agreement. Signature by facsimile or electronic copy is valid and will be effective upon receipt.

[SIGNATURES APPEAR ON NEXT PAGE]

IN WITNESS WHEREOF, the parties hereto have executed or caused this Consulting Agreement to be duly executed as of the day and year written below. Provided that Consultant does not revoke or rescind his execution and acceptance of this Agreement, this Consulting Agreement shall become effective on the 8th business day following the date that Consultant executes and delivers this Agreement to the Company.

Agreed to and accepted on this 8th day of August, 2022.

/s/ Raphael J. Mannini

Raphael J. Mannino
518 Lannon Lane
Glen Gardner, NJ 08826

Agreed to and accepted on this 8th day of August, 2022.

MATINAS BIOPHARMA HOLDINGS, INC.

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

Exhibit 31.1

CERTIFICATION

I, Jerome D. Jabbour, certify that:

1. I have reviewed this report on Form 10-Q 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 and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: November 2, 2022

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

Exhibit 31.2

CERTIFICATION

I, Keith A. Kucinski, certify that:

1. I have reviewed this report on Form 10-Q 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 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 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: November 2, 2022

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

Exhibit 32.1

SECTION 1350 CERTIFICATIONS

Pursuant to 18 U.S.C. §1350 as adopted pursuant to §906 of the Sarbanes-Oxley Act of 2002, the undersigned officers of Matinas BioPharma Holdings, Inc. (the "Company") hereby certify that to their knowledge and in their respective capacities that the Company's quarterly report on Form 10-Q to which this certification is attached (the "Report"), fully complies with the requirements of Section 13(a) or 15(d), as applicable, of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), and that the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: November 2, 2022

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

Date: November 2, 2022

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

This certification shall not be deemed "filed" for any purpose, nor shall it be deemed to be incorporated by reference into any filing under the Securities Act of 1933 or the Exchange Act. A signed original of this written statement required by Section 906, or other document authenticating, acknowledging, or otherwise adopting the signature that appears in typed form within the electronic version of this written statement required by Section 906, has been provided to Matinas BioPharma Holdings, Inc. and will be retained by Matinas BioPharma Holdings, Inc. and furnished to the Securities and Exchange Commission or its staff upon request.