UNITED STATES
SECURITIES AND EXCHANGE COMMISSION

Washington, DC 20549

FORM 10-Q

(Mark One)

☒ **QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For the quarterly period ended 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: 001-38753

Moderna, Inc.

(Exact Name of Registrant as Specified in Its Charter)

Delaware	**81-3467528**
(State or Other Jurisdiction of Incorporation or Organization)	(IRS Employer Identification No.)
200 Technology Square **Cambridge, Massachusetts**	**02139**
(Address of Principal Executive Offices)	(Zip Code)

(617) 714-6500
(Registrant's Telephone Number, Including Area Code)

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

Title of each class	Trading symbol(s)	Name of each exchange on which registered
Common stock, par value $0.0001 per share	MRNA	The Nasdaq Stock Market LLC

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 Act). **Yes** ☐ **No** ☒

As of October 31, 2022, there were 384,180,469 shares of the registrant's common stock, par value $0.0001 per share, outstanding.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Quarterly Report on Form 10-Q (Form 10-Q) contains express or implied forward-looking statements. All statements other than those of historical facts contained in this Form 10-Q are based on our management's beliefs and assumptions and on information currently available to our management. Forward-looking statements in this Form 10-Q include, but are not limited to, statements about:

- our activities with respect to our COVID-19 vaccines, and our plans and expectations regarding future generations of our COVID-19 vaccines, including boosters, that we may develop in response to variants of the SARS-CoV-2 virus, ongoing clinical development, manufacturing and supply, pricing, commercialization, regulatory matters (including dosage for vaccines and authorization or approval for boosters), demand for COVID-19 vaccines, and third-party and governmental arrangements and potential arrangements;
- timing of product sales of our Omicron-targeting bivalent booster vaccines against COVID-19;
- our ability to contract with third-party suppliers, distributors and manufacturers and their ability to perform adequately, particularly with respect to the timely production, release and delivery of our COVID-19 vaccines, including variant-specific booster vaccines;
- our ability and the ability of third parties with whom we contract to successfully manufacture our commercial products at scale, as well as drug substances, delivery vehicles, development candidates, and investigational medicines for preclinical and clinical use;
- internal and external costs associated with manufacturing for our products, including our COVID-19 vaccines, as well as costs associated with winding down or terminating relationships or agreements with third-party manufacturers or suppliers in connection with the production of our COVID-19 vaccines;
- the scope of protection we are able to establish and maintain for intellectual property rights covering our commercial products, investigational medicines and technology;
- the initiation, timing, progress, results, and cost of our research and development programs and our current and future preclinical studies and clinical trials, including statements regarding the timing of initiation and completion of studies or trials and related preparatory work and the period during which the results of the trials will become available;
- the direct or indirect impact of COVID-19 or any future large-scale adverse health event, such as the scope and duration of the outbreak, government actions and restrictive measures implemented in response, material delays in diagnoses, initiation or continuation of treatment for diseases that may be addressed by our development candidates and investigational medicines, or in patient enrollment in clinical trials, potential clinical trials, regulatory review or supply chain disruptions, and other potential impacts to our business, the effectiveness or timeliness of steps taken by us to mitigate the impact of COVID-19, and our ability to execute business continuity plans to address disruptions caused by COVID-19 or any future large-scale adverse health event;
- our anticipated next steps for our development candidates and investigational medicines that may be slowed down due to the impact of COVID-19, including our resources being significantly diverted towards our COVID-19 vaccine efforts;
- our ability to identify research priorities and apply a risk-mitigated strategy to efficiently discover and develop development candidates and investigational medicines, including by applying learnings from one program to our other programs and from one modality to our other modalities;
- our ability to obtain and maintain regulatory approval of our investigational medicines;
- our ability to commercialize our COVID-19 vaccines and any other products, if approved;
- the pricing and reimbursement of our medicines, if approved;
- the implementation of our business model, and strategic plans for our business, investigational medicines, and technology;
- estimates of our future expenses, revenues and capital requirements;
- the potential benefits of strategic collaboration agreements, our ability to enter into strategic collaborations or arrangements, and our ability to attract collaborators with development, regulatory, and commercialization expertise;

- future agreements with third parties in connection with the commercialization of our investigational medicines, if approved;
- the size and growth potential of the markets for our investigational medicines, and our ability to serve those markets;
- our financial performance;
- the rate and degree of market acceptance of our investigational medicines;
- our ability to produce our products or investigational medicines with advantages in turnaround times or manufacturing cost; and
- developments relating to our competitors and our industry.

Forward-looking statements often contain words such as “will,” “may,” “should,” “could,” “expects,” “intends,” “plans,” “aims,” “anticipates,” “believes,” “estimates,” “predicts,” “potential,” “continue,” or the negative of these terms or other comparable terminology, although not all forward-looking statements contain these words. Although we believe that the expectations reflected in these forward-looking statements are reasonable, these statements relate to future events or our operational or financial performance, and involve risks, uncertainties, and other factors that may cause our actual results to differ materially from any future results expressed or implied by these forward-looking statements. Accordingly, you should not place undue reliance on these forward-looking statements. Factors that may cause actual results to differ materially from current expectations include, among other things, those listed under the section entitled “Risk Factors” and elsewhere in this Form 10-Q. If one or more of these risks or uncertainties occur, or if our underlying assumptions prove to be incorrect, actual results could differ materially from those expressed or implied by the forward-looking statements.

The forward-looking statements in this Form 10-Q represent our views as of the date of this Form 10-Q. We undertake no obligation to update any forward-looking statements, except as required by applicable securities law. You should therefore not rely on these forward-looking statements as representing our views as of any date subsequent to the date of this Form 10-Q. However, any further disclosures made on related subjects in our subsequent reports filed with the Securities and Exchange Commission should be consulted.

TRADEMARKS

This Form 10-Q contains references to our trademarks and to trademarks belonging to other entities. Solely for convenience, trademarks and trade names referred to may appear without the ® or ™ symbols, but such references are not intended to indicate that their respective owners will not assert, to the fullest extent under applicable law, their rights thereto. We do not intend our reference to other companies’ trade names or trademarks to imply a relationship with, or endorsement or sponsorship of us by, any other companies.

NOTE REGARDING COMPANY REFERENCES

Unless the context otherwise requires, the terms “Moderna,” “the Company,” “we,” “us,” and “our” in this Form 10-Q refer to Moderna, Inc. and its consolidated subsidiaries.

ADDITIONAL INFORMATION

Our website, www.modernatx.com, including the Investor Relations section, www.investors.modernatx.com; and corporate blog www.modernatx.com/moderna-blog; as well as our social media channels: Facebook, www.facebook.com/modernatx; Twitter, www.twitter.com/modernatx; and LinkedIn, www.linkedin.com/company/modernatx; contain a significant amount of information about us, including financial and other information for investors. We encourage investors to visit these websites and social media channels as information is frequently updated and new information is shared. Information contained on our website, corporate blog and social media channels shall not be deemed incorporated into, or be a part of, this Form 10-Q.

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Item 1. Financial Statements

MODERNA, INC.
CONDENSED CONSOLIDATED BALANCE SHEETS
(Unaudited, in millions, except per share data)

	September 30, 2022	December 31, 2021
Assets		
Current assets:		
Cash and cash equivalents	$ 3,027	$ 6,848
Investments	5,321	3,879
Accounts receivable	2,695	3,175
Inventory	2,077	1,441
Prepaid expenses and other current assets	1,177	728
Total current assets	14,297	16,071
Investments, non-current	8,655	6,843
Property and equipment, net	2,019	1,241
Right-of-use assets, operating leases	113	142
Restricted cash, non-current	14	12
Deferred tax assets	920	326
Other non-current assets	38	34
Total assets	$ 26,056	$ 24,669
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable	$ 330	$ 302
Accrued liabilities	1,856	1,472
Deferred revenue	4,002	6,253
Income taxes payable	66	876
Other current liabilities	553	225
Total current liabilities	6,807	9,128
Deferred revenue, non-current	175	615
Operating lease liabilities, non-current	79	106
Financing lease liabilities, non-current	922	599
Other non-current liabilities	81	76
Total liabilities	8,064	10,524
Commitments and contingencies (Note 12)		
Stockholders' equity:		
Preferred stock, par value $0.0001; 162 shares authorized as of September 30, 2022 and December 31, 2021; no shares issued or outstanding at September 30, 2022 and December 31, 2021	—	—
Common stock, par value $0.0001; 1,600 shares authorized as of September 30, 2022 and December 31, 2021; 387 and 403 shares issued and outstanding as of September 30, 2022 and December 31, 2021, respectively	—	—
Additional paid-in capital	1,488	4,211
Accumulated other comprehensive loss	(351)	(24)
Retained earnings	16,855	9,958
Total stockholders' equity	17,992	14,145
Total liabilities and stockholders' equity	$ 26,056	$ 24,669

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

MODERNA, INC.
CONDENSED CONSOLIDATED STATEMENTS OF INCOME
(Unaudited, in millions, except per share data)

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Revenue:				
Product sales	$ 3,120	$ 4,810	$ 13,576	$ 10,740
Grant revenue	144	140	453	473
Collaboration revenue	100	19	150	47
Total revenue	3,364	4,969	14,179	11,260
Operating expenses:				
Cost of sales	1,100	722	3,498	1,665
Research and development	820	521	2,084	1,343
Selling, general and administrative	278	168	757	366
Total operating expenses	2,198	1,411	6,339	3,374
Income from operations	1,166	3,558	7,840	7,886
Interest income	58	4	113	11
Other expense, net	(7)	(10)	(33)	(22)
Income before income taxes	1,217	3,552	7,920	7,875
Provision for income taxes	174	219	1,023	541
Net income	$ 1,043	$ 3,333	$ 6,897	$ 7,334
Earnings per share:				
Basic	$ 2.67	$ 8.27	$ 17.41	$ 18.25
Diluted	$ 2.53	$ 7.70	$ 16.46	$ 17.00
Weighted average common shares used in calculation of earnings per share:				
Basic	390	404	396	402
Diluted	412	434	419	431

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

MODERNA, INC.
CONDENSED CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
(Unaudited, in millions)

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Net income	$ 1,043	$ 3,333	$ 6,897	$ 7,334
Other comprehensive (loss) income, net of tax:				
Available-for-sales securities:				
Unrealized losses on available-for-sale debt securities	(126)	(3)	(384)	(10)
Less: net realized losses (gains) on available-for-sale securities reclassified in net income	3	(1)	18	(2)
Net decrease from available-for-sale debt securities	(123)	(4)	(366)	(12)
Cash flow hedges:				
Unrealized gains on derivative instruments	62	30	133	51
Less: net realized (gains) on derivative instruments reclassified in net income	(50)	(11)	(94)	(11)
Net increase from derivatives designated as hedging instruments	12	19	39	40
Total other comprehensive (loss) income	(111)	15	(327)	28
Comprehensive income	$ 932	$ 3,348	$ 6,570	$ 7,362

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

MODERNA, INC.
CONDENSED CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
FOR THE THREE MONTHS AND NINE MONTHS ENDED SEPTEMBER 30, 2022 AND 2021
(Unaudited, in millions)

	Common Stock		Additional Paid-In Capital	Accumulated Other Comprehensive Loss	Retained Earnings	Total Stockholders' Equity
	Shares	Amount				
Balance at June 30, 2022	392	$ —	$ 2,413	$ (240)	$ 15,812	$ 17,985
Vesting of restricted common stock units	1	—	—	—	—	—
Exercise of options to purchase common stock	1	—	11	—	—	11
Stock-based compensation	—	—	70	—	—	70
Other comprehensive loss, net of tax	—	—	—	(111)	—	(111)
Repurchase of common stock	(7)	—	(1,006)	—	—	(1,006)
Net income	—	—	—	—	1,043	1,043
Balance at September 30, 2022	387	$ —	$ 1,488	$ (351)	$ 16,855	$ 17,992

	Common Stock		Additional Paid-In Capital	Accumulated Other Comprehensive Income	Retained Earnings	Total Stockholders' Equity
	Shares	Amount				
Balance at June 30, 2021	403	$ —	$ 4,931	$ 16	$ 1,757	$ 6,704
Exercise of options to purchase common stock	2	—	32	—	—	32
Stock-based compensation	—	—	40	—	—	40
Other comprehensive income, net of tax	—	—	—	15	—	15
Net income	—	—	—	—	3,333	3,333
Balance at September 30, 2021	405	$ —	$ 5,003	$ 31	$ 5,090	$ 10,124

	Common Stock		Additional Paid-In Capital	Accumulated Other Comprehensive Loss	Retained Earnings	Total Stockholders' Equity
	Shares	Amount				
Balance at December 31, 2021	403	$ —	$ 4,211	$ (24)	$ 9,958	$ 14,145
Vesting of restricted common stock units	1	—	—	—	—	—
Exercise of options to purchase common stock	3	—	31	—	—	31
Purchase of common stock under employee stock purchase plan	—	—	9	—	—	9
Stock-based compensation	—	—	164	—	—	164
Other comprehensive loss, net of tax	—	—	—	(327)	—	(327)
Repurchase of common stock	(20)	—	(2,927)	—	—	(2,927)
Net income	—	—	—	—	6,897	6,897
Balance at September 30, 2022	387	$ —	$ 1,488	$ (351)	$ 16,855	$ 17,992

	Common Stock		Additional Paid-In Capital	Accumulated Other Comprehensive Income	Retained Earnings (Accumulated Deficit)	Total Stockholders' Equity
	Shares	Amount				
Balance at December 31, 2020	399	$ —	$ 4,802	$ 3	$ (2,244)	$ 2,561
Exercise of options to purchase common stock	6	—	91	—	—	91
Purchase of common stock under employee stock purchase plan	—	—	5	—	—	5
Stock-based compensation	—	—	105	—	—	105
Other comprehensive income, net of tax	—	—	—	28	—	28
Net income	—	—	—	—	7,334	7,334
Balance at September 30, 2021	405	$ —	$ 5,003	$ 31	$ 5,090	$ 10,124

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

MODERNA, INC.
CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(Unaudited, in millions)

	Nine Months Ended September 30,	
	2022	**2021**
Operating activities		
Net income	$ 6,897	$ 7,334
Adjustments to reconcile net income to net cash provided by operating activities:		
Stock-based compensation	164	105
Depreciation and amortization	268	154
Amortization/accretion of investments	35	33
Deferred income taxes	(473)	(89)
Other non-cash items	36	—
Changes in assets and liabilities:		
Accounts receivable	480	(1,751)
Prepaid expenses and other assets	(669)	(186)
Inventory	(636)	(918)
Right-of-use assets, operating leases	29	(25)
Accounts payable	89	26
Accrued liabilities	354	600
Deferred revenue	(2,691)	4,431
Income taxes payable	(810)	565
Operating lease liabilities	(27)	8
Other liabilities	273	23
Net cash provided by operating activities	3,319	10,310
Investing activities		
Purchases of marketable securities	(8,925)	(10,279)
Proceeds from maturities of marketable securities	2,222	1,075
Proceeds from sales of marketable securities	2,918	1,983
Purchases of property and equipment	(308)	(164)
Investment in convertible notes	(35)	—
Net cash used in investing activities	(4,128)	(7,385)
Financing activities		
Proceeds from issuance of common stock through equity plans	40	96
Repurchase of common stock	(2,927)	—
Changes in financing lease liabilities	(123)	(96)
Net cash used in financing activities	(3,010)	—
Net (decrease) increase in cash, cash equivalents and restricted cash	(3,819)	2,925
Cash, cash equivalents and restricted cash, beginning of year	6,860	2,636
Cash, cash equivalents and restricted cash, end of period	$ 3,041	$ 5,561
Non-cash investing and financing activities		
Purchases of property and equipment included in accounts payable and accrued liabilities	$ 80	$ 66
Right-of-use assets obtained through finance lease modifications and reassessments	$ —	$ 364
Right-of-use assets obtained in exchange for financing lease liabilities	$ 781	$ 126

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

MODERNA, INC.
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Unaudited)

1. Description of the Business

Moderna, Inc. (collectively, with its consolidated subsidiaries, any of Moderna, we, us, our, or the Company) is a biotechnology company pioneering messenger RNA (mRNA) therapeutics and vaccines to create a new generation of transformative medicines to improve the lives of patients. Our platform builds on continuous advances in basic and applied mRNA science, delivery technology, and manufacturing, providing us the capability to pursue in parallel a robust pipeline of new development candidates. We are developing therapeutics and vaccines for infectious diseases, immuno-oncology, rare diseases, autoimmune and cardiovascular diseases, independently and with our strategic collaborators.

On December 18, 2020, we received an Emergency Use Authorization (EUA) from the U.S. Food and Drug Administration (FDA) for the emergency use of the Moderna COVID-19 Vaccine (also referred to as mRNA-1273 and marketed under the brand name Spikevax®) as a two-dose, 100 µg primary series in individuals 18 years of age or older. In January 2022, we received full commercial approval for Spikevax as a two-dose, 100 µg primary series to prevent COVID-19 in individuals 18 years of age and older in the United States. Spikevax is approved or authorized in individuals 18 years and older in more than 70 countries. In addition, Spikevax is authorized by the FDA and global regulators in more than 50 countries as a two-dose, 100 µg primary series in adolescents aged 12 to 17 years old and as a two-dose, 50 µg primary series in children ages 6 to 11 years old. Additionally, a two-dose, 25 µg primary series of Spikevax is authorized in young children aged 6 months to 5 years old in the United States, Canada, Australia, and other jurisdictions.

The FDA, European Medicines Agency (EMA), Swissmedic and other health agencies around the world have authorized a booster dose of Spikevax at the 50 µg dose level for adults ages 18 years and older. The FDA and other health agencies have also authorized a second booster dose at the 50 µg dose level for adults 50 years and older and adults 18 years of age and older with certain kinds of immunocompromise.

On August 15, 2022, we received the first authorization for our BA.1 Omicron-targeting bivalent COVID-19 booster vaccine (Spikevax Bivalent Original/Omicron, mRNA-1273.214) from the Medicines and Healthcare products Regulatory Agency (MHRA) in the United Kingdom, given as a 50 µg booster dose for individuals 18 years of age and older who have received either a primary series or an initial booster of any of the authorized or approved COVID-19 vaccines. The EMA in the European Union provided a similar authorization for mRNA-1273.214 as a booster vaccine for individuals 12 years and older on September 2, 2022. During the third quarter of 2022, we received authorizations for mRNA-1273.214 as a booster vaccine in the United Kingdom, the European Union, Japan, Australia, Canada, and Switzerland.

On August 31, 2022, we received an EUA from the FDA for our BA.4/BA.5 Omicron-targeting bivalent COVID-19 booster vaccine (mRNA-1273.222), given as a 50 µg booster dose for individuals 18 years of age and older who have received either a primary series or an initial booster of any of the authorized or approved COVID-19 vaccines. On October 12, 2022, we received an EUA from the FDA for mRNA-1273.222 as a 50 µg booster dose for adolescents 12 to 17 years old and as a 25 µg booster dose for children 6 to 11 years old, each following a completed primary series of any authorized COVID-19 vaccine or a previous booster. The EMA in the European Union, the MHRA in the United Kingdom and other countries worldwide have provided similar authorizations for mRNA-1273.222.

2. Summary of Basis of Presentation and Recent Accounting Standards

Basis of Presentation and Principles of Consolidation

The accompanying unaudited condensed consolidated financial statements that accompany these notes have been prepared in accordance with U.S. generally accepted accounting principles (GAAP) and applicable rules and regulations of the Securities and Exchange Commission (SEC) for interim financial reporting, consistent in all material respects with those applied in our Annual Report on Form 10-K for the year ended December 31, 2021 (2021 Form 10-K). Any reference in these notes to applicable guidance is meant to refer to the authoritative accounting principles generally accepted in the United States as found in the Accounting Standard Codification (ASC) and Accounting Standards Update (ASU) of the Financial Accounting Standards Board (FASB). This report should be read in conjunction with the audited consolidated financial statements in our 2021 Form 10-K.

The condensed consolidated financial statements include Moderna, Inc. and its subsidiaries. All intercompany transactions and balances have been eliminated in consolidation. The significant accounting policies used in preparation of these condensed consolidated financial statements for the three and nine months ended September 30, 2022 are consistent with those described in our 2021 Form 10-K. The results of operations for the three and nine months ended September 30, 2022 are not necessarily indicative of the operating results to be expected for the full fiscal year or future operating periods.

Use of Estimates

We have made estimates and judgments affecting the amounts reported in our condensed consolidated financial statements and the accompanying notes. We base our estimates on historical experience and various relevant assumptions that we believe to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting periods that are not readily apparent from other sources. Significant estimates relied upon in preparing these financial statements include, but are not limited to, critical accounting policies or estimates related to revenue recognition, income taxes, valuation allowance on deferred tax assets, leases, fair value of financial instruments, derivative financial instruments, inventory, firm purchase commitment liabilities, useful lives of property and equipment, research and development expenses, and stock-based compensation. The actual results that we experience may differ materially from our estimates.

Comprehensive Income

Comprehensive income includes net income and other comprehensive income/loss for the period. Other comprehensive income/loss consists of unrealized gains/losses on our investments and derivatives designated as hedging instruments. Total comprehensive income for all periods presented has been disclosed in the condensed consolidated statements of comprehensive income.

The components of accumulated other comprehensive loss for the three and nine months ended September 30, 2022 were as follows (in millions):

	Unrealized Loss on Available-for-Sale Debt Securities	Net Unrealized Gains on Derivatives Designated As Hedging Instruments	Total
Accumulated other comprehensive loss, balance at December 31, 2021	$ (40)	$ 16	$ (24)
Other comprehensive loss	(171)	11	(160)
Accumulated other comprehensive loss, balance at March 31, 2022	(211)	27	(184)
Other comprehensive loss	(72)	16	(56)
Accumulated other comprehensive loss, balance at June 30, 2022	(283)	43	(240)
Other comprehensive loss	(123)	12	(111)
Accumulated other comprehensive loss, balance at September 30, 2022	$ (406)	$ 55	$ (351)

Restricted Cash

We include our restricted cash balance in the cash, cash equivalents and restricted cash reconciliation of operating, investing and financing activities in the condensed consolidated statements of cash flows.

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

	September 30,	
	2022	2021
Cash and cash equivalents	$ 3,027	$ 5,550
Restricted cash, non-current	14	11
Total cash, cash equivalents and restricted cash shown in the condensed consolidated statements of cash flows	$ 3,041	$ 5,561

Recently Issued Accounting Standards Not Yet Adopted

From time to time, new accounting pronouncements are issued by the FASB or other standard setting bodies and adopted by us as of the specified effective date. Unless otherwise discussed, we believe that the impact of recently issued standards that are not yet effective will not have a material impact on our condensed consolidated financial statements and disclosures.

3. Product Sales

Product sales are primarily associated with our COVID-19 vaccine supply agreements with the U.S. Government, other international governments and Gavi (on behalf of the COVAX Facility).

Product sales by customer geographic location were as follows (in millions):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
United States	$ 985	$ 1,197	$ 3,380	$ 4,648
Europe	1,045	1,688	4,511	3,028
Rest of world [(1)]	1,090	1,925	5,685	3,064
Total	$ 3,120	$ 4,810	$ 13,576	$ 10,740

[(1)] Includes product sales recognized under the agreement with Gavi, which facilitates the allocation and distribution of our COVID-19 vaccines around the world, particularly for low- and middle-income countries.

As of September 30, 2022, our COVID-19 vaccine (marketed under the brand name Spikevax) and Omicron-targeting bivalent boosters (mRNA-1273.214 and mRNA-1273.222) were our only commercial products authorized for use.

As of September 30, 2022 and December 31, 2021, we had deferred revenue of $4.1 billion and $6.7 billion, respectively, related to customer deposits. We expect $3.9 billion of our deferred revenue related to customer deposits as of September 30, 2022 to be realized in less than one year. Timing of product manufacturing, delivery, and receipt of marketing approval will determine the period in which product sales are recognized.

4. Grant Revenue

In September 2020, we entered into an agreement with the Defense Advanced Research Projects Agency (DARPA) for an award of up to $56 million to fund development of a mobile manufacturing prototype leveraging our existing manufacturing technology that is capable of rapidly producing therapeutics and vaccines. As of September 30, 2022, the committed funding, net of revenue earned was $5 million. An additional $30 million of funding will be available if DARPA exercises additional contract options.

In April 2020, we entered into an agreement with the Biomedical Advanced Research and Development Authority (BARDA), a division of the Office of the Assistant Secretary for Preparedness and Response within the U.S. Department of Health and Human Services (HHS), for an award of up to $483 million to accelerate development of mRNA-1273, our vaccine candidate against COVID-19. The agreement was amended in both 2020 and 2021 to provide for additional commitments to support various late-stage clinical development efforts of mRNA-1273, including a 30,000 participant Phase 3 study, pediatric clinical trials and pharmacovigilance studies. In March 2022, we entered into a further amendment to the BARDA agreement, increasing the amount of potential reimbursements by $308 million, in connection with costs associated with the clinical development for the adolescent and pediatric studies and the Phase 3 pivotal study. The maximum award from BARDA, inclusive of the 2020, 2021 and 2022 amendments, was approximately $1.7 billion. All contract options have been exercised. As of September 30, 2022, the remaining available funding, net of revenue earned was $67 million.

In September 2016, we received from BARDA an award of up to $126 million, subsequently adjusted to $117 million in 2021, to help fund our Zika vaccine program. In September 2022, the performance period of the grant expired, and BARDA was released of the obligation to fund the remaining $36 million of the award.

In January 2016, we entered a global health project framework agreement with the Bill and Melinda Gates Foundation (Gates Foundation) to advance mRNA-based development projects for various infectious diseases, including human immunodeficiency virus (HIV). As of September 30, 2022, the available funding, net of revenue earned was $7 million, with up to an additional $80 million available if additional follow-on projects are approved.

The following table summarizes grant revenue for the periods presented (in millions):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
BARDA	$ 141	$ 128	$ 442	$ 454
Other grant revenue	3	12	11	19
Total grant revenue	$ 144	$ 140	$ 453	$ 473

5. Collaboration Agreements

We have entered into collaboration agreements with strategic collaborators to accelerate the discovery and advancement of potential mRNA medicines across therapeutic areas. As of September 30, 2022 and December 31, 2021, we had collaboration agreements with AstraZeneca plc (AstraZeneca), Merck & Co., Inc (Merck), Vertex Pharmaceuticals Incorporated and Vertex Pharmaceuticals (Europe) Limited (together, Vertex), and others. Please refer to our 2021 Form 10-K under the heading “Third-Party Strategic Alliances” and Note 5 to our consolidated financial statements for further description of these collaboration agreements.

The following table summarizes our total consolidated revenue from our strategic collaborators for the periods presented (in millions):

	Three Months Ended September 30,		Nine Months Ended September 30,	
Collaboration Revenue by Strategic Collaborator:	2022	2021	2022	2021
AstraZeneca	$ 76	$ 3	$ 80	$ 7
Merck	20	7	35	11
Vertex	4	5	33	23
Other	—	4	2	6
Total collaboration revenue	$ 100	$ 19	$ 150	$ 47

The following table presents changes in the balances of our receivables and contract liabilities related to our strategic collaboration agreements during the nine months ended September 30, 2022 (in millions):

	December 31, 2021	Additions	Deductions	September 30, 2022
Contract Assets:				
Accounts receivable	$ 9	$ 287	$ (18)	$ 278
Contract Liabilities:				
Deferred revenue	$ 204	$ 8	$ (135)	$ 77

As of September 30, 2022, the aggregated amount of the transaction price allocated to performance obligations under our collaboration agreements that are unsatisfied or partially unsatisfied was $99 million.

In the third quarter of 2022, AstraZeneca terminated our collaborations with them, including the development of VEGF-A and IL-12 programs, for which termination will become effective on November 21, 2022. All rights to these two programs will revert to us. As a result of the termination, we recognized the remaining deferred revenue of $76 million as collaboration revenue during the three months ended September 30, 2022.

In September 2022, Merck exercised its option to jointly develop and commercialize PCV mRNA-4157 pursuant to the terms of the PCV Collaboration and License Agreement, as amended and restated (the PCV/SAV Agreement). We concluded that the contractual provisions in the existing arrangement are not sufficiently definitive to identify the rights and obligations of the parties during the Merck Participation Term (as defined in the PCV/SAV Agreement). As such, we recorded a receivable of $250 million and other current liabilities of $250 million on our condensed consolidated financial statements related to Merck's participation election as of September 30, 2022. After receipt of the participation election payment, we and Merck will agree on a joint development plan and budget, and we will reassess the accounting treatment for the participation election payment and the collaboration arrangement at such time.

In addition to the collaboration agreements mentioned above, we have other collaborative and licensing arrangements that we do not consider to be individually significant to our business at this time. Pursuant to these agreements, we may be required to make upfront payments and payments upon achievement of various development, regulatory and commercial milestones, which in the aggregate could be significant. Future milestone payments, if any, will be reflected in our consolidated financial statements when the corresponding events become probable. In addition, we may be required to pay significant royalties on future sales if products related to these arrangements are commercialized.

6. Financial Instruments

Cash and Cash Equivalents and Investments

The following tables summarize our cash and available-for-sale securities by significant investment category at September 30, 2022 and December 31, 2021 (in millions):

	September 30, 2022						
	Amortized Cost	Unrealized Gains	Unrealized Losses	Estimated Fair Value	Cash and Cash Equivalents	Current Marketable Securities	Non-Current Marketable Securities
Cash and cash equivalents	$ 3,027	$ —	$ —	$ 3,027	$ 3,027	$ —	$ —
Available-for-sale:							
Certificates of deposit	208	—	—	208	—	208	—
U.S. treasury bills	220	—	(2)	218	—	218	—
U.S. treasury notes	7,826	—	(268)	7,558	—	3,765	3,793
Corporate debt securities	6,124	—	(270)	5,854	—	1,130	4,724
Government debt securities	147	—	(9)	138	—	—	138
Total	$ 17,552	$ —	$ (549)	$ 17,003	$ 3,027	$ 5,321	$ 8,655

	December 31, 2021						
	Amortized Cost	Unrealized Gains	Unrealized Losses	Estimated Fair Value	Cash and Cash Equivalents	Current Marketable Securities	Non-Current Marketable Securities
Cash and cash equivalents	$ 6,848	$ —	$ —	$ 6,848	$ 6,848	$ —	$ —
Available-for-sale:							
Certificates of deposit	80	—	—	80	—	80	—
U.S. treasury bills	479	—	—	479	—	479	—
U.S. treasury notes	6,595	—	(31)	6,564	—	1,984	4,580
Corporate debt securities	3,508	—	(20)	3,488	—	1,323	2,165
Government debt securities	112	—	(1)	111	—	13	98
Total	$ 17,622	$ —	$ (52)	$ 17,570	$ 6,848	$ 3,879	$ 6,843

The amortized cost and estimated fair value of available-for-sale securities by contractual maturity at September 30, 2022 and December 31, 2021 were as follows (in millions):

	September 30, 2022	
	Amortized Cost	Estimated Fair Value
Due in one year or less	$ 5,417	$ 5,321
Due after one year through five years	9,108	8,655
Total	$ 14,525	$ 13,976

	December 31, 2021	
	Amortized Cost	Estimated Fair Value
Due in one year or less	$ 3,882	$ 3,879
Due after one year through five years	6,892	6,843
Total	$ 10,774	$ 10,722

In accordance with our investment policy, we place investments in investment grade securities with high credit quality issuers, and generally limit the amount of credit exposure to any one issuer. We evaluate securities for impairment at the end of each reporting period. Impairment is evaluated considering numerous factors, and their relative significance varies depending on the situation.

Factors considered include whether a decline in fair value below the amortized cost basis is due to credit-related factors or non-credit-related factors, the financial condition and near-term prospects of the issuer, and our intent and ability to hold the investment to allow for an anticipated recovery in fair value. Any impairment that is not credit related is recognized in other comprehensive loss, net of applicable taxes. A credit-related impairment is recognized as an allowance on the balance sheet with a corresponding adjustment to earnings. We did not recognize any impairment charges related to available-for-sale securities for the three and nine months ended September 30, 2022 and 2021. We did not record any credit-related allowance to available-for-sale securities as of September 30, 2022 and December 31, 2021.

The following table summarizes the amount of gross unrealized losses and the estimated fair value for our available-for-sale securities in an unrealized loss position by the length of time the securities have been in an unrealized loss position at September 30, 2022 and December 31, 2021 (in millions):

	Less than 12 Months		12 Months or More		Total	
	Gross Unrealized Losses	Estimated Fair Value	Gross Unrealized Losses	Estimated Fair Value	Gross Unrealized Losses	Estimated Fair Value
As of September 30, 2022:						
U.S. treasury bills	$ (1)	$ 218	$ —	$ —	$ (1)	$ 218
U.S. treasury notes	(166)	5,204	(102)	2,353	(268)	7,557
Corporate debt securities	(204)	4,404	(67)	1,200	(271)	5,604
Government debt securities	(2)	46	(7)	93	(9)	139
Total	$ (373)	$ 9,872	$ (176)	$ 3,646	$ (549)	$ 13,518
As of December 31, 2021:						
U.S. treasury bills	$ —	$ 329	$ —	$ —	$ —	$ 329
U.S. treasury notes	(31)	6,332	—	—	(31)	6,332
Corporate debt securities	(20)	2,573	—	1	(20)	2,574
Government debt securities	(1)	112	—	—	(1)	112
Total	$ (52)	$ 9,346	$ —	$ 1	$ (52)	$ 9,347

At September 30, 2022 and December 31, 2021, we held 620 and 384 available-for-sale securities, respectively, out of our total investment portfolio that were in a continuous unrealized loss position. We neither intend to sell these investments, nor do we believe that we are more-likely-than-not to conclude we will have to sell them before recovery of their carrying values. We also believe that we will be able to collect both principal and interest amounts due to us at maturity.

Assets and Liabilities Measured at Fair Value on a Recurring Basis

The following fair value hierarchy is used to classify assets and liabilities based on the observable inputs and unobservable inputs used to value the assets and liabilities:

- Level 1: Unadjusted quoted prices in active markets that are accessible at the measurement date for identical, unrestricted assets or liabilities;
- Level 2: Quoted prices for similar assets and liabilities in active markets, quoted prices in markets that are not active, or inputs which are observable, either directly or indirectly, for substantially the full term of the asset or liability; or
- Level 3: Prices or valuation techniques that require inputs that are both significant to the fair value measurement and unobservable (i.e., supported by little or no market activity).

The following tables summarize our financial assets and liabilities measured at fair value on a recurring basis as of September 30, 2022 and December 31, 2021 (in millions):

	Fair value at September 30, 2022	Fair Value Measurement Using	
		Level 1	Level 2
Assets:			
Money market funds	$ 1,937	$ 1,937	$ —
Certificates of deposit	208	—	208
U.S. treasury bills	218	—	218
U.S. treasury notes	7,558	—	7,558
Corporate debt securities	5,854	—	5,854
Government debt securities	138	—	138
Derivative instruments (Note 7)	77	—	77
Total	$ 15,990	$ 1,937	$ 14,053
Liabilities:			
Derivative instruments (Note 7)	$ 6	$ —	$ 6

	Fair value at December 31, 2021	Fair Value Measurement Using	
		Level 1	Level 2
Assets:			
Money market funds	$ 2,329	$ 2,329	$ —
Certificates of deposit	80	—	80
U.S. treasury bills	479	—	479
U.S. treasury notes	6,564	—	6,564
Corporate debt securities	3,488	—	3,488
Government debt securities	111	—	111
Derivative instruments (Note 7)	21	—	21
Total	$ 13,072	$ 2,329	$ 10,743
Liabilities:			
Derivative instruments (Note 7)	$ 7	$ —	$ 7

As of September 30, 2022 and December 31, 2021, we did not have non-financial assets or liabilities measured at fair value on a recurring basis and did not have any Level 3 financial assets or financial liabilities.

In addition, as of September 30, 2022, we had $30 million in equity investments without readily determinable fair values, which are recorded within other non-current assets in our condensed consolidated balance sheets and excluded from the fair value measurement tables above. We did not have equity investments as of December 31, 2021.

7. Derivative Financial Instruments

We transact business in various foreign currencies and have international sales and expenses denominated in foreign currencies. Therefore, we are exposed to certain risks arising from both our business operations and economic conditions. Our risk management strategy includes the use of derivative financial instruments to hedge: (1) forecasted product sales that are denominated in foreign currencies and (2) foreign currency exchange rate fluctuations on monetary assets or liabilities denominated in foreign currencies. We do not enter into derivative financial contracts for speculative or trading purposes. We do not believe that we are exposed to more than a nominal amount of credit risk in our foreign currency hedges, as counterparties are large, global and well-capitalized financial institutions. We classify cash flows from our derivative transactions as cash flows from operating activities in our condensed consolidated statements of cash flows.

Cash Flow Hedges

We mitigate the foreign exchange risk arising from the fluctuations in foreign currency denominated product sales in Euro through a foreign currency cash flow hedging program, using forward contracts and foreign currency options that do not exceed 15 months in duration. We hedge these cash flow exposures to reduce the risk that our earnings and cash flows will be adversely affected by changes in exchange rates. To receive hedge accounting treatment, all hedging relationships are formally documented at the inception of the hedge, and the hedges must be highly effective in offsetting changes to future cash flows on hedged transactions. The derivative assets or liabilities associated with our hedging activities are recorded at fair value in other current assets or other current liabilities, respectively, in our condensed consolidated balance sheets. The gains or losses resulting from changes in the fair value of these hedges are initially recorded as a component of accumulated other comprehensive income (loss) (AOCI) in stockholders' equity and subsequently reclassified to product sales in the period during which the hedged transaction affects earnings. In the event the underlying forecasted transaction does not occur, or it becomes probable that it will not occur, within the defined hedge period, we reclassify the gains or losses on the related cash flow hedge from AOCI to other expense, net in our condensed consolidated statements of income. We evaluate hedge effectiveness at the inception of the hedge prospectively, and on an on-going basis both retrospectively and prospectively. If we do not elect hedge accounting, or the contract does not qualify for hedge accounting treatment, the changes in fair value from period to period are recorded as a component of other expense, net in our condensed consolidated statements of income. As of September 30, 2022, we had net deferred gains of $70 million on our foreign currency forward contracts included in AOCI that are expected to be recognized into product sales within the next 12 months.

Balance Sheet Hedges

We enter into foreign currency forward contracts to hedge fluctuations associated with foreign currency denominated monetary assets and liabilities, primarily accounts receivable, accounts payable and lease liabilities in Euro, Japanese Yen and Swiss Franc, that are not designated for hedge accounting treatment. Therefore, these forward contracts are accounted for as derivatives whereby the fair value of the contracts are reported as other current assets or other current liabilities in our condensed consolidated balance sheets, and gains and losses resulting from changes in the fair value are recorded as a component of other expense, net in our condensed consolidated statements of income. The gains and losses on these foreign currency forward contracts generally offset the gains and losses in the underlying foreign currency denominated assets and liabilities, which are also recorded to other expense, net in our condensed consolidated statements of income.

Total gross notional amount and fair value of our foreign currency derivatives were as follows (in millions):

	September 30, 2022		
		Fair Value	
	Notional Amount	Asset [1]	Liability [2]
Derivatives designated as cash flow hedging instruments:			
Foreign currency forward contracts	$ 789	$ 68	$ 1
Derivatives not designated as hedging instruments:			
Foreign currency forward contracts	833	9	5
Total derivatives	$ 1,622	$ 77	$ 6

	December 31, 2021		
		Fair Value	
	Notional Amount	Asset [1]	Liability [2]
Derivatives designated as cash flow hedging instruments:			
Foreign currency forward contracts	$ 565	$ 20	$ —
Derivatives not designated as hedging instruments:			
Foreign currency forward contracts	1,370	1	7
Total derivatives	$ 1,935	$ 21	$ 7

[1] As presented in the condensed consolidated balance sheets within prepaid expenses and other current assets.
[2] As presented in the condensed consolidated balance sheets within other current liabilities.

Gains on our foreign currency derivatives, net of tax recognized in our condensed consolidated statements of comprehensive income for the three and nine months ended September 30, 2022 and 2021 were as follows (in millions):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Derivatives in cash flow hedging relationships:				
Foreign currency forward contracts	$ 62	$ 30	$ 133	$ 51

The effect of our foreign currency derivatives in our condensed consolidated statements of income for the three and nine months ended September 30, 2022 and 2021 was as follows (in millions):

		Three Months Ended September 30,		Nine Months Ended September 30,	
	Statement of Income Classification	2022	2021	2022	2021
Derivatives in cash flow hedging relationships:					
Foreign currency forward contracts					
Net gain reclassified from AOCI into income	Product sales	$ 50	$ 11	$ 94	$ 11
Derivatives not designated as hedging instruments:					
Foreign currency forward contracts					
Net realized and unrealized gain (loss)	Other expense, net	$ 26	$ 3	$ 95	$ (16)

8. Inventory

Inventory as of September 30, 2022 and December 31, 2021 consisted of the following (in millions):

	September 30, 2022	December 31, 2021
Raw materials	$ 1,541	$ 870
Work in progress	366	338
Finished goods	170	233
Total inventory	$ 2,077	$ 1,441

Inventory is recorded at the lower of cost or net realizable value. On a quarterly basis, we evaluate the composition of inventory to identify excess, obsolete, slow-moving or otherwise unsaleable items. We also assess whether we have any excess firm, non-cancelable, purchase commitment liabilities, resulting from our supply agreements with third-party vendors on a quarterly basis. The determination of net realizable value of inventory and firm purchase commitment liabilities requires judgment, including consideration of many factors, such as estimates of future product demand, current and future market conditions, potential product obsolescence, expiration and utilization of raw materials under firm purchase commitments and contractual minimums, among others.

Inventory write-downs as a result of excess, obsolescence, scrap or other reasons, and losses on firm purchase commitments are recorded as a component of cost of sales in our condensed consolidated statements of income. For the three and nine months ended September 30, 2022, inventory write-downs were $333 million and $1.0 billion, respectively. Inventory write-downs were immaterial for the three and nine months ended September 30, 2021. For the three and nine months ended September 30, 2022, losses on firm purchase commitments were $7 million and $349 million, respectively. As of September 30, 2022, the accrued liability for losses on firm future purchase commitments in our condensed consolidated balance sheets was $349 million. There were no such charges in 2021 or accrued liabilities at December 31, 2021.

Pre-launch Inventory

Costs relating to raw materials and production of inventory in preparation for product launch prior to regulatory approval are capitalized when future commercialization is considered probable, the future economic benefit is expected to be realized, and we believe that material uncertainties related to the ultimate regulatory approval have been significantly reduced. For pre-launch inventory that is capitalized, we consider a number of factors based on the information available at the time, including the product candidate's current status in the drug development and regulatory approval process, results from the related clinical trials, results from meetings with relevant regulatory agencies prior to the filing of regulatory applications, potential impediments to the approval process such as product safety or efficacy, historical experience, viability of commercialization and market trends.

During the second quarter of 2022, we capitalized pre-launch inventory relating to our BA.1 Omicron-targeting booster candidate (mRNA-1273.214). As of June 30, 2022, we had pre-launch inventory of $155 million in our condensed consolidated balance sheets. Subsequent to June 30, 2022, we received authorization for the use of mRNA-1273.214 in several countries and commenced supply of this vaccine to customers.

9. Property and Equipment, Net

Property and equipment, net, as of September 30, 2022 and December 31, 2021 consisted of the following (in millions):

	September 30, 2022	December 31, 2021
Manufacturing and laboratory equipment	$ 239	$ 175
Leasehold improvements	388	313
Furniture, fixtures and other	18	11
Computer equipment and software	23	16
Internally developed software	8	9
Right-of-use asset, financing (Note 11)	1,585	857
Construction in progress	338	212
Total	2,599	1,593
Less: Accumulated depreciation	(580)	(352)
Property and equipment, net	$ 2,019	$ 1,241

Depreciation and amortization expense for the three and nine months ended September 30, 2022 was $113 million and $268 million, respectively. Depreciation and amortization expense for the three and nine months ended September 30, 2021 was $70 million and $154 million, respectively.

10. Other Balance Sheet Components

Prepaid Expenses and Other Current Assets

Prepaid expenses and other current assets, as of September 30, 2022 and December 31, 2021 consisted of the following (in millions):

	September 30, 2022	December 31, 2021
Down payments for materials and supplies	$ 180	$ 287
Down payments to manufacturing vendors	169	118
Prepaid services	277	126
Value added tax receivable	21	70
Tenant improvement allowance receivable	51	51
Interest receivable	54	27
Derivative assets	77	21
Prepaid income tax	263	23
Other current assets	85	5
Prepaid expenses and other current assets	$ 1,177	$ 728

Accrued Liabilities

Accrued liabilities, as of September 30, 2022 and December 31, 2021 consisted of the following (in millions):

	September 30, 2022	December 31, 2021
Clinical trials	$ 269	$ 283
Raw materials	246	260
Royalties	106	241
Development operations	96	137
Manufacturing	411	227
Other external goods and services	108	79
Loss on future firm purchase commitments[1]	349	—
Compensation-related	141	126
Other	130	119
Accrued liabilities	$ 1,856	$ 1,472

[1] Related to losses that are expected to arise from firm, non-cancellable, commitments for future raw material purchases (Note 8).

Other Current Liabilities

Other current liabilities, as of September 30, 2022 and December 31, 2021 consisted of the following (in millions):

	September 30, 2022	December 31, 2021
Lease liabilities - financing (Note 11)	$ 224	$ 165
Lease liabilities - operating (Note 11)	36	46
Other[1]	293	14
Other current liabilities	$ 553	$ 225

[1] Includes $250 million related to Merck's participation election as of September 30, 2022 (Note 5).

Deferred Revenue

The following table summarizes the activities in deferred revenue for the nine months ended September 30, 2022 (in millions):

	December 31, 2021	Additions	Deductions	September 30, 2022
Product sales	$ 6,658	$ 2,467	$ (5,030)	$ 4,095
Grant revenue	6	—	(1)	5
Collaboration revenue	204	8	(135)	77
Total deferred revenue	$ 6,868	$ 2,475	$ (5,166)	$ 4,177

11. Leases

We have entered into various long-term non-cancelable lease arrangements for our facilities and equipment expiring at various times through 2042. Certain of these arrangements have free rent periods or escalating rent payment provisions. We recognize lease cost under such arrangements on a straight-line basis over the life of the lease. We have two campuses in Massachusetts, our Cambridge campus and our Moderna Technology Center (MTC), an industrial technology center located in Norwood. We also lease other office and lab spaces globally for our business operations.

Operating Leases

Cambridge Campus

We occupy a multi-building campus in Technology Square in Cambridge, Massachusetts with a mix of offices and research laboratory space totaling approximately 261,000 square feet. Our Cambridge campus leases have expiry ranges from 2024 to 2029.

In addition, we are investing in a new Moderna Science Center (MSC) in Cambridge, to create a purpose-built space to support our next chapter of discovery (see Note 12). In connection with our MSC investment, in September 2021, we entered into amendments to our lease agreements to allow for an option for early termination of the leases, either in part or full. Notification of the intent to exercise the option must be provided by August 2023. We have not elected to exercise this option.

Finance Leases

Moderna Technology Center

Our MTC comprises three main buildings: MTC South, MTC North and MTC East. Each of MTC South and MTC North is approximately 200,000 square feet and provides office, laboratory and light manufacturing space, directly supporting improvement in our manufacturing capabilities. MTC East is approximately 240,000 square feet for commercial and clinical activities. The MTC campus is leased through 2042 and we have the option to extend the term for three extension periods of five years.

Embedded Leases

We have entered into multiple contract manufacturing service agreements with third parties which contain embedded leases within the scope of ASC 842. These leases expire from 2022 through 2026. As of September 30, 2022 and December 31, 2021, we had lease liabilities of $513 million and $166 million, respectively, related to the embedded leases. As of September 30, 2022 and December 31, 2021, we had right-of-use assets of $695 million and $173 million, respectively, related to the embedded leases.

Operating and financing lease right-of-use assets and lease liabilities as of September 30, 2022 and December 31, 2021 were as follows (in millions):

	September 30, 2022	December 31, 2021
Assets:		
Right-of-use assets, operating, net [1] [2]	$ 113	$ 142
Right-of-use assets, financing, net [3] [4]	1,209	665
Total	$ 1,322	$ 807
Liabilities:		
Current:		
Operating lease liabilities [5]	$ 36	$ 46
Financing lease liabilities [5]	224	165
Total current lease liabilities	260	211
Non-current:		
Operating lease liabilities, non-current	79	106
Financing lease liabilities, non-current	922	599
Total non-current lease liabilities	$ 1,001	$ 705
Total	$ 1,261	$ 916

[1] These assets are real estate related assets, which include land, office, and laboratory spaces.
[2] Net of accumulated amortization.
[3] These assets are real estate assets related to the MTC leases as well as assets related to contract manufacturing service agreements.
[4] Included in property and equipment in the condensed consolidated balance sheets, net of accumulated depreciation.
[5] Included in other current liabilities in the condensed consolidated balance sheets.

Future minimum lease payments under our non-cancelable lease agreements as of September 30, 2022, were as follows (in millions):

Fiscal Year	Operating Leases	Financing Leases [1]
2022 (remainder of the year)	$ 11	$ 153
2023	39	136
2024	15	120
2025	16	121
2026	16	101
Thereafter	51	1,111
Total minimum lease payments	148	1,742
Less amounts representing interest or imputed interest	(33)	(596)
Present value of lease liabilities	$ 115	$ 1,146

[1] Includes certain optional lease term extensions, predominantly related to the MTC leases, which represent a total of $662 million of undiscounted future lease payments.

12. Commitments and Contingencies

Legal Proceedings

We are involved in various claims and legal proceedings of a nature considered ordinary course in our business. The outcome of any such proceedings, regardless of the merits, is inherently uncertain; therefore, assessing the likelihood of loss and any estimated damages is difficult and subject to considerable judgment. We are not currently a party to any legal proceedings for which a material loss is probable, or for which a loss is reasonably estimable at this time.

Indemnification Obligations

As permitted under Delaware law, we indemnify our officers, directors, and employees for certain events, occurrences while the officer, or director is, or was, serving at our request in such capacity. The term of the indemnification is for the officer's or director's lifetime.

We have standard indemnification arrangements in our leases for laboratory and office space that require us to indemnify the landlord against any liability for injury, loss, accident, or damage from any claims, actions, proceedings, or costs resulting from certain acts, breaches, violations, or non-performance under our leases.

We enter into indemnification provisions under our agreements with counterparties in the ordinary course of business, typically with business partners, contractors, clinical sites and customers. Under these provisions, we generally indemnify and hold harmless the indemnified party for losses suffered or incurred by the indemnified party as a result of our activities. These indemnification provisions generally survive termination of the underlying agreement. The maximum potential amount of future payments we could be required to make under these indemnification provisions is unlimited.

Through the three and nine months ended September 30, 2022 and the year ended December 31, 2021, we had not experienced any material losses related to these indemnification obligations, and no material claims were outstanding. We do not expect significant claims related to these indemnification obligations and, consequently, concluded that the fair value of these obligations is negligible, and no related reserves were established.

Purchase Commitments and Purchase Orders

We enter into agreements in the normal course of business with vendors and contract manufacturing organizations for raw materials and manufacturing services and with vendors for preclinical research studies, clinical trials and other goods or services. As of September 30, 2022, we had $3.0 billion of non-cancelable purchase commitments related to raw materials and manufacturing agreements, which are expected to be paid through 2026. As of September 30, 2022, $349 million of the purchase commitments related to raw materials was recorded as an accrued liability for loss on future firm purchase commitments. As of September 30, 2022, we had $178 million of non-cancelable purchase commitments related to clinical services and other goods and services which are expected to be paid through 2026. These amounts represent our minimum contractual obligations, including termination fees.

In addition to purchase commitments, we have agreements with third parties for various goods and services, including services related to clinical operations and support and contract manufacturing, for which we are not contractually able to terminate for convenience and avoid any and all future obligations to the vendors. Certain agreements provide for termination rights subject to termination fees or wind down costs. Under such agreements, we are contractually obligated to make certain payments to vendors, mainly, to reimburse them for their unrecoverable outlays incurred prior to cancellation. At September 30, 2022, we had cancelable open purchase orders of $2.9 billion in total under such agreements for our significant clinical operations and support and contract manufacturing. These amounts represent only our estimate of those items for which we had a contractual commitment to pay at September 30, 2022, assuming we would not cancel these agreements. The actual amounts we pay in the future to the vendors under such agreements may differ from the purchase order amounts.

Licenses to Patented Technology

On June 26, 2017, we entered into sublicense agreements with Cellscript, LLC and its affiliate, mRNA RiboTherapeutics, Inc., to sublicense certain patent rights. Pursuant to each agreement, we are required to pay certain license fees, annual maintenance fees, minimum royalties on future net sales and milestone payments contingent on achievement of certain development, regulatory and commercial milestones for specified products, on a product-by-product basis. Commercial milestone payments and royalties based on annual net sales of licensed products for therapeutic and prophylactic products are accounted for as additional expense of the related product sales in the period in which the corresponding sales occur. For the three and nine months ended September 30, 2022, we recognized $106 million and $470 million, respectively, of royalty expenses associated with our product sales, which was recorded to cost of sales in our condensed consolidated statements of income. For the three and nine months ended September 30, 2021, we recognized $168 million and $400 million, respectively, of royalty expenses associated with our product sales, which was recorded to cost of sales in our condensed consolidated statements of income.

Additionally, we have other in-license agreements with third parties which require us to make future development, regulatory and commercial milestone payments and sales-based royalties for specified products associated with the agreements. The achievement of these milestones was not deemed probable as of September 30, 2022.

Moderna Science Center

In September 2021, we announced an investment in the MSC in Cambridge, Massachusetts. The MSC is expected to integrate scientific and non-scientific spaces, including our principal executive offices and will be built to support our growth as we continue to advance our pipeline of mRNA medicines. In relation to the investment, we entered into a lease agreement for approximately 462,000 square feet and will undergo an approximately two-year building project. Following the building project, the lease term is 15 years, subject to our right to extend the lease for up to two additional seven-year terms. Pursuant to this lease agreement, we are committed to approximately $1.1 billion non-cancellable rent payments for the initial lease term. We expect to begin the move-in process in 2023.

13. Stock-Based Compensation and Share Repurchase Programs

Stock-Based Compensation

The following table presents the components and classification of stock-based compensation expense for the three and nine months ended September 30, 2022 and 2021 as follows (in millions):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Options	$ 15	$ 27	$ 67	$ 73
Restricted Common Stock (RSUs) and Performance Stock Units (PSUs)	54	12	93	29
Employee Stock Purchase Plan (ESPP)	1	1	4	3
Total	$ 70	$ 40	$ 164	$ 105
Cost of sales	$ 10	$ 1	$ 31	$ 13
Research and development	28	25	67	54
Selling, general and administrative	32	14	66	38
Total	$ 70	$ 40	$ 164	$ 105

As of September 30, 2022, there was $529 million of total unrecognized compensation cost related to unvested stock-based compensation with respect to options, RSUs and PSUs granted. That cost is expected to be recognized over a weighted-average period of 3.0 years at September 30, 2022.

Share Repurchase Programs

On August 2, 2021, our Board of Directors authorized a share repurchase program (2021 Repurchase Program) of our common stock. Pursuant to the 2021 Repurchase Program, we were authorized to repurchase up to $1.0 billion of our outstanding common stock, with an expiration date no later than August 2, 2023. By the end of January 2022, we had repurchased the entire $1.0 billion of common stock that was authorized under the 2021 Repurchase Program.

On February 22, 2022, our Board of Directors authorized an additional share repurchase program of our common stock, with no expiration date, for up to $3.0 billion. On August 1, 2022, our Board of Directors authorized an increase of $3.0 billion under the repurchase program for our common stock, with no expiration date (collectively with the February 22, 2022 authorization, the 2022 Repurchase Programs). The timing and actual number of shares repurchased under the 2022 Repurchase Programs will depend on a variety of factors, including price, general business and market conditions, and other investment opportunities, and shares may be repurchased through open market purchases through the use of trading plans intended to qualify under Rule 10b5-1 under the Securities Exchange Act of 1934, as amended.

During the nine months ended September 30, 2022, we repurchased 20 million shares of our common stock under the 2021 and 2022 Repurchase Programs for an aggregate of $2.9 billion, including commissions and fees. As of September 30, 2022, there was a total of $3.2 billion remaining for repurchases of our common stock under the 2022 Repurchase Programs.

14. Income Taxes

The following table summarizes our income tax expense for the periods presented (in millions, except for percentages):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Income before income taxes	$ 1,217	$ 3,552	$ 7,920	$ 7,875
Provision for income taxes	$ 174	$ 219	$ 1,023	$ 541
Effective tax rate	14.3 %	6.2 %	12.9 %	6.9 %

The effective tax rate for the three and nine months ended September 30, 2022 was lower than the U.S. statutory tax rate, primarily due to the benefit of the foreign derived intangible income deduction (FDII) and a discrete item for excess tax benefits related to stock-based compensation. The increased effective tax rate for the three and nine months ended September 30, 2022, compared to the same periods in 2021, was mainly due to the tax benefit recorded in 2021 related to the release of the valuation allowance on the majority of our deferred tax assets and a decrease in excess windfall benefits from stock-based compensation, partially offset by an increase in the FDII benefit in 2022.

We file U.S. federal income tax returns and income tax returns in various state, local and foreign jurisdictions. We are not currently subject to any tax assessment from an income tax examination in the United States or any other major taxing jurisdiction.

Effective January 1, 2022, research and development expenses are required to be capitalized and amortized for U.S. tax purposes. Unless modified or repealed, and based on current assumptions, the mandatory capitalization increases our cash tax liabilities, but also increases our FDII deduction resulting in a decrease to our effective tax rate.

15. Earnings per Share

The computation of basic earnings per share (EPS) is based on the weighted-average number of our common shares outstanding. The computation of diluted EPS is based on the weighted-average number of our common shares outstanding and potential dilutive common shares during the period as determined by using the treasury stock method.

Basic and diluted EPS for the three and nine months ended September 30, 2022 and 2021 were calculated as follows (in millions, except per share data):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Numerator:				
Net income	$ 1,043	$ 3,333	$ 6,897	$ 7,334
Denominator:				
Basic weighted-average common shares outstanding	390	404	396	402
Effect of dilutive securities	22	30	23	29
Diluted weighted-average common shares outstanding	412	434	419	431
Basic EPS	$ 2.67	$ 8.27	$ 17.41	$ 18.25
Diluted EPS	$ 2.53	$ 7.70	$ 16.46	$ 17.00
Anti-dilutive potential common shares excluded from the EPS computation above	4	—	3	1

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

You should read the following discussion and analysis of our financial condition and results of operations together with our unaudited financial information and related notes included in this Form 10-Q and our consolidated financial statements and related notes and other financial information in our Annual Report on Form 10-K for the year ended December 31, 2021, which was filed with the Securities and Exchange Commission (the SEC) on February 25, 2022 (the 2021 Form 10-K). Some of the information contained in this discussion and analysis or set forth elsewhere in this Form 10-Q, including information with respect to our plans and strategy for our business, includes forward-looking statements that involve risks and uncertainties. As a result of many factors, including those factors set forth in Part II, Item 1A - Risk Factors in this Form 10-Q, our actual results could differ materially from the results described in or implied by the forward-looking statements contained in the following discussion and analysis.

Overview

We are a biotechnology company pioneering messenger RNA (mRNA) therapeutics and vaccines to create a new generation of transformative medicines to improve the lives of patients. Our platform builds on continuous advances in basic and applied mRNA science, delivery technology, and manufacturing, providing us the capability to pursue in parallel a robust pipeline of new development candidates. We are developing therapeutics and vaccines for infectious diseases, immuno-oncology, rare diseases, autoimmune diseases and cardiovascular diseases, independently and with our strategic collaborators. Within our platform, we develop technologies that enable the development of mRNA medicines for diverse applications. When we identify technologies that we believe could enable a new group of potential mRNA medicines with shared product features, we call that group a "modality." We have created seven modalities to date:

- prophylactic vaccines;
- systemic secreted and cell surface therapeutics;
- cancer vaccines;
- intratumoral immuno-oncology;
- localized regenerative therapeutics;
- systemic intracellular therapeutics; and
- inhaled pulmonary therapeutics.

On December 18, 2020, we received an Emergency Use Authorization (EUA) from the U.S. Food and Drug Administration (FDA) for the emergency use of the Moderna COVID-19 Vaccine (also referred to as mRNA-1273 and marketed under the brand name Spikevax) as a two-dose, 100 µg primary series in individuals 18 years of age or older. In January 2022, we received full commercial approval for Spikevax as a two-dose, 100 µg primary series to prevent COVID-19 in individuals 18 years of age and older in the United States. Spikevax is approved or authorized in individuals 18 years and older in more than 70 countries. In addition, Spikevax is authorized by the FDA and global regulators in more than 50 countries as a two-dose 100 µg primary series in adolescents ages 12 to 17 years old and as a two-dose 50 µg primary series in children ages 6 to 11 years old. Additionally, a two-dose, 25 µg primary series of Spikevax is authorized in young children ages 6 months to 5 years old in the United States, Canada, Australia, and other jurisdictions.

The FDA, European Medicines Agency (EMA), Swissmedic and other health agencies around the world have authorized a booster dose of Spikevax at the 50 µg dose level for adults ages 18 years and older. In March 2022, the FDA and other health agencies authorized a second booster dose at the 50 µg dose level for adults 50 years and older and adults over 18 years of age with certain kinds of immunocompromise.

On August 15, 2022, we received the first authorization for our BA.1 Omicron-targeting bivalent COVID-19 booster vaccine (Spikevax Bivalent Original/Omicron, mRNA-1273.214) from the Medicines and Healthcare products Regulatory Agency (MHRA) in the United Kingdom, given as a 50 µg booster dose for individuals 18 years of age and older who have received either a primary series or an initial booster of any of the authorized or approved COVID-19 vaccines. The EMA in the European Union provided a similar authorization for mRNA-1273.214 as a booster vaccine for individuals 12 years and older on September 2, 2022. During the third quarter of 2022, authorizations for mRNA-1273.214 as a booster vaccine were also received in the United Kingdom, the European Union, Japan, Australia, Canada and Switzerland.

On August 31, 2022, we received an EUA from the FDA for our BA.4/BA.5 Omicron-targeting bivalent COVID-19 booster vaccine (mRNA-1273.222), given as a 50 µg booster dose for individuals 18 years of age and older who have received either a primary series or an initial booster of any of the authorized or approved COVID-19 vaccines. On October 12, 2022, we received an EUA from the FDA for mRNA-1273.222 as a 50 µg booster dose for adolescents 12 to 17 years old and as a 25 µg booster dose for children 6 to 11 years old, each following a completed primary series of any authorized COVID-19 vaccine or a previous booster. The EMA in the European Union, the MHRA in the United Kingdom and other countries worldwide have provided similar authorizations for mRNA-1273.222.

Business Highlights and Recent Developments

Moderna COVID-19 Vaccine Clinical Studies

- **Omicron-targeting bivalent boosters (mRNA-1273.214/.222):** We have received authorization from regulatory agencies around the globe for two different Omicron-targeting bivalent booster vaccines against COVID-19, including in the United States, Australia, Canada, Europe, Japan, Switzerland, South Korea, Taiwan and the UK, with additional regulatory submissions completed worldwide.

- mRNA-1273.214 is a bivalent vaccine targeting the BA.1 Omicron variant, combined with Spikevax. mRNA-1273.222 is a bivalent vaccine targeting the BA.4/BA.5 Omicron variants, combined with Spikevax. Both boosters are administered as a single dose of 50 µg in individuals ages 12 and older, and as a single 25 µg dose in pediatric populations, ages six to 11. mRNA-1273.214 is being studied to evaluate its immunogenicity, safety and reactogenicity as a single booster dose in adults aged 18 years and older. mRNA-1273.214 is being evaluated in an ongoing registrational, Phase 2/3 study in the U.S. and a Phase 3 study in the UK. A Phase 2/3 clinical trial for mRNA-1273.222 is fully enrolled and currently underway, with initial data expected later this year.
- Based on clinical trial data from the Phase 2/3 trial, mRNA-1273.214 met all primary endpoints, including superior neutralizing antibody response against Omicron (BA.1) when compared to the currently authorized 50 µg booster dose of Spikevax (mRNA-1273) in previously uninfected participants. A booster dose of mRNA-1273.214 increased neutralizing geometric mean titers (GMT) against Omicron approximately 8-fold above baseline levels. In addition, mRNA-1273.214 elicited higher neutralizing antibody titers against the Omicron subvariants BA.4 and BA.5 when compared to Spikevax (mRNA-1273) regardless of prior infection status or age, including in those aged 65 and older. mRNA-1273.214 was generally well tolerated, with a reactogenicity and safety profile consistent with the currently authorized booster.

- For the third quarter of 2022, we recognized product sales of $3.1 billion from sales of our COVID-19 vaccines, compared to $4.8 billion in the third quarter of 2021.

Key Updates for our Other Development Candidates

- **Seasonal influenza (flu) (mRNA-1010):** As part of our influenza vaccine development strategy, we are developing five different influenza vaccines. mRNA-1010 is a single investigational vaccine consisting of four distinct mRNA sequences that encode the A H1N1, H3N2 and influenza B Yamagata and Victoria lineages in our proprietary LNP. mRNA-1011 and mRNA-1012 are investigational vaccines that will include the four WHO-recommended strains and aim to add additional hemagglutinin (HA) antigens (e.g. H3N2, H1N1). mRNA-1020 and mRNA-1030 are investigational vaccines that will aim to add neuraminidase (NA) antigens.

  In March 2022, an interim analysis of a Phase 2 study of mRNA-1010 identified no significant safety concerns, and the immunogenicity data is consistent with a potential for superiority to standard dose vaccine for influenza A strains (which drives the majority of disease in adults). The interim data is consistent with potential for non-inferiority to standard dose vaccine in influenza B strains (primarily a concern in pediatrics). A Phase 3 immunogenicity and safety study of mRNA-1010 in the Southern Hemisphere is fully enrolled with approximately 6,000 participants. Initial regulatory feedback supports an accelerated pathway for approval. We also launched a Phase 3 efficacy trial in the Northern Hemisphere, which is ongoing and expected to enroll approximately 23,000 participants.

- **Respiratory syncytial virus (RSV) vaccine (mRNA-1345):** mRNA-1345 is a vaccine against RSV encoding for a prefusion F glycoprotein, which elicits a superior neutralizing antibody response compared to the postfusion state. The Phase 1 study of mRNA-1345 to evaluate the tolerability, reactogenicity and immunogenicity of mRNA-1345 in younger adults, older adults, women of child-bearing age, older adults of Japanese descent and children is ongoing. All cohorts are fully enrolled. Phase 1 interim data from the older adult cohort showed that a single mRNA-1345 vaccination at 50 µg, 100 µg or 200 µg boosted neutralizing antibody titers against RSV-A by approximately 14-fold and against RSV-B by approximately 10-fold. The pivotal global Phase 3 study of mRNA-1345 with approximately 37,000 participants is currently enrolling. The original 34,000 participants are fully enrolled; 3,000 additional participants were added to the study to assess additional symptoms. Additionally, a Phase 3 study to evaluate the safety, tolerability and immunogenicity of mRNA-1345, when given alone or co-administered with a seasonal influenza vaccine, in adults 50 years of age or older is fully enrolled. The FDA has granted Fast Track designation for mRNA-1345 in adults older than 60 years of age.

- **Respiratory combination vaccines (mRNA-1073, mRNA-1230 and mRNA-1045):** We are evaluating several respiratory combination vaccines in the clinic. mRNA-1073 is a combination vaccine that encodes for the COVID spike protein and the influenza HA glycoproteins. A Phase 1/2 study comparing mRNA-1073 to co-administered mRNA-1010 and mRNA-1273, and to mRNA-1010 and mRNA-1273 alone is ongoing in approximately 1,050 participants aged 18-75 years, and the trial is fully enrolled. mRNA-1230 is a combination vaccine that encodes for the COVID spike protein, the influenza HA glycoproteins and the RSV prefusion F protein. mRNA-1045 is a combination vaccine that encodes for the influenza HA glycoproteins and the RSV prefusion F protein. A Phase 1/2 study comparing mRNA-1230 and mRNA-1045 to individual respiratory vaccines, mRNA-1010, mRNA-1345 and mRNA-1273.214 is ongoing.

- **Propionic acidemia (PA) (mRNA-3927):** The Phase 1/2 clinical trial for mRNA-3927, our therapy for the treatment of propionic acidemia, or PA, is ongoing, and the second cohort is fully enrolled. We are enrolling other patients into additional cohorts. The Phase 1/2 study is designed to evaluate the safety and tolerability of mRNA-3927 in patients with PA. PA is a rare, life-threatening, inherited metabolic disorder due to a defect in the mitochondrial enzyme propionyl-CoA carboxylase (PCC). It primarily affects the pediatric population. In September 2022, we announced that several critical milestones have been reached in the trial. Over 120 repeated intravenous doses have been administered to ten patients. mRNA-3927 has been well-tolerated at the doses tested to date, and there have been no dose-limiting toxicities, discontinuations due to safety, or drug-related serious adverse safety events. Three of the ten study participants have been dosed with over one year of continuous treatment and all eligible participants have decided to continue with treatment by participating in the Open Label Extension Study. PA is characterized by recurrent life-threatening metabolic decompensation events (MDEs) which are clinical crises that occur when there is a build-up of toxic metabolites. Due to the objective and disease-defining nature of MDEs, regulators have provided initial support for MDE as a clinically meaningful, preferred primary clinical endpoint for development. Based on preliminary data, there was a decrease in the number of MDEs post-mRNA-3927 treatment. The trial will continue with testing the next dose level (0.6 mg/kg IV every two weeks). There is no approved therapy for PA, including no approved enzyme replacement therapy. We have received Rare Pediatric Disease Designation and Orphan Drug Designation from the FDA and Orphan Drug Designation from the European Commission for the PA program. The FDA has also granted Fast Track designation to mRNA-3927.

- **Methylmalonic acidemia (MMA) (mRNA-3705):** The Phase 1/2 clinical trial for mRNA-3705, our therapy for the treatment of methylmalonic acidemia, or MMA, is ongoing and the second cohort has been fully enrolled. The study is enrolling additional cohorts across the UK, Canada and the U.S. The Phase 1/2 study is designed to evaluate the safety and tolerability of mRNA-3705 in patients with MMA. MMA is a rare, life-threatening, inherited metabolic disorder that is primarily caused by a defect in the mitochondrial enzyme methylmalonyl-coenzyme A mutase (MUT). It primarily affects the pediatric population. There is no approved therapy that addresses the underlying disorder, including no approved enzyme replacement therapy, due to the complexity of the protein and its mitochondrial localization.

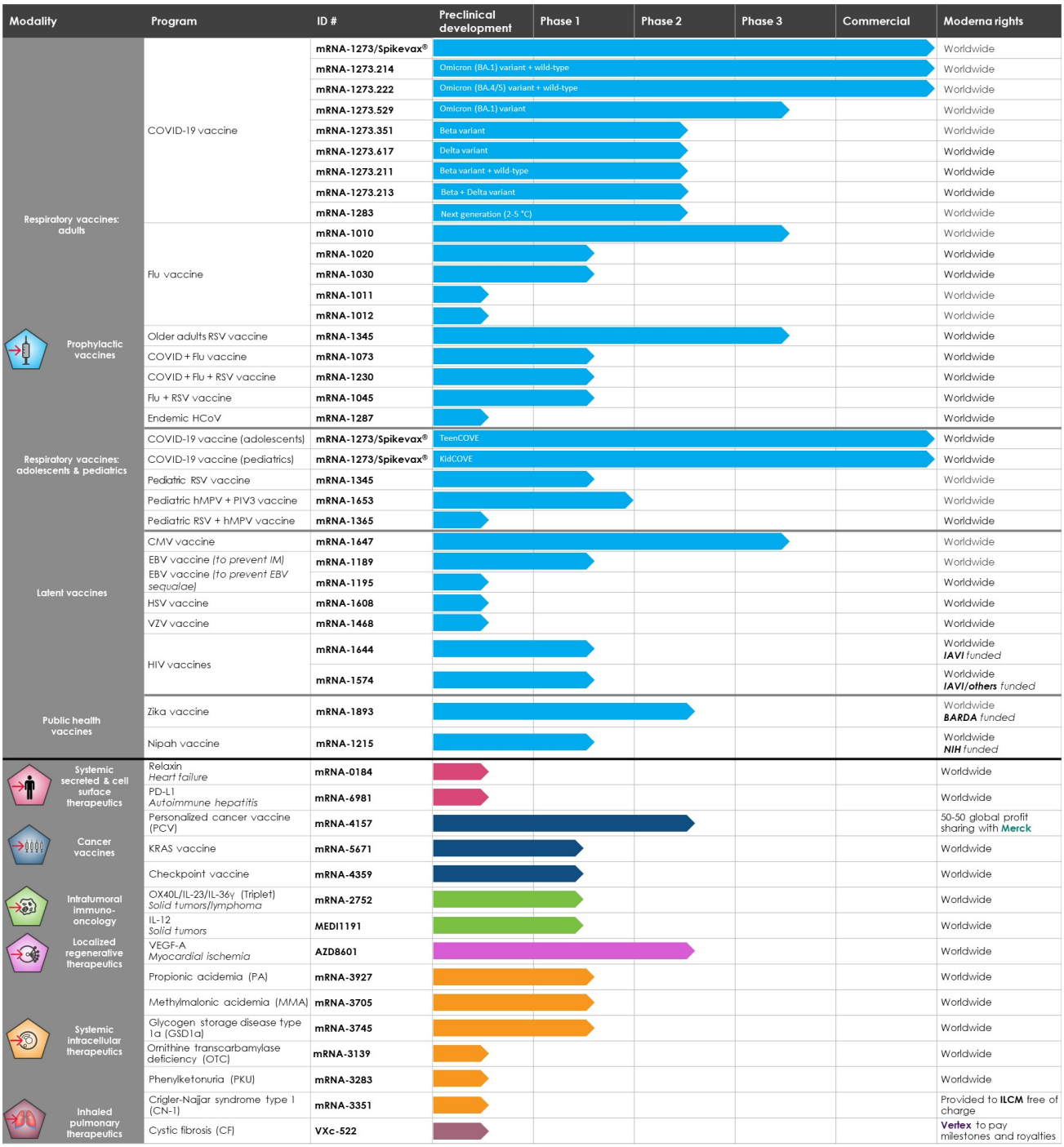
- **Glycogen storage disease type 1a (GSD1a) (mRNA-3745):** The Phase 1/2 clinical trial for mRNA-3745, our therapy for the treatment of GSD1a is ongoing. Individuals with GSD1a have a deficiency in glucose-6-phosphatase resulting in pathological blood glucose imbalance. mRNA-3745 is an IV-administered mRNA encoding human G6Pase enzyme, designed to restore the deficient or defective intracellular enzyme activity in patients with GSD1a. In September 2022, we announced that early data on safety and pharmacodynamics for mRNA-3745 have been consistent and encouraging. In two patients, intravenous infusion of mRNA-3745 was well-tolerated to date, and showed extension of fast duration and normalization of glucose during fast. The FDA has granted mRNA-3745 Orphan Drug Designation.

- **IL-12 (MEDI1191)**: In August 2022, AstraZeneca notified us that it was terminating the development of the IL-12 program (MEDI1191) and that they were returning the rights to the program to us. AstraZeneca is continuing to lead the ongoing, open-label multicenter Phase 1 clinical trial of intratumoral injections of MEDI1191 alone and in combination with the checkpoint inhibitor, durvalumab. In April 2022, AstraZeneca presented updated Phase 1 data at the American Association for Cancer Research (AACR) conference. Intratumoral MEDI1191 combined with durvalumab was safe and the combination showed preliminary evidence of clinical benefit, with 29% of patients exhibiting partial responses or stable disease ≥12 weeks as best overall response. We are evaluating the next steps for the program.

- **Personalized cancer vaccine (mRNA-4157):** Our personalized cancer vaccine (PCV) is currently being evaluated in a Phase 1 and Phase 2 study. The randomized, placebo-controlled Phase 2 study investigating a 1 mg dose of mRNA-4157 in combination with Merck's pembrolizumab (KEYTRUDA®), compared to pembrolizumab alone, for the adjuvant treatment of high-risk resected melanoma is fully enrolled (n=150). The primary endpoint of the Phase 2 study is recurrence-free survival. The Phase 1 in multiple cohorts is ongoing. In September 2022, Merck exercised its option to jointly develop and commercialize mRNA-4157. We and Merck will share costs and any profits related to mRNA-4157 equally under our worldwide collaboration.

Our Pipeline

The following chart shows our current pipeline of 48 development programs, grouped by respiratory vaccines, latent & public health vaccines and therapeutics.



Abbreviations: AZ, AstraZeneca; BARDA, Biomedical Advanced Research and Development Authority; CMV, Cytomegalovirus; DARPA, Defense Advanced Research Projects Agency; EBV, Epstein-Barr virus; HIV, human immunodeficiency virus; hMPV, human metapneumovirus; ILCM, Institute for Life Changing Medicines; IL-12, interleukin 12; IL-23, interleukin 23; IL-36γ, interleukin-36 gamma; NIH, National Institutes of Health; OX40L, wildtype OX40 ligand; RSV, respiratory syncytial virus; VEGF-A, vascular endothelial growth factor A.

We have developed seven modalities, which are summarized as follows:

- **Prophylactic vaccines:** Our prophylactic vaccines modality currently includes 33 development programs, 26 of which have entered into clinical trials. We have ongoing Phase 1 trials for our RSV vaccine in pediatrics (mRNA-1345), flu vaccines (mRNA-1020 and mRNA-1030), combined COVID and flu vaccine (mRNA-1073), combined COVID, flu and RSV vaccine (mRNA-1230), combined flu and RSV vaccine (mRNA-1045), hMPV/PIV3 vaccine (mRNA-1653), EBV vaccine (mRNA-1189), HIV vaccines (mRNA-1644 and mRNA-1574) and Nipah vaccine (mRNA-1215). We have an ongoing Phase 2 study for our Zika vaccine (mRNA-1893). We have ongoing Phase 3 studies for our flu vaccine (mRNA-1010), RSV vaccine in older adults (mRNA-1345) and CMV vaccine (mRNA-1647). Our COVID-19 vaccine (mRNA-1273) is described in detail above. Our seven preclinical programs within our prophylactic vaccines modality are for a combined, pediatric RSV and hMPV vaccine (mRNA-1365), pan-HCoV vaccine (mRNA-1287), seasonal flu vaccines (mRNA-1011 and mRNA-1012), EBV vaccine to prevent long-term sequelae (mRNA-1195), VZV vaccine (mRNA-1468), and HSV vaccine (mRNA-1608). Three other vaccines as part of public health programs have had positive Phase 1 readouts – H10N8 vaccine (mRNA-1440), H7N9 flu vaccine (mRNA-1851), and Chikungunya vaccine (mRNA-1388) – but are not being further developed without government or other funding.

- **Systemic secreted and cell surface therapeutics:** We have two systemic secreted and cell surface therapeutics development candidates in our pipeline. Our secreted programs include Relaxin (mRNA-0184) for cardiac disorders and PD-L1 (mRNA-6981) for autoimmune hepatitis, which are currently in preclinical development. We previously announced positive data from our Chikungunya Antibody program (mRNA-1944) within this modality; however, we do not expect to advance our Chikungunya Antibody program without outside funding, and we are not currently pursuing further development of it at this time.

- **Cancer vaccines:** We are currently developing three programs within our cancer vaccines modality. Our personalized cancer vaccine program (mRNA-4157) is being developed in collaboration with Merck and is in a multiple-arm Phase 1 trial and a randomized Phase 2 trial, which is fully enrolled. Our second program within this modality is a KRAS vaccine (mRNA-5671). We have retained all rights to our KRAS vaccine from Merck and we are evaluating next steps for the program. Our third program is our checkpoint vaccine (mRNA-4359), which has dosed the first patient in a Phase 1 clinical trial.

- **Intratumoral immuno-oncology**: We have two programs in this modality. Our first program, OX40L/IL-23/IL-36γ (Triplet) (mRNA-2752), is currently in a Phase 1 study that is designed as an open-label, multicenter study of intratumoral injections of Triplet (mRNA-2752) alone or in combination with durvalumab (anti-PD-L1). Our second program, IL-12 (MEDI1191), was developed in collaboration with AstraZeneca. In August 2022, AstraZeneca notified us that it was terminating the development of the IL-12 program (MEDI1191) and that they were returning the rights to the program to us. We are evaluating next steps for the program.

- **Localized regenerative therapeutics:** Our localized VEGF-A program, AZD8601, which was developed in collaboration with AstraZeneca, has completed a Phase 1a/b trial to describe its safety, tolerability, protein production, and activity in diabetic patients. The study has met its primary objectives of describing safety and tolerability and secondary objectives of demonstrating protein production and changes in blood flow post AZD8601 administration. We believe these data provide clinical proof of mechanism for our mRNA technology outside of the vaccine setting. In 2021, the Phase 2 study met the primary endpoint of safety and tolerability of AZD8601 for the 3 mg dose. In the study of 11 patients, seven were treated with AZD8601 VEGF-A mRNA and four received placebo injections. Numerical trends were observed in endpoints in the heart failure efficacy domains compared with placebo, including increase in left ventricular ejection fraction (LVEF) and patient reported outcomes. In addition, all seven patients treated with AZD8601 had NT-proBNP (a biomarker that measures the level of a hormone that is elevated in patients with heart failure) levels below heart failure limit at 6 months follow-up compared to one of four patients treated with placebo. After a portfolio review, AstraZeneca has returned the rights to AZD8601 to us. We are evaluating next steps for the program.

- **Systemic intracellular therapeutics:** We have six systemic intracellular therapeutics development candidates in our pipeline. Our intracellular programs address propionic acidemia, or PA (mRNA-3927), methylmalonic acidemia (MMA) (mRNA-3705), glycogen storage disorder type 1a (GSD1a) (mRNA-3745), ornithine transcarbamylase deficiency (OTC) (mRNA-3139), phenylketonuria (PKU) (mRNA-3283), and Crigler-Najjar Syndrome Type 1 (CN-1) (mRNA-3351). We have ongoing Phase 1 clinical trials for PA (mRNA-3927), MMA (mRNA-3705) and GSD1a (mRNA-3745). OTC (mRNA-3139), PKU (mRNA-3283) and CN-1 (mRNA-3351) are currently in preclinical development. We have entered into a collaboration agreement with the Institute for Life Changing Medicines (ILCM) to license mRNA-3351 to ILCM with no upfront fees, and without any downstream payments. ILCM will be responsible for the clinical development of mRNA-3351.

- **Inhaled pulmonary therapeutics:** We have one inhaled pulmonary therapeutic development candidate in our pipeline. Our program addresses cystic fibrosis, or CF (VXc-522), in collaboration partnership with Vertex Pharmaceuticals. VXc-522 is an mRNA therapeutic designed to treat the underlying cause of CF by enabling cells in the lungs to produce functional cystic fibrosis transmembrane conductance regulator (CFTR) protein for the treatment of the 10% of patients who do not produce any CFTR protein. IND-enabling studies are underway and Vertex expects to submit an IND for this program in 2022. Moderna has licensed worldwide commercial rights to VXc-522 to Vertex.

Financial Operations Overview

Revenue

The following table summarizes revenue for the periods presented (in millions):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Revenue:				
Product sales	$ 3,120	$ 4,810	$ 13,576	$ 10,740
Grant revenue	144	140	453	473
Collaboration revenue	100	19	150	47
Total revenue	$ 3,364	$ 4,969	$ 14,179	$ 11,260

For the three months ended September 30, 2022, we recognized $3.1 billion of product sales from our COVID-19 vaccines, of which $1.0 billion was generated in the United States and $2.1 billion was generated from Europe and the rest of the world. For the three months ended September 30, 2021, we recognized $4.8 billion of product sales from our COVID-19 vaccines, of which $1.2 billion was generated in the United States and $3.6 billion was generated from Europe and the rest of the world.

For the nine months ended September 30, 2022, we recognized $13.6 billion of product sales from our COVID-19 vaccines, of which $3.4 billion was generated in the United States and $10.2 billion was generated from Europe and the rest of the world. For the nine months ended September 30, 2021, we recognized $10.7 billion of product sales from our COVID-19 vaccines, of which $4.6 billion was generated in the United States and $6.1 billion was generated from Europe and the rest of the world.

As of September 30, 2022, we had deferred revenue of $4.1 billion associated with customer deposits received or billable under supply agreements for delivery of our COVID-19 vaccines into 2023. We anticipate that product sales will be greater in the fourth quarter of 2022 than the third quarter of 2022, driven by the timing of marketing authorizations and release of our Omicron-targeting bivalent booster vaccines. Based upon currently signed supply agreements for delivery of our COVID-19 vaccines in 2022 and our supply chain forecast, we expect that our COVID-19 vaccine product sales will be slightly lower in the second half of 2022 than in the first half of 2022, in part due to deferrals of deliveries into the first quarter of 2023 that we originally expected to make in 2022.

Other than product sales, our revenue has been primarily derived from government-sponsored and private organizations including BARDA, DARPA and the Gates Foundation and from strategic alliances with AstraZeneca, Merck and Vertex to discover, develop, and commercialize potential mRNA medicines.

Grant revenue was comprised as follows for the periods presented (in millions):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Grant revenue:				
BARDA [(1)]	$ 141	$ 128	$ 442	$ 454
Other	3	12	11	19
Total grant revenue	$ 144	$ 140	$ 453	$ 473

[(1)] For the three months ended September 30, 2022, $135 million of BARDA grant revenue was related to our mRNA-1273 program and $6 million was related to our Zika vaccine program. For the nine months ended September 30, 2022, $430 million of BARDA grant revenue was related to our mRNA-1273 program and $12 million was related to our Zika vaccine program.

Collaboration revenue from our strategic alliances was comprised as follows for the periods presented (in millions):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Collaboration revenue:				
AstraZeneca	$ 76	$ 3	$ 80	$ 7
Merck	20	7	35	11
Vertex	4	5	33	23
Other	—	4	2	6
Total collaboration revenue	$ 100	$ 19	$ 150	$ 47

In the third quarter of 2022, AstraZeneca elected to terminate our collaborations with them, effective on November 21, 2022. As a result of the termination, we recognized the remaining deferred revenue of $76 million as collaboration revenue during the three months ended September 30, 2022. Please refer to Note 5 to our condensed consolidated financial statements.

As of September 30, 2022, the remaining available funding, net of revenue earned under our agreement with BARDA for the development of our mRNA-1273 vaccine was $67 million. To the extent that existing or potential future products generate revenue, our revenue may vary due to many uncertainties in the future product demand, the development of our mRNA medicines and other factors.

Research and development expenses

We use our employee and infrastructure resources for the advancement of our platform, and for discovering and developing programs. Due to the number of ongoing programs and our ability to use resources across several projects, indirect or shared operating costs incurred for our research and development programs are generally not recorded or maintained on a program- or modality-specific basis. The following table reflects our research and development expenses, including direct program-specific expenses summarized by modality and indirect or shared operating costs summarized under other research and development expenses during the three and nine months ended September 30, 2022 and 2021 (in millions):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Program expenses by modality:				
Prophylactic vaccines	$ 414	$ 271	$ 940	$ 760
Systemic secreted and cell surface therapeutics	4	3	7	5
Cancer vaccines	7	11	12	35
Intratumoral immuno-oncology	—	6	12	19
Systemic intracellular therapeutics	9	6	22	17
Inhaled pulmonary therapeutics [1]	2	—	7	—
Total program-specific expenses by modality [2]	$ 436	$ 297	$ 1,000	$ 836
Other research and development expenses:				
Discovery programs	62	15	133	43
Platform research	32	28	97	80
Technical development and unallocated manufacturing expenses	166	79	495	165
Shared discovery and development expenses	96	77	292	165
Stock-based compensation	28	25	67	54
Total research and development expenses	$ 820	$ 521	$ 2,084	$ 1,343

(1) Inhaled pulmonary therapeutics modality was added in the fourth quarter of 2021.

(2) Includes a total of 44 and 34 development candidates at September 30, 2022 and 2021, respectively. Program-specific expenses include external costs and allocated manufacturing costs of pre-launch inventory, mRNA supply and consumables, and are reflected as of the beginning of the period in which the program was internally advanced to development or removed if development was ceased.

A *"modality"* refers to a group of programs with common product features and the associated combination of enabling mRNA technologies, delivery technologies, and manufacturing processes. The program-specific expenses by modality summarized in the table above include expenses we directly attribute to our programs, which consist primarily of external costs, such as fees paid to outside consultants, central laboratories, investigative sites, and contract research organizations (CROs) in connection with our preclinical studies and clinical trials, contract manufacturing organizations, and allocated manufacturing costs of pre-launch inventory, mRNA supply and consumables. Costs to acquire and manufacture pre-launch inventory, mRNA supply for preclinical studies and clinical trials are recognized and included in unallocated manufacturing expenses when incurred, and subsequently allocated to program-specific manufacturing costs after completion of the program-specific production. The timing of allocating manufacturing costs to the specific program varies depending on the program development and production schedule. We generally do not allocate personnel-related costs, including stock-based compensation, costs associated with our general platform research, technical development, and other shared costs on a program-specific basis. These costs were therefore excluded from the summary of program-specific expenses by modality.

Discovery program expenses are costs associated with research activities for our programs in the preclinical discovery stage, and primarily consist of external costs for CROs and lab services, and allocated manufacturing cost of preclinical mRNA supply and consumables.

Platform research expenses are mainly costs to develop technical advances in mRNA science, delivery science, and manufacturing process design. These costs include personnel-related costs, computer equipment, facilities, preclinical mRNA supply and consumables, and other administrative costs to support our platform research. Technology development and unallocated manufacturing expenses are primarily related to non-program-specific manufacturing process development and manufacturing costs.

Shared discovery and development expenses are research and development costs such as personnel-related costs and other costs, which are not otherwise included in development programs, discovery programs, platform research, technical development and unallocated manufacturing expenses, stock-based compensation, and other expenses.

The largest component of our total operating expenses has historically been our investment in research and development activities, including preclinical and clinical development of our product candidates, development of our platform, mRNA technologies, and manufacturing technologies. As we continue to develop variant-specific and next-generation COVID-19 vaccine candidates, we expect to continue to incur significant additional expenses.

Changes in expectations or outcomes of any of the known or unknown risks and uncertainties may materially impact our expected research and development expenditures. Continued research and development is central to the ongoing activities of our business. Investigational medicines in later stages of clinical development, such as our CMV vaccine, RSV vaccine, flu vaccine and our COVID-19 vaccines, generally have higher development costs than those in earlier stages of clinical development, primarily due to the increased size and duration of later-stage clinical trials. We expect our research and development costs to continue to increase in the foreseeable future as our investigational medicines progress through the development phases and identify and develop additional programs. There are numerous factors associated with the successful commercialization of any of our investigational medicines, including future trial design and various regulatory requirements, many of which cannot be determined with accuracy at this time due to the early stage of development of our investigational medicines. Moreover, future commercial and regulatory factors beyond our control will impact our clinical development programs and plans.

Critical accounting policies and significant judgments and estimates

There have been no material changes in our critical accounting policies and estimates in the preparation of our condensed consolidated financial statements during the three months ended September 30, 2022 compared to those disclosed in our 2021 Form 10-K.

Results of operations

The following table summarizes our condensed consolidated statements of income for each period presented (in millions):

	Three Months Ended September 30,		Change 2022 vs. 2021	
	2022	2021	$	%
Revenue:				
Product revenue	$ 3,120	$ 4,810	$ (1,690)	(35)%
Grant revenue	144	140	4	3%
Collaboration revenue	100	19	81	426%
Total revenue	3,364	4,969	(1,605)	(32)%
Operating Expenses:				
Cost of sales	1,100	722	378	52%
Research and development	820	521	299	57%
Selling, general and administrative	278	168	110	65%
Total operating expenses	2,198	1,411	787	56%
Income from operations	1,166	3,558	(2,392)	(67)%
Interest income	58	4	54	1,350%
Other expense, net	(7)	(10)	3	(30)%
Income before income taxes	1,217	3,552	(2,335)	(66)%
Provision for income taxes	174	219	(45)	(21)%
Net income	$ 1,043	$ 3,333	$ (2,290)	(69)%

	Nine Months Ended September 30,		Change 2022 vs. 2021	
	2022	2021	$	%
Revenue:				
Product revenue	$ 13,576	$ 10,740	$ 2,836	26%
Grant revenue	453	473	(20)	(4)%
Collaboration revenue	150	47	103	219%
Total revenue	14,179	11,260	2,919	26%
Operating Expenses:				
Cost of sales	3,498	1,665	1,833	110%
Research and development	2,084	1,343	741	55%
Selling, general and administrative	757	366	391	107%
Total operating expenses	6,339	3,374	2,965	88%
Income from operations	7,840	7,886	(46)	(1)%
Interest income	113	11	102	927%
Other expense, net	(33)	(22)	(11)	50%
Income before income taxes	7,920	7,875	45	1%
Provision for income taxes	1,023	541	482	89%
Net income	$ 6,897	$ 7,334	$ (437)	(6)%

Revenue

Total revenue decreased by $1.6 billion, or 32%, for the three months ended September 30, 2022, compared to the same period in 2021, mainly due to a decrease in product sales of our COVID-19 vaccines. Product revenue decreased by $1.7 billion, or 35%, for the three months ended September 30, 2022, compared to the same period in 2021, primarily due to lower sales volume driven by the timing of marketing authorizations for our Omicron-targeting COVID-19 bivalent boosters and the related manufacturing ramp up.

Total revenue increased by $2.9 billion, or 26%, for the nine months ended September 30, 2022, compared to the same period in 2021, mainly due to an increase in product sales of our COVID-19 vaccines. Product revenue increased by $2.8 billion, or 26%, for the nine months ended September 30, 2022, compared to the same period in 2021, largely driven by a favorable customer mix and higher manufacturing capacity to fulfill customer demand for the first half of 2022 compared to early 2021.

Operating expenses

Cost of sales

Cost of sales for the three months ended September 30, 2022 was $1.1 billion, including third-party royalties of $106 million. Cost of sales for the three months ended September 30, 2022 increased by $378 million, or 52%, compared to the same period in 2021. Cost of sales as a percentage of product sales for the three months ended September 30, 2022 was 35%, compared to 15% for the same period in 2021. These increases were primarily attributable to write-downs for excess and obsolete inventory related to our COVID-19 vaccine, unutilized manufacturing capacity, and losses on firm purchase commitments of raw materials and related cancellation charges, driven by a shift in product demand to our Omicron-targeting COVID-19 bivalent boosters.

Cost of sales for the nine months ended September 30, 2022 was $3.5 billion, including third-party royalties of $470 million. Cost of sales for the nine months ended September 30, 2022 increased by $1.8 billion, or 110%, compared to the same period in 2021. Cost of sales as a percentage of product sales for the nine months ended September 30, 2022 was 26%, compared to 16% for the same period in 2021. These increases were mainly due to write-downs for excess and obsolete inventory related to our COVID-19 vaccines, unutilized manufacturing capacity and losses on firm purchase commitments of raw materials, driven by a shift in product demand.

We expect our manufacturing costs to increase as we move from a pandemic to a seasonal market environment for our COVID-19 vaccines. We expect that this shift will cause our cost of sales for the full year of 2022 to represent a higher percentage of our product sales than the percentage experienced in 2021.

Research and development expenses

Research and development expenses increased by $299 million, or 57%, for the three months ended September 30, 2022, compared to the same period in 2021. The increase was primarily attributable to increases in clinical trial expenses of $200 million and manufacturing costs for clinical trial materials of $49 million.

Research and development expenses increased by $741 million, or 55%, for the nine months ended September 30, 2022, compared to the same period in 2021. The increase was primarily attributable to increases in clinical trial expenses of $400 million, personnel-related costs of $110 million, manufacturing costs for clinical trial materials of $76 million, consulting and outside services of $74 million, and technology and facility-related costs of $42 million. These increases for the three and nine month periods in 2022 were largely driven by increased clinical development, particularly our COVID-19 vaccines, RSV, flu and CMV programs, and headcount.

We expect that research and development expenses will increase in 2022, as compared to 2021, as we continue to progress the development of variant-specific and next-generation COVID-19 vaccine candidates and continue to develop our pipeline and advance our product candidates into later-stage development, in particular those in ongoing Phase 3 studies: our RSV, flu and CMV vaccine programs.

Selling, general and administrative expenses

Selling, general and administrative expenses increased by $110 million, or 65%, for the three months ended September 30, 2022, compared to the same period in 2021. The increase was mainly due to increases in consulting and outside services of $43 million and personnel-related costs of $28 million. These increases for the three month period in 2022 were primarily driven by our COVID-19 vaccine commercialization-related activities and increased headcount.

Selling, general and administrative expenses increased by $391 million, or 107%, for the nine months ended September 30, 2022, compared to the same period in 2021. The increase was mainly due to increases in personnel-related costs of $86 million, consulting and outside services of $80 million, distributor fees of $44 million, marketing expenses of $41 million, and an endowment to the Moderna Charitable Foundation (the Foundation) of $50 million. These increases for the nine month period in 2022 were primarily driven by our COVID-19 vaccine commercialization-related activities, increased headcount, and the launch of the Foundation.

We expect that selling, general and administrative expenses will increase in 2022, as compared to 2021, as we continue to build out our global commercial, regulatory, sales and marketing infrastructure, and continue to expand the number of programs and our business operations.

Interest income

Interest income increased by $54 million for the three months ended September 30, 2022, compared to the same period in 2021. Interest income increased by $102 million for the nine months ended September 30, 2022, compared to the same period in 2021. The increases in interest income from our investments in marketable securities for the three and nine month periods in 2022 were mainly driven by an overall higher interest rate environment and increased investment balances.

Other expense, net

The following table summarizes other expense, net for each period presented (in millions):

	Three Months Ended September 30,		Change 2022 vs. 2021	
	2022	2021	$	%
Loss on investments	$ (4)	$ —	$ (4)	100%
Interest expense	(8)	(4)	(4)	100%
Other income (expense), net	5	(6)	11	(183)%
Total other expense, net	$ (7)	$ (10)	$ 3	(30)%

	Nine Months Ended September 30,		Change 2022 vs. 2021	
	2022	2021	$	%
(Loss) gain on investments	$ (18)	$ 2	$ (20)	1,000%
Interest expense	(19)	(12)	(7)	58%
Other income (expense), net	4	(12)	16	(133)%
Total other expense, net	$ (33)	$ (22)	$ (11)	50%

Total other expense, net decreased by $3 million, or 30%, for the three months ended September 30, 2022, compared to the same period in 2021. Total other expense, net increased by $11 million, or 50%, for the nine months ended September 30, 2022, compared to the same period in 2021. The decrease in other expense, net for the three months ended September 30, 2022 was primarily due to a net gain related to our foreign currency balance sheet hedging activities, foreign currency transactions and remeasurements, partially offset by realized losses on available-for-sale debt securities and an increase in interest expense. The increase in other expense, net for the nine months ended September 30, 2022 was primarily due to realized losses on available-for-sale debt securities and an increase in interest expense, partially offset by a net gain related to our foreign currency balance sheet hedging activities, foreign currency transactions, and remeasurements. Our interest expense is primarily related to our finance leases. Please refer to Note 11 to our condensed consolidated financial statements.

Income taxes

Provision for income taxes decreased by $45 million, or 21%, for the three months ended September 30, 2022, compared to the same period in 2021, primarily due to a decrease in pre-tax income, partially offset by a higher effective tax rate. Provision for income taxes increased by $482 million, or 89%, for the nine months ended September 30, 2022, compared to the same period in 2021, primarily due to a higher effective tax rate. The increase in effective tax rate for the three and nine months ended September 30, 2022 was mainly due to the tax benefit recorded in 2021 related to the release of the valuation allowance on the majority of our deferred tax assets and a decrease in excess windfall benefits from stock-based compensation, partially offset by an increase in foreign derived intangible income benefit in 2022. We expect that our effective tax rate will increase for the full year 2022 compared to 2021, mainly driven by the release of the valuation allowance on the majority of the deferred tax assets in 2021.

Liquidity and capital resources

The following table summarizes our cash, cash equivalents, investments and working capital for each period presented (in millions):

	September 30, 2022	December 31, 2021
Financial assets:		
Cash and cash equivalents	$ 3,027	$ 6,848
Investments	5,321	3,879
Investments, non-current	8,655	6,843
Total	$ 17,003	$ 17,570
Working capital:		
Current assets	$ 14,297	$ 16,071
Current liabilities	6,807	9,128
Total	$ 7,490	$ 6,943

Our cash, cash equivalents and investments are invested in accordance with our investment policy, primarily with a view to liquidity and capital preservation. Investments, consisting primarily of government and corporate debt securities, are stated at fair value. Cash, cash equivalents and investments as of September 30, 2022 decreased by $567 million, or 3%, compared to December 31, 2021. During the nine months ended September 30, 2022, we generated cash from operations of $3.3 billion, partially offset by repurchases of our common stock of $2.9 billion, unrealized losses on available-for-sale debt securities of $497 million, and purchases of property and equipment of $308 million.

Working capital, which is current assets less current liabilities, as of September 30, 2022 increased by $547 million, or 8%, compared to December 31, 2021, primarily due to a decrease in short-term deferred revenue of $2.3 billion, mainly driven by revenue recognized from deferred revenue in excess of customer deposits received, and a decrease in income taxes payable of $810 million. This was partially offset by a decrease in cash, cash equivalents and short-term investments of $2.4 billion, primarily due to purchases of long-term marketable securities, repurchases of our common stock, and income tax payments.

As of September 30, 2022, we did not have any off-balance sheet arrangements.

Cash flow

The following table summarizes the primary sources and uses of cash for each period presented (in millions):

	Nine Months Ended September 30,	
	2022	2021
Net cash provided by (used in):		
Operating activities	$ 3,319	$ 10,310
Investing activities	(4,128)	(7,385)
Financing activities	(3,010)	—
Net (decrease) increase in cash, cash equivalents and restricted cash	$ (3,819)	$ 2,925

Operating activities

We derive cash flows from operations primarily from cash collected from customer deposits and accounts receivable related to our COVID-19 vaccine supply agreements, as well as certain government-sponsored and private organizations and strategic alliances. Our cash flows from operating activities are significantly affected by our use of cash for operating expenses and working capital to support the business.

Beginning in the third quarter of 2020, we entered into supply agreements with the U.S. Government, other international governments, and Gavi for the supply of our COVID-19 vaccines and received upfront deposits. As of September 30, 2022, we had $4.1 billion in deferred revenue related to customer deposits received or billable.

Net cash provided by operating activities for the nine months ended September 30, 2022 was $3.3 billion and consisted of net income of $6.9 billion and non-cash adjustments of $30 million, partially offset by a net change in assets and liabilities of $3.6 billion. Non-cash items primarily included deferred income taxes of $473 million, depreciation and amortization of $268 million, and stock-based compensation of $164 million. The net change in assets and liabilities was mainly due to a decrease in deferred revenue of $2.7 billion, a decrease in income taxes payable of $810 million, an increase in prepaid expenses and other assets of $669 million, and an increase in inventory of $636 million, partially offset by a decrease in accounts receivable of $480 million, an increase in accrued liabilities of $354 million, and an increase in other liabilities of $273 million.

Net cash provided by operating activities decreased by $7.0 billion, or 68%, during the nine months ended September 30, 2022, compared to the same period in 2021, primarily attributable to revenue recognized from deferred revenue in excess of customer deposits received and increased income tax payments, partially offset by higher collection of receivables.

Investing activities

Our primary investing activities consist of purchases, sales, and maturities of our investments and capital expenditures for leasehold improvements, manufacturing, laboratory, computer equipment and software.

Net cash used in investing activities for the nine months ended September 30, 2022 was $4.1 billion, which primarily included purchases of marketable securities of $8.9 billion and purchases of property and equipment of $308 million, partially offset by proceeds from sales of marketable securities of $2.9 billion and proceeds from maturities of marketable securities of $2.2 billion.

Net cash used in investing activities decreased by $3.3 billion, or 44%, during the nine months ended September 30, 2022, compared to the same period in 2021, primarily reflecting timing differences related to purchases, sales, and maturities of marketable debt securities and changes in our investment portfolio mix.

Financing activities

Net cash used in financing activities for the nine months ended September 30, 2022 was $3.0 billion, primarily due to repurchase of common stock of $2.9 billion.

Net cash used in financing activities increased by $3.0 billion during the nine months ended September 30, 2022, compared to the same period in 2021, mainly due to repurchase of common stock.

Operation and funding requirements

Our principal sources of funding as of September 30, 2022 consisted of cash and cash equivalents, investments, and cash we expect to generate from operations. We generated net income of $12.2 billion for the year ended 2021, following the authorization of our first commercial product in December 2020. From our inception to the end of 2020, we incurred significant losses from operations due to our significant research and development expenses. We have retained earnings of $16.9 billion as of September 30, 2022.

We have significant future capital requirements including expected operating expenses to conduct research and development activities, operate our organization, meet capital expenditure needs, and fund our share repurchase programs (refer to Note 13 to our condensed consolidated financial statements). We expect our expenses to increase in connection with our ongoing activities, particularly as we continue research and development of our development candidates and clinical activities for our investigational medicines. We also expect our expenses to increase associated with manufacturing costs, including our arrangements with our international supply and manufacturing partners. Our ongoing work on our COVID-19 vaccines, including development of any new generations of boosters and vaccines against variants of SARS-CoV-2, and buildout of global commercial, regulatory, sales and marketing infrastructure will require significant cash outflows during 2022, most of which will not be reimbursed or otherwise paid for by our partners or collaborators. In addition, we have substantial facility, lease and purchase obligations (refer to Note 11 and Note 12 to our condensed consolidated financial statements). We have entered into certain collaboration and licensing agreements with third parties that include the funding of certain research and development activities and potential future milestone and royalty payments by us.

We believe that our cash, cash equivalents, and investments as of September 30, 2022, together with cash expected to be generated from operations, will be sufficient to enable us to fund our projected operations, capital expenditures and stock repurchases through at least the next 12 months from the issuance of these financial statements included in this Form 10-Q. We are subject to all the risks related to the development and commercialization of novel medicines, and we may encounter unforeseen expenses, difficulties, complications, delays, and other unknown factors, which may adversely affect our business. Our forecast of the period of time through which our financial resources will be adequate to support our operations is a forward-looking statement and involves risks and uncertainties, and actual results could vary as a result of a number of factors. We have based this estimate on assumptions that may prove to be wrong, and we could utilize our available capital resources sooner than we currently expect.

Contractual Obligations

As of September 30, 2022, other than disclosed within Note 11 and Note 12 to our condensed consolidated financial statements, there have been no material changes to our contractual obligations and commitments from those described under "Management's Discussion and Analysis of Financial Condition and Results of Operations" included in our 2021 Form 10-K.

Item 3. Quantitative and Qualitative Disclosures about Market Risk

Our market risks, and the way we manage them, are summarized in Part II, Item 7A, "Quantitative and Qualitative Disclosures About Market Risk" of our 2021 Form 10-K. There have been no material changes to our market risk or to our management of such risks for the three and nine months ended September 30, 2022.

Item 4. Controls and Procedures

Disclosure Controls and Procedures

Our management, with the participation of our Chief Executive Officer and our Chief Financial Officer, evaluated the effectiveness of our disclosure controls and procedures as of September 30, 2022. The term "disclosure controls and procedures," as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act means controls and other procedures of a company that are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the SEC's rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the company's management, including its principal executive and principal financial officers, as appropriate to allow timely decisions regarding required disclosure. Management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. Based on the evaluation of our disclosure controls and procedures as of September 30, 2022, our Chief Executive Officer and Chief Financial Officer concluded that, as of such date, our disclosure controls and procedures were effective at the reasonable assurance level.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act) during the three months ended September 30, 2022, which have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Inherent Limitations on Effectiveness of Controls

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

PART II

Item 1. Legal Proceedings

We are involved in various claims and legal proceedings of a nature considered ordinary course in our business, including the intellectual property litigation described below and in our quarterly report on Form 10-Q for the quarter ended June 30, 2022. Most of the issues raised by these claims are highly complex and subject to substantial uncertainties. For a description of risks relating to these and other legal proceedings we face, see Part I, Item 1A, “Risk Factors,” of our 2021 Form 10-K, including the discussion under the headings entitled “Risks related to our intellectual property,” and “Risks related to the manufacturing of our commercial products, development candidates, investigational medicines and our future pipeline.” The outcome of any such proceedings, regardless of the merits, is inherently uncertain; therefore, assessing the likelihood of loss and any estimated damages is difficult and subject to considerable judgment.

Pfizer/BioNTech Patent Litigation

On August 26, 2022, Moderna filed a lawsuit in the U.S. District Court for the District of Massachusetts against (1) Pfizer Inc. (Pfizer) and (2) BioNTech SE, BioNTech Manufacturing GmbH, and BioNTech US Inc. (collectively BioNTech). This lawsuit seeks damages for infringement of U.S. Patent Nos. 10,898,574, 10,702,600 and 10,933,127 in Pfizer and BioNTech’s manufacture and sale of their messenger RNA, or mRNA, COVID-19 vaccines. The complaint seeks a judgment of infringement of the asserted patents, monetary damages (together with interest), costs and expenses of the lawsuit, and attorneys’ fees.

Also on August 26, 2022, Moderna initiated patent infringement proceedings in the Dusseldorf Regional Court in Germany against Pfizer, BioNTech and related entities with respect to European patents EP 3 718 565 B1 and EP 3 590 949 B1, which also concern Moderna’s mRNA platform technology and disease-specific vaccine designs, including coronaviruses. Moderna has also initiated similar proceedings in the Netherlands and UK. As in the U.S. action, Moderna seeks a judgment of infringement of the asserted patents, monetary damages (together with interest), costs and expenses of the lawsuit, and attorneys’ fees.

In the U.K., Pfizer Inc. and BioNTech SE, have also filed an action seeking revocation of EP 3 718 565 B1 and EP 3 590 949 B1 in the U.K., along with costs (together with interest).

In addition, the Moderna patents being asserted in the European actions are subject to notices of opposition, including by BioNTech SE, seeking to revoke EP 3 718 565 B1 and EP 3 590 949 B1, which have been filed at the European Patent Office (EPO). The periods for filing such oppositions for EP 3 718 565 B1 and EP 3 590 949 B1 end on January 27, 2023 and February 18, 2023, respectively.

Item 1A. Risk Factors

Information regarding risk and uncertainties related to our business appears in Part I, Item 1A. “Risk Factors” of our 2021 Form 10-K. There have been no material changes from the risk factors previously disclosed in the 2021 Form 10-K other than those set forth in our Quarterly Report on Form 10-Q for the quarter ended March 31, 2022 and filed with the SEC on May 4, 2022.

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

Issuer Purchases of Equity Securities

The following table provides information with respect to the shares of common stock repurchased by us during the three months ended September 30, 2022:

Period	Total Number of Shares Purchased	Average Price Paid per Share [1]	Total Number of Shares Purchased as Part of Publicly Announced Program	Approximate Dollar Value of Shares that May Yet Be Purchased Under the Program (in millions) [2]
July 1 - July 31, 2022	1,393,559	$ 159.16	13,777,298	$ 1,000
August 1 - August 31, 2022	1,708,602	$ 153.03	15,485,900	$ 3,739
September 1 - September 30, 2022	4,013,594	$ 130.20	19,499,494	$ 3,216
Total	7,115,755			

[1] Average price paid per share includes related expenses.
[2] On February 22, 2022, our Board of Directors authorized a share repurchase program for our common stock of up to $3.0 billion, with no expiration date. This share repurchase program was increased by the Board of Directors by an additional $3.0 billion on August 1, 2022, also with no expiration date.

Refer to Note 13 to condensed consolidated financial statements for information regarding our share repurchase programs.

Item 6. Exhibits

The Exhibits listed below are filed or incorporated by reference as part of this Form 10-Q.

Exhibit No.	Exhibit Index
10.1*#	Amended and Restated Non-Employee Director Compensation Policy, effective October 1, 2022.
10.2*#	Offer Letter by and between ModernaTX, Inc. and James Mock, dated as of August 15, 2022.
10.3*†	Amendment No. PZ0025 and P00026 to Award Contract No. W911QY20C0100, by and between Moderna US Inc. and the Army Contracting Command of the U.S. Department of Defense, dated August 9, 2020.
31.1*	Certification of Principal Executive Officer pursuant to Rule 13a-14(a) and Rule 15d-14(a) of the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
31.2*	Certification of Principal Financial Officer pursuant to Rule 13a-14(a) and Rule 15d-14(a) of the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
32.1+	Certification pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
101.INS*	XBRL Instance Document - The instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document
101.SCH*	XBRL Taxonomy Extension Schema Document
101.CAL*	XBRL Taxonomy Extension Calculation Document
101.DEF*	XBRL Taxonomy Extension Definition Linkbase Document
101.LAB*	XBRL Taxonomy Extension Label Linkbase Document
101.PRE*	XBRL Taxonomy Extension Presentation Link Document
104*	Cover Page Interactive Data File (formatted as Inline XBRL with applicable taxonomy extension information contained in Exhibits 101.)

* Filed herewith

† Portions of this exhibit (indicated by asterisks) have been omitted in accordance with the rules of the Securities and Exchange Commission.

# Indicates a management contract or any compensatory plan, contract or arrangement.

+ The certification furnished in Exhibit 32.1 hereto is deemed to accompany this Form 10-Q and will not be deemed "filed" for purposes of Section 18 of the Securities Exchange Act of 1934, as amended. Such certification will not be deemed to be incorporated by reference into any filings under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, except to the extent that the Registrant specifically incorporates it by reference.

SIGNATURES

Pursuant to the requirements of the Section 13 or 15(d) 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.

MODERNA, INC.

Date:
November 3, 2022

By: /s/ Stéphane Bancel

Stéphane Bancel
Chief Executive Officer and Director
(*Principal Executive Officer)*

Date:
November 3, 2022

By: /s/ James M. Mock

James M. Mock
Chief Financial Officer
(*Principal Financial Officer)*

Exhibit 10.1

Moderna, Inc.

Amended and Restated Non-Employee Director Compensation Policy

The purpose of this Amended and Restated Non-Employee Director Compensation Policy (the "Policy") of Moderna, Inc., a Delaware corporation (the "Company"), is to provide a total compensation package that enables the Company to attract and retain, on a long-term basis, high-caliber directors who are not employees or officers of the Company or its subsidiaries ("Outside Directors"). In furtherance of the purpose stated above, all Outside Directors shall be paid compensation for services provided to the Company as set forth below, beginning October 1, 2022:

I. Cash Retainers

(a) Annual Retainer for Board Membership: $80,000 for general availability and participation in meetings and on conference calls of our Board of Directors (the "Board of Directors") and its committees. No additional compensation for attending individual Board of Director meetings.

(b) Additional Annual Retainer for Non-Executive Chairman of the Board of Directors: $50,000

(c) Additional Annual Retainers for Committee Chairs: $20,000 per Committee

No additional compensation for attending individual committee meetings or for service as a member of any committee. All cash retainers will be paid quarterly, in arrears, or upon the earlier resignation or removal of the Outside Director. Cash retainers owing to Outsider Directors shall be annualized, meaning that with respect to Outside Directors who join the Board of Directors during the calendar year, such amounts shall be pro-rated based on the number of calendar days served by such director.

II. Equity Retainers

All grants of equity retainer awards to Outside Directors pursuant to this Policy will be automatic and nondiscretionary and will be made in accordance with the following provisions:

(a) Value. For purposes of this Policy, "Value" means with respect to (i) any award of stock options the grant date fair value of the option (i.e., Black-Scholes Value) determined in accordance with the reasonable assumptions and methodologies employed by the Company for calculating the fair value of options under ASC 718 and which shall generally reflect, when calculating the fair value, the average closing market price on the Nasdaq Global Market (or such other market on which the Company's common stock is then principally listed) (the "NASDAQ") of one share of the Company's common stock over the preceding 20 trading days, up to and including the last trading day immediately preceding the grant date; and (ii) any award of restricted stock and restricted stock units ("RSUs') the product of (A) the average closing market price on the NASDAQ over the preceding 20 trading days, up to and including the last trading day immediately preceding the grant date of one share of the Company's common stock on the grant date and (B) the aggregate number of shares pursuant to such award.

(b) Revisions. The Compensation & Talent Committee (the "Compensation Committee") in its discretion may change and otherwise revise the terms of awards to be granted under this Policy, including, without limitation, the number of shares subject thereto, for awards

of the same or different type granted on or after the date the Compensation Committee determines to make any such change or revision.

(c) Sale Event Acceleration. In the event of a Sale Event (as defined in the Company's 2018 Stock Option and Incentive Plan (as amended from time to time, the "Stock Plan")), the equity retainer awards granted to Outside Directors pursuant to this Policy shall become 100% vested and exercisable.

(d) Initial Grant. Upon initial election to the Board of Directors, each new Outside Director will receive an initial, one-time equity grant (the "Initial Grant") with a Value of $400,000, of which 75% of the Value shall be delivered in the form of a non-statutory stock option and 25% of the Value shall be delivered in the form of RSUs. The portion of the Initial Grant delivered as a stock option shall have an exercise price per share equal to the closing price of a share of the Company's common stock on the date of grant and a term of ten years, and shall vest in full on the one-year anniversary of the grant date. The portion of the Initial Grant delivered as RSUs shall vest in full on the one-year anniversary of the grant date. All vesting of the Initial Grant shall cease if the director resigns from our Board of Directors or otherwise ceases to serve as a director, unless the Board of Directors determines that the circumstances warrant continuation of vesting.

(e) Annual Grant. On the date of the Company's Annual Meeting of Stockholders, each Outside Director who will continue as a member of the Board of Directors following such Annual Meeting of Stockholders will receive an equity grant on the date of such Annual Meeting of Stockholders (the "Annual Grant") with a Value of $425,000, which may be in the form of a mix of RSUs and stock options as chosen by the Outside Director; provided that there shall not be more than 25% of such value delivered in the form of RSUs. The portion of the Annual Grant delivered as a stock option shall have an exercise price per share equal to the closing price of a share of the Company's common stock on the date of grant and a term of ten years, and shall vest in full on the earlier of (i) the one-year anniversary of the grant date or (ii) the next Annual Meeting of Stockholders. The portion of the Annual Grant delivered as RSUs shall vest in full on the earlier of (i) the one-year anniversary of the grant date or (ii) the next Annual Meeting of Stockholders. All vesting of the Annual Grant shall cease if the director resigns from our Board of Directors or otherwise ceases to serve as a director, unless the Board of Directors determines that the circumstances warrant continuation of vesting. If a new Outside Director joins our Board of Directors on a date other than the date of the Company's Annual Meeting of Stockholders, then such Outside Director will be granted a pro-rata portion of the Annual Grant based on the time between such Outside Director's appointment and the next Annual Meeting of Stockholders, on the first eligible grant date following such Outside Director's appointment to our Board of Directors.

III. Expenses

The Company will reimburse all reasonable out-of-pocket expenses incurred by Outside Directors in attending meetings of the Board of Directors or any committee thereof.

IV. Maximum Annual Compensation

The aggregate amount of compensation, including both equity compensation and cash compensation, paid to any Outside Director in a calendar year period shall not exceed $1,500,000 for the first year of service and $1,000,000 for each year of service thereafter (or such other limits as may be set forth in Section 3(b) of the Stock Plan or any similar provision of a successor plan). For this purpose, the "amount" of equity compensation paid in a calendar year shall be determined based on the grant date fair value thereof, as determined in accordance with ASC 718 or its successor provision, but excluding the impact of estimated forfeitures related to service-based vesting conditions.

Date Amended and Restated Policy Approved: August 24, 2022.

August 15, 2022

VIA ELECTRONIC MAIL ([***])

James Mock

[***]
[***]

Re: Offer of Employment with Moderna

Dear Jamey,

On behalf of Moderna (ModernaTx, Inc. or, alternatively, one of its US-based subsidiaries to which you may be assigned, hereafter "Moderna" or the "Company"), it is my privilege to offer you the opportunity to join our mission: to boldly, curiously, and relentlessly deliver on the promise of mRNA technology to transform the lives of patients. We are confident that, as you leverage our Moderna Mindsets to help build and grow the best possible version of Moderna, you will experience challenge, satisfaction, collaboration, and opportunity for professional and personal growth.

Role and Start Date: You will join Moderna in the position of Chief Financial Officer as a regular, full-time employee. Your first day of employment will be on September 6, 2022 (the "Start Date") and your regular place of work will be at the Company's offices in Cambridge, Massachusetts.

Moderna Total Rewards: As a Moderna executive, you are eligible for a meaningful total compensation and rewards program, inclusive of:

Base Compensation: You will be paid an annualized base salary of USD$750,000.00 at the rate of USD$28,846.15 per bi-weekly pay period. Your salary is subject to deductions and withholdings as required by law. As a salaried, exempt employee, you will not be eligible for overtime payments. Adjustments in your Base Salary, if any, will only be made in a manner that is consistent with the rest of the executive team and at the direction of the Board of Directors (and shall otherwise be subject to your rights under the Amended and Restated Executive Severance Plan ("ESP"). The Company acknowledges and agrees that you shall be a Participant in the current ESP upon your Start Date.

Sign On Cash Bonus: If you accept this offer, you will receive a one-time gross sign-on payment of $1,000,000.00 (the "Sign On Bonus") within thirty (30) days following the Start Date (the "Payment Date") unless you give notice of your resignation, resign, or your employment terminates for any reason prior to the Payment Date. If you resign for any reason (other than due to death or disability) or are terminated by the Company for Cause (as defined below), either within twenty-four (24) months of the Payment Date, you will be required to and agree to repay the Company for the total net amount of the Sign-On Bonus within one week of your separation date, and to the maximum extent permitted by law, you authorize the Company to deduct any owed Sign-On Bonus as a valid set-off from your final wages, any accrued and unused vacation pay, bonus, outstanding expense reimbursement, and/or any other payments or compensation owed to you by the Company. For purposes of this section, "Cause" means one or more of the following events, as determined in the Company's reasonable discretion: (i) your failure to perform or negligence in performing (other than by reason of disability or death) your duties and responsibilities as a Company employee after receiving written notification of the failure from the

Company and, if curable, a period of thirty (30) days to cure such failure; (ii) your failure to comply with the requirements of the Company's Code of Conduct or any other Company standards, policies, or practice(s) regarding acceptable workplace conduct; (iii) a breach by you of any provision of this offer letter (including its Exhibit A) or any of the other agreements you may have with the Company; (iv) your conviction of, or the entry of a pleading of guilty or nolo contendere to, any crime involving fraud or embezzlement or any felony; or (iv) any form of fraudulent conduct.

Benefits: Moderna is proud to provide you with a comprehensive suite of innovative health and wellbeing benefits to support our diverse and multigenerational workforce. As a regular employee working over 20 hours per week, you will be eligible for various employee benefit programs offered to Company employees in comparable positions in line with the eligibility requirements and other terms of the Company's benefit plans and/or policies. These benefits currently include paid vacation and sick time, group medical and dental insurance, group life insurance, short and long-term disability insurance, and a 401(k) plan with a Company match, along with many other wellness benefits. The eligibility requirements and other information regarding these benefits are set forth in the Company's Summary of Benefits and more detailed documents available from the Company. With the exception of the "employment at will" policy below, Moderna may, from time to time in its sole discretion, modify the benefits offered to employees and any associated plans or policies. Where a benefit is subject to a formal plan (for example, medical insurance or life insurance), eligibility to participate in and receive such benefit is controlled solely by the applicable plan document.

Annual Performance Bonus Program: Executives at Moderna work hard and are well rewarded for their performance. To that end, you will be eligible to participate in the Company's annual performance bonus program, subject to its terms and conditions, with the potential to earn an annual performance bonus at an initial target level of 90% of your then annual base compensation. Performance bonuses under the Company's annual performance bonus program are subject to the Company's sole discretion based upon multiple factors, including but not limited to the Company's performance, overall business conditions, and your individual performance and likelihood of continued employment, which means that any annual performance bonus could be higher, lower, or equivalent to the target bonus amount. The components of the Company's annual incentive bonus program are subject to periodic review and adjustment. As your Start Date with the Company is between January 1 and the first Monday of October of this year, you will be eligible to earn an annual incentive bonus payment for this year prorated to your length of employment during this calendar year. You must be actively employed by the Company at the time annual performance bonus awards are distributed to employees in your role to be eligible to receive an annual performance bonus award. Annual performance bonus awards are typically paid on or before March 15 of the calendar year following the bonus eligibility year.

New Hire and Long-Term Incentive Equity Program: As an additional incentive for you to join the Company and to contribute to its long-term growth, you will be eligible to participate in both new hire and annual long-term equity incentive award programs. Subject to approval by the Company's Board of Directors (the "Board") and the Company's parent entity, within thirty (30) trading days of your Start Date you will be granted a new hire long term equity award equivalent to a total value of $6,000,000.00 (the "New Hire Equity Award") with the effective date of the New Hire Equity Award being the date the grant is approved by the Board (the "Grant Date"). Further, subject to the Board's approval, you also will be eligible to receive an annual long-term equity award related to your performance during the eligible performance period and potential for long-term impact (the "Annual Equity Award") provided

your Start Date is on or before the first Monday in October of this year, which shall not be subject to proration in your first year of employment. The target grant value of an Annual Equity Award at your level is currently between $3,000,000.00 and $4,000,000.00. Annual Equity Awards typically will be issued in the first quarter of the year. The New Hire Equity and Annual Equity Award grants are conditioned upon, among other things, your execution of all incentive award program documentation required by the Company. At this time, the Board has approved that the New Hire Equity Award will vest according to the following schedule: 25% of the New Hire Equity Award will vest on the first anniversary of the date of grant, and the remaining 75% of the New Hire Equity Award will vest in equal calendar quarterly installments over the next three (3) years. As a condition to the vesting of each installment of the New Hire Equity Award, you must be actively employed by the Company as of the relevant vesting date without any prior interruption of service. All Equity Awards are subject to the terms and conditions of the Company's equity award plans and Board approvals, as they may be amended from time to time.

You shall also be provided a Moderna, Inc. Officer's Indemnification Agreement, which shall be in addition to any rights of indemnification to which you may be entitled under applicable law, Moderna's organizing documents, a vote of stockholders or a resolution of directors, or otherwise.

All compensation, payments, stock, stock options, and benefits referred to above are subject to withholdings, taxes and other deductions as required by applicable laws or regulations.

There are many additional benefits to joining Moderna and they are outlined in further detail at https://modernabenefits.com/fair/index and throughout the onboarding process.

Preparing For Your Moderna Experience To Begin:

Protection of Moderna Innovation: In connection with your employment, you will be exposed to and provided with confidential and/or trade secret information about the Company and its present and future operations, products, and services ("Confidential Information"). In order to protect such Confidential Information and the Company's goodwill, this offer of employment is contingent upon you signing the Employee Confidentiality, Assignment, Nonsolicitation, and Noncompetition Agreement (the "Restrictive Covenant Agreement"), attached to this offer letter as Exhibit A, and your ongoing observance of its terms.

Protection Of Third-Party Innovation: You represent that your employment with the Company does not violate any pre-existing restriction, obligation, or contract, and that you are not subject to any agreements with non-competition, non-solicitation, invention assignment, proprietary information, confidentiality, or similar provisions that could prevent you from devoting your full business time, know- how, and attention to your work at the Company. You understand that your initial and continued employment with the Company is contingent upon the accuracy of this representation. If you are subject to any such restriction or agreement, please immediately provide me with a copy of the applicable agreement for review prior to accepting this offer. You also represent and agree that you will abide by the terms of any ongoing obligations to your present or prior employers or any other person, including but not limited to promises relating to the hiring or solicitation of employees, the solicitation of clients or customers, and maintaining the confidentiality of proprietary information or trade secrets. By accepting this offer, you agree that you will not, at any time, bring with you to the Company or use or disclose any confidential or proprietary information or trade secrets of any person, employer, or entity

with whom or with which you have an agreement or obligation to keep in confidence that is not generally available to the public or has not been legally transferred to you or the Company.

Pre-Hire Requirements: This offer of employment is contingent upon the satisfactory completion of professional reference and background checks (which include verification of employment and education as well as a job-related criminal background screen) and a pre-employment drug test. We suggest that you do not resign from your current position and do not relocate until you have received confirmation from the Company that these pre-hire requirements have been successfully completed, as this offer will be rescinded if any of the above conditions are not satisfied. This offer is also contingent upon satisfactory proof of your right to work in the United States. Please expect to complete an I-9 Employment Verification Form with supporting documentation of eligibility to work in the United States on or immediately prior to your Start Date. By accepting this offer, you certify that you have not been debarred by the U.S. Food and Drug Administration or excluded from participation in federal health care programs by the Office of Inspector General, and further certify that in the event you are so debarred or excluded at any time during your employment, you will immediately report this to the Company's Compliance team. You understand that the Company and its agents may conduct ongoing checks of criminal history and other relevant government databases to confirm that your continued employment does not violate any of the Company's compliance obligations and authorize the Company and its agents to conduct such checks as needed.

PLEASE NOTE: *Moderna currently maintains a requirement that all US-based employees be fully vaccinated against COVID-19 prior to their employment start date unless a reasonable accommodation is approved for those unable to be vaccinated where it is not an undue hardship to the Company to do so as provided under federal, state, and local law.*

At-Will Employment: This offer letter does not constitute a contract of employment for any specific time period. You may terminate your employment with the Company at any time and for any reason simply by notifying the Company in writing. Likewise, the Company may terminate your employment at any time, with or without cause or advance notice, and as needed in a dynamic business, may change your job duties, title, reporting structure, and other terms and conditions of employment at any time, for any legal reason, subject to and in accordance with the terms and conditions of the ESP and other executive plans that may be applicable to you from time to time. Your employment-at-will status can only be modified in a written agreement signed by you and the Chief Executive Officer of the Company or his designee.

Entire Agreement: This offer letter, together with the Restrictive Covenant Agreement, forms the complete employment arrangement with the Company and supersedes any other agreements or promises made to you by anyone regarding this offer, whether oral or written. Changes to your initial employment terms, require a written modification signed by you and the Company's Chief Executive Officer. The terms of this offer letter and the resolution of any disputes arising out of, related to, or in any way connected with this offer letter or your employment with the Company will be governed by the laws of the Commonwealth of Massachusetts, without giving effect to conflict of law provisions.

We look forward to your acceptance of this offer on or before August 16, 2022. You acknowledge and agree that electronic signatures, whether digital or encrypted, of you and the Company on this offer letter are intended to have the same force and effect as manual signatures.

We look forward to you joining the Moderna team and are pleased that you will be working with us to build a transformative company for patients.

On behalf of Moderna,

/s/ April Eldred

April Eldred
Vice President, Talent Acquisition

YOU ACKNOWLEDGE THAT YOU HAVE CAREFULLY READ THIS OFFER, INCLUDING ITS EXHIBIT A, AND UNDERSTAND AND AGREE TO ALL OF ITS PROVISIONS AND CONDITIONS AS DEMONSTRATED BY YOUR ELECTRONIC SIGNATURE. YOU FURTHER REPRESENT THAT YOU WERE GIVEN THIS OFFER, INCLUDING ITS EXHIBIT A, AT LEAST TEN DAYS PRIOR TO THE START DATE AND HAD THE OPPORTUNITY TO REVIEWIT WITH A REPRESENTATIVE OF YOUR CHOOSING.

Acknowledged:

/s/ James Mock Date: 15 August 2022
NAME

Certain confidential portions of this exhibit have been omitted and replaced with "[***]." Such identified information has been excluded from this exhibit because it (i) is not material and (ii) is the type of information that the registrant treats as private and confidential.

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE OF PAGES
	1 | 16

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO.(If applicable)
PZ0001	16-AUG-2022	SEE SCHEDULE	

6. ISSUED BY CODE W58P05	7. ADMINISTERED BY (If other than item 6) CODE S2206A
ACC-APG - COVID RESPONSE - W58P05 6472 INTEGRITY COURT (BUILDING 4401) ABERDEEN PROVING GROUND MD 21005-3013	DCMA BOSTON 495 SUMMER STREET BOSTON MA 02210-2138

8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)		
MODERNA US, INC. 200 TECHNOLOGY SQ CAMBRIDGE MA 02139-3578		9A. AMENDMENT OF SOLICITATION NO.
		9B. DATED (SEE ITEM 11)
	X	10A. MOD. OF CONTRACT /ORDER NO. W911QY20C0100
CODE 8PTM0 FACILITY CODE	X	10B. DATED (SEE ITEM 13) 09-Aug-2020

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer ☐ is extended, ☐ is not extended.

Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one ofthe following methods:

(a) By completing Items 8 and 15, and returning copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN

REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegramor letter, provided each telegramor letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
See Schedule

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT /ORDER NO. AS DESCRIBED IN ITEM 14.

	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT /ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).
X	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: FAR 43.103(a)(3), Mutual Agreement of the Parties
	D. OTHER (Specify type of modification and authority)

E. IMPORTANT : Contractor ☐ is not, ☒ is required to sign this document and return 1 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)
Modification Control Number: [***]
See Block 14 Continuation Page

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)	16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
[***]	[***] TEL: [***] EMAIL: [***]

15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
[***] (Signature of person authorized to sign)	8/15/2022	[***] BY [***] [***] (Signature of Contracting Officer)	16-AUG-2022

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

SUMMARY OF CHANGES

SECTION SF 30 - BLOCK 14 CONTINUATION PAGE

The following have been added by full text:
PZ0025

OBLIGATION AMOUNT: $17,477,343

a. The purpose of this modification (PZ0025) is to:

- Definitize Unpriced Change Orders (UCO) issued per contract modifications W911QY-20-C-0100-P00022 and W911QY-20 C-0100-P00023.
- CLIN 5000 is adjusted from $73,000,000 to $53,977,343 based on definitized pricing.
- SubCLIN 500003 is added and funded for $17,477,343.
- Section H, H.19 is revised, and H.22 is added.

b. This modification was requested by the program office to meet the Government's COVID-19 National Response Strategy.

c. The total value of the contract has decreased by $19,022,657 from $ 8,223,641,280.12 to $8,204,618,623.12. The total funded amount has increased by $17,477,343 from $8,187,141,280.12 to $8,204,618,623.12.

All other terms and conditions remain unchanged.

SECTION A - SOLICITATION/CONTRACT FORM

The total cost of this contract was decreased by $19,022,657.00 from $8,223,641,280.12 to $8,204,618,623.12.

SECTION B - SUPPLIES OR SERVICES AND PRICES

CLIN 5000
The unit price amount has decreased by $19,022,657.00 from $73,000,000.00 to $53,977,343.00.
The total cost of this line item has decreased by $19,022,657.00 from $73,000,000.00 to $53,977,343.00.

SUBCLIN 500001

The CLIN description has changed from NTE Amount to Funding for CLIN 5000.
The CLIN extended description has changed from:

To:

PR 0011770238
.

SUBCLIN 500002
The CLIN description has changed from NTE Amount to Funding for CLIN 5000.
The CLIN extended description has changed from:

To:

PR 0011776492-0002
.

SUBCLIN 500003 is added as follows:

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
500003					$0.00
	Funding for CLIN 5000 FFP PR 0011835771 PURCHASE REQUEST NUMBER: 0011835771				
				NET AMT	$0.00
	ACRN AQ CIN: GFEBS001183577100001				$17,477,343.00

SECTION E - INSPECTION AND ACCEPTANCE

The following Acceptance/Inspection Schedule was added for SUBCLIN 500003:

INSPECT AT	INSPECT BY	ACCEPT AT	ACCEPT BY
N/A	N/A	N/A	N/A

SECTION G - CONTRACT ADMINISTRATION DATA

Accounting and Appropriation

Summary for the Payment Office

As a result of this modification, the total funded amount for this document was increased by $17,477,343.00 from $8,187,141,280.12 to $8,204,618,623.12.

SUBCLIN 500003:
Funding on SUBCLIN 500003 is initiated as follows:

ACRN: AQ

CIN: GFEBS001183577100001

Acctng Data: 021202220232040000066565426O S.0074658.7.3.8 6100.0152021001

Increase: $17,477,343.00

Total: $17,477,343.00

Cost Code: A5XAH

SECTION H - SPECIAL CONTRACT REQUIREMENTS

The following have been modified:

H.1 Key Personnel

Any key personnel specified in this contract are considered to be essential to work performance. At least thirty (30) calendar days prior to the Contractor voluntarily diverting any of the specified individuals to other programs or contracts the Contractor shall notify the Contracting Officer and shall submit a justification for the diversion or replacement and a request to replace the individual. The request must identify the proposed replacement and provide an explanation of how the replacement's skills, experience, and credentials meet or exceed the requirements of the contract (including, when applicable, Human Subjects Testing requirements). If the employee of the Contractor is terminated for cause or separates from the Contractor voluntarily with less than thirty (30) calendar-day notice, the Contractor shall provide the maximum notice practicable under the circumstances. The Contractor shall not divert, replace, or announce any such change to key personnel without the written consent of the Contracting Officer. The contract will be modified to add or delete key personnel as necessary to reflect the agreement of the parties. The following individuals are determined to be key personnel:

Name	Title
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]

H.2 Substitution of Key Personnel

The Contractor agrees to assign to the contract those persons whose resumes/CVs were submitted with the proposal who are necessary to fill the requirements of the contract. No substitutions shall be made except in accordance with this clause.

All requests for substitution must provide a detailed explanation of the circumstance necessitating the proposed substitution, a complete resume for the proposed substitute and any other information requested by the contracting officer to approve or disapprove the proposed substitution. All proposed substitutes must have qualifications that are equal to or higher than the qualifications of the person to be replaced. The contracting officer or authorized representative will evaluate such requests and promptly notify the contractor of his approval or disapproval thereof.

H.3 Disclosure of Information:

Performance under this contract may require the Contractor to access non-public data and information proprietary to a Government agency, another Government Contractor or of such nature that its dissemination or use other than as specified in the work statement would be adverse to the interests of the Government or others. Neither the Contractor, nor Contractor personnel, shall divulge nor release data nor information developed or obtained under performance of this contract, except authorized by Government personnel or upon written approval of the CO which the KO will provide in accordance with OWS or other Government policies and/or guidance. The Contractor shall not use, disclose, or reproduce proprietary data that bears a restrictive legend, other than as specified in this contract, or any information at all regarding this agency.

The Contractor shall comply with all applicable Government requirements for protection of non-public information. Unauthorized disclosure of nonpublic information is prohibited by the Government's rules. Unauthorized disclosure may result in termination of the contract, replacement of a Contractor employee, or other appropriate redress. Neither the Contractor nor the Contractor's employees shall disclose or cause to be disseminated, any information concerning the operations of the activity, which could result in, or increase the likelihood of, the possibility of a breach of the activity's security or interrupt the continuity of its operations.

No information related to data obtained under this contract shall be released or publicized without the prior written consent of the COR, whose approval shall not be unreasonably withheld, conditioned, or delayed, provided that no such consent is required to comply with any law, rule, regulation, court ruling or similar order; for submission to any government entity' for submission to any securities exchange on which the Contractor's (or its parent corporation's) securities may be listed for trading; or to third parties relating to securing, seeking, establishing or maintaining regulatory or other legal approvals or compliance, financing and capital raising activities, or mergers, acquisitions, or other business transactions. The exceptions identified in this paragraph apply to all disclosures under this Section except to the extent that a disclosure is otherwise prohibited by law.

H.4 Publication and Publicity

The contractor shall not release any reports, manuscripts, press releases, or abstracts about the work being performed under this contract without written notice in advance to the Government.

a. Unless otherwise specified in this contract, the contractor may publish the results of its work under this contract. The contractor shall promptly send a copy of each submission to the COR for security review prior to submission. The contractor shall also inform the COR when the abstract article or other publication is published, and furnish a copy of it as finally published.

b. Unless authorized in writing by the CO, the contractor shall not display the DoD logo including Operating Division or Staff Division logos on any publications.

c. The contractor shall not reference the products(s) or services(s) awarded under this contract in commercial advertising, as defined in FAR 31.205-1, in any manner which states or implies DoD approval or endorsement of the product(s) or service(s) provided.

d. The contractor shall include this clause, including this section (d) in all subcontracts where the subcontractor may propose publishing the results of its work under the subcontract. The contractor shall acknowledge the support of the Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response, Biomedical Advanced Research and Development Authority whenever publicizing the work under this contract in any media by including an acknowledgement substantially as follows:

"This project has been funded in whole or in part with Federal funds from the Office of the Assistant Secretary for Preparedness and Response, Biomedical Advanced Research and Development Authority, under Contract Number W911QY-20-C-0100."

H.5 Confidentiality of Information

a. Confidential information, as used in this article, means non-public information or data of a personal nature about an individual, or proprietary information or data submitted by or pertaining to an institution or organization.

b. The Contracting Officer and the Contractor may, by mutual consent, identify elsewhere in this contract specific information and/or categories of information which the Government will furnish to the Contractor or that the Contractor is expected to generate which is confidential. Similarly, the Contracting Officer and the Contractor may, by mutual consent, identify such confidential information from time to time during the performance of the contract. Failure to agree will be settled pursuant to the "Disputes" clause.

c. If it is established elsewhere in this contract that information to be utilized under this contract, or a portion thereof, is subject to the Privacy Act, the Contractor will follow the rules and procedures of disclosure set forth in the Privacy Act of 1974, 5 U.S.C. 552a, and implementing regulations and policies, with respect to systems of records determined to be subject to the Privacy Act.

d. Confidential information, as defined in paragraph (a) of this article, shall not be disclosed without the prior written consent of the individual, institution, or organization.

e. Whenever the Contractor is uncertain with regard to the proper handling of material under the contract, or if the material in question is subject to the Privacy Act or is confidential information subject to the provisions of this article, the Contractor shall obtain a written determination from the Contracting Officer prior to any release, disclosure, dissemination, or publication.

f. Contracting Officer Determinations will reflect the result of internal coordination with appropriate program and legal officials.

g. The provisions of paragraph (d) of this article shall not apply to conflicting or overlapping provisions in other Federal, State or local laws.

ALL REQUIREMENTS OF THIS SECTION H.5 MUST BE PASSED TO ALL SUB-CONTRACTOR.

H.6 Regulatory Rights

This contract involves supply of a product that requires FDA pre-market approval or clearance before commercial authorization. Contractor is seeking FDA authorization or clearance for the commercialization of mRNA-1273, Moderna vaccine for SARS-CoV-2 Coronavirus (the "Technology"). The Contractor is the Sponsor of the Regulatory Application (an investigational new drug application (IND), investigational device exemption (IDE), emergency use authorization (EUA), new drug application (NDA), biologics license application (BLA), premarket approval application (PMA), or 510(k) pre-market notification filing (510(k)) or another regulatory filing submitted to FDA) for the technology. As the Sponsor of the Regulatory Application to FDA (as the terms "sponsor" and "applicant" are defined or used in at 21 CFR §§3.2(c), 312.5, 600.3(t), 812.2(b), 812 Subpart C, or 814.20), the Contractor has certain standing before the FDA that entitles it to exclusive communications related to the Regulatory Application.

Accordingly, the Contractor and the Government agree to the following:

a. DoD Medical Product Priority. PL 115-92 allows the DoD to request, and FDA to provide, assistance to expedite development of products to diagnose, treat, or prevent serious or life-threatening diseases or conditions facing American military personnel. The contractor recognizes that only the DoD can utilize PL 115-92. As such, the contractor will work proactively with the Government to leverage this law to its maximum potential under this contract. The contractor shall submit Public Law 115-92 Sponsor Authorization Letter that will be delivered to the designated OWS POC(s) within [***] of award.

b. [***].

H.7 Performance Based Payment Liquidated under Termination

Performance Based Payments (PBPs) have been authorized as a method of financing under this contract. In the event the Moderna's mRNA-1273 COVID Vaccine is unsuccessful in its bid to obtain EUA or FDA approval, the Government may issue a Termination for Convenience (T4C) in whole or in part, on this contract. Upon notice of a T4C, the contractor shall submit a termination settlement proposal, IAW FAR 52.249-2, Termination for Convenience of the Government (Fixed-Price).

H.8 Public Readiness and Emergency Preparedness (PREP) Act:

In accordance with the Public Readiness and Emergency Preparedness Act ("PREP Act"), Pub. L. No. 109-148, Division C, Section 2, as amended (codified at 42 U.S.C. § 247d-6d and 42 U.S.C. § 247d-6e), as well as the Secretary of HHS's Declaration Under the Public Readiness and Emergency Preparedness Act for Medical Countermeasures Against COVID-19, 85 Fed. Reg. 15198 (Mar. 17, 2020, effective Feb. 4, 2020), and amended on April 15, 2020, 85 Fed. Reg. 21012 (together, the "Prep Act Declaration"):

(i) This Agreement is being entered into for purposes of facilitating the manufacture, testing, development, distribution, administration, and use of "Covered Countermeasures" for responding to the COVID-19 public health emergency, in accordance with Section VI of the PREP Act Declaration;

(ii) Contractor's performance of this Agreement falls within the scope of the "Recommended Activities" for responding to the COVID-19 public health emergency, to the extent it is in accordance with Section III of the PREP Act Declaration; and

(iii) Contractor is a "Covered Person" to the extent it is a person defined in Section V of the PREP Act Declaration.

Therefore, in accordance with Sections IV and VII of the PREP Act Declaration as well as the PREP Act (42 U.S.C. § 247d-6d), the Department of Defense contracting via assisted acquisition on behalf of the HHS, expressly acknowledges and agrees that the HHS Declaration cited above, specifically its language providing immunity from suit and liability is applicable to this acquisition as long as Contractors activities fall within the terms and conditions of the PREP Act and the PREP Act Declaration.

The Government may not use, or authorize the use of, any products or materials provided under this contract, unless such use occurs in the United States (or a U.S. territory where U.S. law applies such as embassies, military and NATO installations) and is protected from liability under a declaration issued under the PREP Act, or a successor COVID-19 PREP Act Declaration of equal or greater scope. Any use where the application of the PREP Act is in question will be discussed with Moderna prior to use and, if the parties disagree on such use, the dispute will be resolved according to the "Disputes Clause" (52.233-1)

The items and technology covered by this Contract are being developed for both civil and military applications.

H.9 [***]

H.10 Ensuring Sufficient Supply of the Product

1. In recognition of the Government's significant funding for the development and manufacturing of the product in this contract and the Government's need to provide sufficient quantities of a COVID-19 vaccine to protect the United States population, the Government shall have the remedy described in this section to ensure sufficient supply of the product to meet the needs of the public health or national security. This remedy is not available to the Government unless and until both of the following conditions ((a) and (b)) are met:

a. Moderna gives written notice, required to be submitted to the Government [***], of:

i. any formal management decision to terminate manufacturing of this product vaccine prior to delivery of any doses to USG under this contract, including all exercised options, other than as a result of clinical failure, or serious technical or safety reasons or;

ii. any formal management decision to discontinue sale of this product vaccine to the Government prior to delivery of any doses to USG under this contract, including all exercised options, other than as a result of clinical failure, or serious technical or safety reasons; or

iii. any filing that anticipates Federal bankruptcy protection; and

b. Moderna has submitted an Emergency Use Authorization application under §564 of the FD&C Act or a biologics license application provisions of §351(a) of the Public Health Service Act (PHSA).

2. If both conditions listed in section 1 occur, Moderna, upon the request of the Government, shall provide the following items necessary for the Government to pursue manufacturing of this product vaccine with a third party for exclusive sale to the U.S. Government:

a. a writing evidencing a non-exclusive, nontransferable, irrevocable (except for cause), royalty-free paid-up license to practice or have practiced for or on behalf of the U.S. Government any Moderna Background Patent, Copyright, other Moderna Intellectual Property, Moderna Know-How, Moderna Technical Data rights necessary to manufacture doses of the mRNA-1273 vaccine;

b. necessary FDA regulatory filings or authorizations owned or controlled by Moderna related to this product vaccine and any confirmatory instrument pertaining thereto; and

c. any outstanding Deliverables contemplated or materials purchased under this contract.

3. This remedy will remain available until the end of the contract.

H.11 [***]

H.12 Transportation to Final Destination

During the course of performance under this contract, the Government may require storage of the filled drug product (FDP) before delivery to the final government location. In these circumstances, the Government will accept FDP at the contractor facility (Origin). The contractor; however, shall continue to be responsible for secure delivery of the vaccine to its final destination as identified on this contract. [***].

H.13 Validation of IP/Data

The Parties acknowledge that background intellectual property and technical data assertions have been made and evaluated by the parties. The parties agree that, should additional information relevant to these assertions become available, the parties will reevaluate said assertions as necessary in the future.

H.14 Novation

Upon Moderna, US, Inc.'s registration in the System for Award Management, the Government will, at the Contractor's request, complete a novation of this Contract to recognize Moderna US, Inc. as a counterparty instead of Moderna TX, Inc. This novation will be completed through a modification executed by the Government that identifies Moderna US, Inc. as the contracting party for all purposes as if it had originally executed the Contract.

H.15 Base & Option 1 Delivery Acceleration

In an effort to accelerate production of the mRNA-1273 vaccine, [***] within the Option 1 period via a Modification to the contract. If these manufacturing slots are

successfully utilized, [***] above what was projected by Moderna and assumed within the price per dose for the doses of mRNA-1273 vaccine delivered in the Base Period and Option
1. However, because the Government is funding the additional slots within the Base and Option 1 periods in order to accelerate production, the Government is entitled to an adjustment under the conditions outlined. The Government and Moderna agree to the following:

1. If the Government exercises Option 2 (NLT 15 May):

a. Moderna will reduce the cost of Option 2 by $[***] for each successfully accelerated drug product fill under the Base Period ([***]) and $[***] for each successfully accelerated drug product fill under Option 1 ([***]).

2. If the Government does not exercise Option 2 (NLT 15 May):
a. In the event Moderna timely cancels the manufacturing slots and/or is able to otherwise fully utilize the slots originally reserved for production in the Option 2 period, Moderna agrees to credit the Government $[***] for [***] and $[***] for [***]. In no case shall the number of drug product manufacturing slots credited exceed the number of successfully accelerated drug product manufacturing fills under the Base Period and Option 1. It is understood that Moderna will make all good-faith efforts to fill reserved slots or cancel reservations in a timely manner (i.e. within the time period required by the subcontractor).

b. In the event that Moderna is unable to fill those reserved slots (i.e. due to lack of demand) and cancels slots, Moderna shall be entitled to recoup those reservation cancellation costs from the USG. The process is outlined as follows:

1. Moderna shall submit documentation to the USG of the following:

i. Cancellation notice to the subcontractor,
ii. The basis of the cancellation. and
iii. Cancellation fees incurred.

2. Moderna shall reduce credits to the USG under paragraph 2a) of this clause, IAW agreed cancellation costs incurred.

3. Bi-lateral agreement of the final credit shall be included in a modification to the contract. Net credit shall be deducted from final payments under the contract.

H.16 Delivery Schedule, as revised 11Feb2021 via modification P00004

[***]

H.17 Post-Termination Disposition of Undelivered Product

For the avoidance of doubt, if the USG elects to terminate the exercised CLINs prior to acceptance and delivery in full of the required quantities of mRNA-1273, Moderna will be free to direct any unaccepted/undelivered supplies of mRNA-1273 to customers other than the USG, at its discretion, without further obligation of either party with regard to such unaccepted/undelivered supplies of mRNA-1273. The contract will be bilaterally modified to decrease the quantities by the agreed upon volume.

H.18 [***]

In order to facilitate projections and invoicing, the Government shall provide or direct a third party ([***]) to provide to Moderna (1) actual quantities of Moderna [***] with 8.0mL vials during the reporting period; (2) actual quantities of Moderna [***] with 8.0mL vials during the reporting period; and (3) the number of [***] remaining in inventory and available for upcoming shipments. This information will be provided to Moderna at a frequency of at least twice monthly.

For each 8.0mL fill volume (1600mcg) vial of vaccine shipped with a [***].

Both parties acknowledge that the delivery schedule is based on an [***] 8.0mL fill volume (1600mcg) vial delivered. In accordance with the agreed approach for invoicing and counting doses toward Moderna's delivery requirement, [***]. Specifically for purposes of adhering to the scheduled delivery dates set forth in this contract for the Base Period, Option 1 and Option 2, schedule shall be deemed to have been met once doses are released by Moderna and are available for order.

H.19 Product Variations (as added via P00018 & modified via PZ0025)
Specific to CLINs 3001 and 4001, Moderna will deliver to the Government the following product types according to the schedule defined in the table below:

a. Adult Primary Series (≥18 years of age) (mRNA-1273 or other, as determined by EUA/BLA and any related supplement or amendment thereto accepted and authorized/licensed by FDA and mutually agreed upon; 100µg/dose in 10-dose vials (5.0ml vial presentation, 0.5ml per dose))).

b. Adult Seasonal Boost (≥ 18 years of age) / Pediatric Primary Series (6 to < 12 years of age) (mRNA- 1273 or other, as determined by EUA/BLA and any related supplement or amendment thereto accepted and authorized/licensed by FDA and mutually agreed upon; 50µg/dose in 20-dose vials, (5.0ml vial presentation, 0.25ml per dose)).

c. Adult Seasonal Boost (≥ 18 years of age) / Pediatric Primary Series (6 to < 12 years of age) (mRNA- 1273 or other, as determined by EUA/BLA and any related supplement or amendment thereto accepted and authorized/licensed by FDA and mutually agreed upon; 50µg/dose in 5-dose vials (2.5ml vial presentation, 0.5ml per dose)).

d. Pediatric Primary Series (6 months to <6 years of age) (mRNA-1273 or other, as determined by EUA/BLA and any related supplement or amendment thereto accepted and authorized/licensed by FDA and mutually agreed upon; 25µg/dose in 10-dose vials, (2.5ml vial presentation, 0.25ml per dose)).

For avoidance of doubt, all doses delivered to the Government must be suitable for use in the United States pursuant to an active EUA or approved BLA at the time of product delivery. Both parties acknowledge that efforts to validate and receive FDA authorization for products "C" and "D" are ongoing. Consistent with previous requirements under this contract associated with development of the 2.5-mL vial presentation, Moderna will make good-faith, commercially reasonable efforts to establish capabilities to enable 2022 delivery requirements of Products "C" and "D" as summarized in the table below. As part of the shared objective to establish this capability, and Moderna will provide the Government with updates on progress, upcoming activities and planned FDA submissions relevant to the establishment of this capability during the weekly Sales & Operations Planning meetings starting in November 2021 and continuing until completion of product releases. If it becomes clear to the Parties that progress toward authorization of Products "C" or "D" is delayed to the extent that it may impact fulfillment of the delivery requirements summarized in the table below, both Parties will work in good faith to determine a mutually acceptable adjustment to those delivery requirements.

If US regulatory authorities determine there is a need for an updated vaccine containing one or more variant mRNA sequences for any reason, including improved efficacy against new or emerging virus strains, the Parties agree to work together in good faith to discuss any such situation and any potential impact on this contract. If, during the period of performance of this contract, Moderna receives EUA or BLA for a vaccine with a variant mRNA sequence(s) for its SARS-CoV-2 vaccine, Moderna will make available supplies of that product available to the US Government at the current rate of $16.50 per dose.

Both parties acknowledge that the EUA for mRNA-1273 may be expanded such that doses procured under this contract may have utility beyond the currently authorized indications/populations, and in the event of any such expansion, the Government will not be restricted hereunder from use of mRNA-1273 in accordance with the full scope of any FDA authorization and CDC recommendation to the extent consistent with the Government's obligations under Section H.8 and the terms of Section H.20.

The Government and Moderna agree that the total monthly delivery quantities for CLIN 3001 and 4001 will follow the following Delivery Schedule, as revised via special clause H.22:

[***]

The Government and Moderna agree as follows:

- [***].
- *Sale of doses to the African Union.* The Government is agreeing to defer delivery of 33,000,000 doses previously scheduled for delivery in December and February to facilitate Moderna's supply of 50,000,000 doses of mRNA-1273 to the African Union (AU) at a not-for-profit price.
- [***].

EUA Wind Down. It is anticipated that all mRNA-1273 under this contract will be delivered in accordance with an active EUA. If a BLA is issued during the term of this Contract for the mRNA-1273 vaccine, the Government and Moderna shall discuss an appropriate transition of mRNA-1273 to BLA which will include that any doses subsequently provided to the Government under this Contract are appropriately labeled and are otherwise suitable for use in the United States under the terms of the EUA (before expiration) or the BLA.

H.20 Donation of Excess Product

a. If the Government determines that a quantity of doses of mRNA-1273 supplied to the Government under this contract is no longer needed by the Government, the Government may donate such doses to a foreign nation or nongovernmental organization (NGO) facilitating donation to a foreign nation, subject to the remainder of this Clause H.20. The Government shall notify Contractor in writing prior to any proposed donation to a foreign nation or NGO, which notice will include [***].

b. Contractor must verify in writing that all of the required conditions below are met before any such donation is made, [***]:

i. [***];

ii. [***];

iii. [***]; and

iv. [***].

c. Additionally, the Government may donate product for use in the clinical study to be conducted pursuant to the Clinical Trial Agreement (as amended on October 28, 2021) between The National Institute of Allergy and Infectious Disease ("NIAID") and the South African Medical Research Counsel ("SAMRC") under Protocol CoVPN 3008 (the "CoVPN 3008 Study"), subject to the Government's having a binding written agreement(s) in place with the sponsor that satisfies the conditions set forth below in this clause (c):

i. [***],

ii. [***];

iii. [***].

iv. [***];

v. [***];

vi. [***];

vii. [***];

viii. [***];

ix. [***]; and

x. [***].

d. The Government's donations will be from supplies of vaccine delivered to and accepted by the Government. To the extent the Government commits to deliver doses that have not yet been physically delivered to the Government, such donation will not occur until such doses have been delivered to the Government. The Government will be responsible for delivery of the donated doses to, and coordination of delivery with, the receiving foreign nation, clinical study sponsor, or NGO, as applicable. The Government or the receiving foreign nation, clinical study sponsor, or NGO, as applicable, will (i) satisfy all customs shipping requirements for import and export of the product; and (ii) as the exporter, file any required FDA export notifications. To the extent not already provided to the Government, the Contractor will provide all information necessary to complete any requirements identified in this paragraph in advance of shipment.

e. When the conditions above are met for any donation, the Parties [***].

f. [***].

g. Shipment of any donated doses under this Article does not constitute a violation of the Defense Production Act.

H.21 CDC Healthcare Provider List

To ensure timely communication is provided to health care providers, the USG has provided Moderna the mailing list for the Centers for Disease Control and Prevention (CDC) healthcare providers administering Moderna's vaccine and boosters in order for Moderna to send information regarding boosters that were authorized by the FDA on October 20, 2021. Moderna agrees to the terms below of the handling of the CDC Healthcare Provider List.

1. Moderna shall use the CDC Healthcare Provider List only for the express purpose of the specific mailing regarding Moderna's FDA-authorized booster product/EUA expansion;

2. Moderna shall not share or provide this list to any outside parties other than those who are supporting this specific mailing; and

3. Moderna shall delete (and require any other parties to delete) the list once they have completed the mailing.

H.22 Realignment of Product to Pediatric Primary Series 6 months to <6 years

[***].

(End of Summary of Changes)

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE OF PAGES
J	1 of 2

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO.(If applicable)
P00026	04-Oct-2022	SEE SCHEDULE	

6. ISSUED BY CODE	7. ADMINISTERED BY (If other than item 6) CODE
W58P05	S2206A
ACC-APG - COVID RESPONSE - W58P05 6472 INTEGRITY COURT (BUILDING 4401) ABERDEEN PROVING GROUND MD 21005-3013	DCMA BOSTON 495 SUMMER STREET BOSTON MA 02210-2138

8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)		
MODERNA US, INC. 200 TECHNOLOGY SQ CAMBRIDGE MA 02139-3578		9A. AMENDMENT OF SOLICITATION NO.
		9B. DATED (SEE ITEM 11)
	X	10A. MOD. OF CONTRACT /ORDER NO. W911QY20C0100
CODE 8PTM0 FACILITY CODE	X	10B. DATED (SEE ITEM 13) 09-Aug-2020

11. T HIS ITEM ONLY APPLIES TO AMENDMENT S OF SOLICIT ATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer ☐ is extended, ☐ is not extended.

Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one ofthe following methods:
(a) By completing Items 8 and 15, and returning copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN
REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegramor letter, provided each telegramor letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNT ING AND APPROPRIATION DATA (If required)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACT S/ORDERS. IT MODIFIES THE CONTRACT /ORDER NO. AS DESCRIBED IN ITEM 14.

	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. T HE ABOVE NUMBERED CONTRACT /ORDER IS MODIFIED TO REFLECT THE ADMINIST RATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORT H IN ITEM 14, PURSUANT TO THE AUT HORIT Y OF FAR 43.103(B).
X	C. T HIS SUPPLEMENT AL AGREEMENT IS ENTERED INTO PURSUANT TO AUT HORIT Y OF: FAR 43.103(a)(3), Mutual Agreement of the Parties
	D. OTHER (Specify type of modification and authority)

E. IMPORT ANT : Contractor ☐ is not, ☒ is required to sign this document and return 2 copies to the issuing office.

14. DESCRIPT ION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)
Modification Control Number: [***]
See Section H, Special Contract Requirements

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)	16A. NAME AND TITLE OF CONT RACTING OFFICER (Type or print)
[***]	[***] TEL: [***] EMAIL: [***]

15B. CONT RACT OR/OFFEROR	15C. DATE SIGNED	16B. UNIT ED STATES OF AMERICA	16C. DATE SIGNED
[***] (Signature of person authorized to sign)	10/4/2022	[***] BY [***] Date: [***] (Signature of Contracting Officer)	04-Oct-2022

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

SUMMARY OF CHANGES

SECTION H - SPECIAL CONTRACT REQUIREMENTS

The following have been added by full text:

[***]

The Parties acknowledge that [***]. In view of the foregoing, the Contractor and Government agree to [***].
The Parties understand that, [***].

(End of Summary of Changes)

Exhibit 31.1

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

CERTIFICATIONS

I, Stéphane Bancel, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Moderna, 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)) 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 3, 2022

By: /s/ Stéphane Bancel

Stéphane Bancel
Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

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

CERTIFICATIONS

I, James M. Mock, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Moderna, 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)) 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 3, 2022

By: /s/ James M. Mock

James M. Mock
Chief Financial Officer
(Principal Financial Officer)

Exhibit 32.1

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

In connection with the Quarterly Report on Form 10-Q of Moderna, Inc. (the "Company") for the period ended September 30, 2022 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), we, Stéphane Bancel, Chief Executive Officer of the Company, and James M. Mock, Chief Financial Officer of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to the best of our knowledge:

1. The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and
2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: November 3, 2022

By: /s/ Stéphane Bancel
Stéphane Bancel
Chief Executive Officer
(Principal Executive Officer)

Date: November 3, 2022

By: /s/ James M. Mock
James M. Mock
Chief Financial Officer
(Principal Financial Officer)