

## Notice of Exempt Solicitation

**NAME OF REGISTRANT:** Moderna

**NAME OF PERSON RELYING ON EXEMPTION:** Oxfam America

**ADDRESS OF PERSON RELYING ON EXEMPTION:** 226 Causeway Street, Boston, MA 02114

**Written materials are submitted pursuant to Rule 14(a)-6(g)(1) promulgated under the Securities and Exchange Act of 1934. Submission is not required of this filer under the terms of the Rule, but is made voluntarily in the interest of public disclosure and consideration of these important issues.**

Oxfam America and Domini Impact Investments urge you to vote FOR the Shareholder Proposal (item #4 on the proxy card) at the Annual Meeting of Moderna (MRNA) on April 28, 2022.

### **I. SUMMARY OF RESOLUTION**

RESOLVED, that shareholders of Moderna Inc. (“Moderna”) ask the Board of Directors to commission a third-party report to shareholders, at reasonable expense and omitting confidential and proprietary information, analysing the feasibility of promptly transferring intellectual property and technical knowledge (“know-how”) to facilitate the production of COVID-19 vaccine doses by additional qualified manufacturers located in low- and middle-income countries, as defined by the World Bank.

#### ***Supporting Statement***

Worldwide vaccination is a critical element of slowing transmission of the COVID-19 virus, preventing the emergence of new variants of concern, protecting the global economy, and saving lives. Moderna has been responsible for the production and distribution of an approved COVID-19 vaccine, yet has taken steps to restrict rather than promote broad access to its vaccine. This harms Moderna’s investors.

Moderna’s failure to ensure widespread access to its vaccine through technology transfer creates significant risk for shareholders for several reasons:

1. First, Moderna is “squandering its lead”: because Moderna refuses to license mRNA technology to the 120+ manufacturers in low- and middle-income countries<sup>1</sup> that could produce the vaccine, other manufacturers are racing to develop their own mRNA technology.<sup>2</sup> Rather than earn licensing profits and remain an industry leader in the years to come, Moderna’s short-sighted approach paves the way for competitors to emerge with approved vaccines in 2-3 years.<sup>3</sup> This comes at the expense of the company’s long-term prospects.
2. Second, Moderna’s refusal to share its technology will likely prolong the pandemic and exacerbate its economic damage, dragging down returns across diversified investors’ entire portfolios.
3. Third, there is significant reputational risk from refusing to share technology despite the life and death consequences for millions of people.
4. Fourth, Moderna could damage its long-term relationship with the U.S. government, which funded development of Moderna’s COVID-19 vaccine in its entirety, with significant negative impacts on its future business activities and earnings.
5. Fifth, the efforts Moderna references in its Statement in Opposition to the proposal, such as selling doses to governments that in turn donate those doses, do not address the underlying need to increase manufacturing capacity at scale through the transfer of “know how” to allow other manufacturers to produce the vaccine in a decentralized way.

<sup>1</sup> <https://www.hrw.org/news/2021/12/15/experts-identify-100-plus-firms-make-covid-19-mrna-vaccines>

<sup>2</sup> <https://www.reuters.com/world/africa/world-first-safricas-afrigen-makes-mrna-covid-vaccine-using-moderna-data-2022-02-03/>

<sup>3</sup> <https://www.reuters.com/world/africa/approval-covid-vaccine-made-south-africa-could-take-3-years-who-says-2022-02-04/>

## **II. ARGUMENTS IN FAVOR OF A FOR VOTE**

As the COVID-19 vaccine is the sole product that Moderna has commercialized for sale, the company's ability to meet the global demand for its product, particularly in the midst of a global public health crisis, will be fundamental to its long-term success and reputation. As a relative newcomer to the industry, it is already facing steep competition around financial, technical, and human resources, as well as in manufacturing and commercialization. Moderna's ability to access global markets and meet demand may be at risk if it declines to study the feasibility of transferring the tech know-how required to manufacture its COVID-19 vaccine.

### **1. Moderna is missing key opportunities to license technology which would earn short-term profit, and creating a crop of competitors to emerge in 2-3 years**

Moderna's refusal to transfer or license mRNA technology to the 120+ manufacturers in low- and middle-income countries<sup>4</sup> that could produce the vaccine means the company is leaving profits on the table. Even more concerning for the company's long-term investors, however, is that this refusal to license IP and resulting neglect of lower-income markets are incentivizing other manufacturers to develop their own mRNA COVID-19 vaccines.<sup>5</sup> Rather than earning licensing profits, serving more markets, and remaining industry leaders, Moderna's myopic drive toward maximizing short-term profits creates a substantial likelihood that competitors will emerge with approved vaccines in 2-3 years.<sup>6</sup> Indeed, the World Health Organization (WHO) and South African biopharmaceutical Afrigen have already teamed up to develop a vaccine based on Moderna's mRNA vaccine,<sup>7</sup> meaning Moderna could miss the opportunity to earn profit from licensing this technology in the short-term and generate a competitor in the mRNA vaccine market for years to come. Given that its mRNA vaccine is Moderna's sole profit-generating product, encouraging a crop of competitors poses a significant risk for investors. Long-term investors should encourage the company to operate in ways that safeguard its position as industry leader for years to come.

### **2. Moderna's failure to transfer intellectual property and know-how causes investors with diversified holdings significant financial harm by undermining the global economy.**

As of February 2022 an enormous disparity between vaccination rates persists, with 72% of the population in high-income states fully vaccinated, versus 5.5% in low-income states.<sup>8</sup> Economists have issued stark warnings of the cost of vaccine inequity. In January 2021, the International Chamber of Commerce warned that failure to ensure developing economies have access to vaccines would cost the global economy as much as US \$9.2 trillion, and that half of these losses would fall on advanced economies.<sup>9</sup> The economic costs borne by wealthy countries in the absence of vaccine access could range between US\$ 203 billion and US\$ 5 trillion.<sup>10</sup> In October 2021, the Economist Intelligence Unit stated that vaccine inequity would cost the global economy US\$ 2.3 trillion between 2022 and 2025.<sup>11</sup> These staggering estimates stem from the reality that leaving much of the world unvaccinated creates supply chain disruptions while undermining commerce, tourism, and international trade.

---

<sup>4</sup> <https://www.hrw.org/news/2021/12/15/experts-identify-100-plus-firms-make-covid-19-mrna-vaccines>

<sup>5</sup> <https://www.reuters.com/world/africa/world-first-safricas-afrigen-makes-mrna-covid-vaccine-using-moderna-data-2022-02-03/>

<sup>6</sup> <https://www.reuters.com/world/africa/approval-covid-vaccine-made-south-africa-could-take-3-years-who-says-2022-02-04/>

<sup>7</sup> <https://fortune.com/2022/02/04/south-africa-afrigen-moderna-covid-vaccine-mrna-who-hotez-corbevax/>

<sup>8</sup> <https://www.cnbc.com/2022/02/02/these-countries-have-the-lowest-covid-vaccination-rates-in-the-world.html>

<sup>9</sup> <https://iccwbo.org/media-wall/news-speeches/study-shows-vaccine-nationalism-could-cost-rich-countries-us4-5-trillion/>

<sup>10</sup> Id.

<sup>11</sup> [https://www.eiu.com/n/campaigns/how-much-will-vaccine-inequity-cost/#mktoForm\\_anchor](https://www.eiu.com/n/campaigns/how-much-will-vaccine-inequity-cost/#mktoForm_anchor)

---

Such inequity also leads to the emergence of dangerous new variants.<sup>12</sup> The spread of omicron has been linked to countries that have been denied equitable access to COVID-19 vaccines – including on the African continent. As of January 2022, fewer than one out of every ten people of the continent’s population had been fully vaccinated.<sup>13</sup> The emergence of new variants – a fate made far more likely should Moderna continue to withhold its mRNA technology – represents a serious risk to investors: numerous economic forecasts confirm that omicron is projected to have significant economic consequences in the first quarter of 2022. Moody’s has revised its forecast for GDP growth downward from a roughly 5% annualised rate to near 2%, and Jeffries has slashed its forecast to 1.5% from a previously forecast 6.6%.<sup>14</sup> Investors hoping for broad economic recovery should urge Moderna to do everything in its power to speed the end of the pandemic, which entails transferring vaccine technology and know-how.

For investors who have holdings across sectors, the pandemic’s continued drag on the global economy means that lack of widespread vaccination will damage their broader portfolio of investments. As economists explain, COVID-19 has created “unprecedented level of risk, causing investors to suffer significant losses in a very short period of time.”<sup>15</sup> For investors with diverse portfolios, such portfolio-wide losses are unlikely to be offset by the profits that a single company like Moderna may be capturing because of vaccine sales to high-income countries.

### **3. Moderna is facing significant reputational and business risks for failing to meet production targets and ensure equitable access to its COVID-19 vaccine.**

Moderna’s refusal to transfer mRNA technology is causing significant damage to the company’s reputation. High-profile media outlets including the New York Times have published disparaging headlines such as “Moderna, Racing for Profits, Keeps Vaccine Out of Reach of Poor,”<sup>16</sup> a Bloomberg headline references the company’s “greed” and refers to the company as “Murderna,”<sup>17</sup> and the Washington Post characterizes Moderna as a “pharmaceutical bully: grasping, tone deaf, financially insatiable and conveniently forgetful about some of the reasons behind its success.”<sup>18</sup> Forbes,<sup>19</sup> Politico,<sup>20</sup> and myriad other publications have also portrayed the company’s drive for short-term profit, regardless of the human toll, in a highly critical light. This includes critiques that the company is contributing to “vaccine apartheid,” in which wealthy states receive a staggeringly disproportionate number of vaccines compared to their poorer counterparts,<sup>21</sup> and that its greed in refusing to share technology will prolong the pandemic – an argument put forward by economics Nobel laureate Joseph Stiglitz.<sup>22</sup>

---

<sup>12</sup> <https://www.rockefellerfoundation.org/case-study/vaccine-inequity-increases-the-risk-of-new-sars-cov-2-variants-emerging/>

<sup>13</sup> Our World in Data, <https://ourworldindata.org/covid-vaccinations> (accessed 4th January 2021).

<sup>14</sup> <https://www.barrons.com/articles/omicron-covid-first-quarter-gdp-economy-51640739855?tesla=y>

<sup>15</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7160643/>

<sup>16</sup> Rebecca Robbins, “Moderna, Racing for Profits, Keeps Vaccine Out of Reach of Poor, NY Times (Oct. 9, 2021) <https://www.nytimes.com/2021/10/09/business/moderna-covid-vaccine.html>.

<sup>17</sup> Bloomberg, “AHF: Global Vax Advocates to Target Moderna Greed – ‘Murderna’ – with Daily Protests,” (Nov. 5, 2021), <https://www.bloomberg.com/press-releases/2021-11-05/ahf-global-vax-advocates-to-target-moderna-greed-murderna-with-daily-protests>.

<sup>18</sup> Timothy L. O’Brien, “Moderna to Uncle Sam: My Vaccine, Not Yours,” The Washington Post (Nov. 12, 2021), [https://www.washingtonpost.com/enterprise/moderna-to-uncle-sam-my-vaccine-not-yours/2021/11/12/8fedfca0-43b8-11ec-9404-50a28a88b9cd\\_story.html?utm\\_source=rss&utm\\_medium=referral&utm\\_campaign=wp\\_business](https://www.washingtonpost.com/enterprise/moderna-to-uncle-sam-my-vaccine-not-yours/2021/11/12/8fedfca0-43b8-11ec-9404-50a28a88b9cd_story.html?utm_source=rss&utm_medium=referral&utm_campaign=wp_business).

<sup>19</sup> Robert Hart, “Legal Battle Looms Over Who Should Take Credit for Moderna Vaccine,” Forbes (Nov. 11, 2021), <https://www.forbes.com/sites/roberthart/2021/11/11/government-legal-battle-looms-over-who-should-take-credit-for-moderna-vaccine/?sh=1daae6f424c4>.

<sup>20</sup> Mark R. Wilson, “Vaccine Manufacturers Are Profiteering. History Shows How to Stop Them,” Politico, (Nov. 4, 2021), <https://www.politico.com/news/magazine/2021/11/04/vaccine-manufacturers-are-profiteering-history-shows-how-to-stop-them-519504>

<sup>21</sup> See, e.g., Vidya Krishnan, “How to End Vaccine Apartheid,” Foreign Policy (Nov. 9, 2021), <https://foreignpolicy.com/2021/11/09/vaccine-apartheid-covid-pandemic-covax-us-trips-waiver/>; Nick Dearden, “Vaccine Apartheid: The Global South Fights Back,” Al Jazeera (Sept. 30, 2021); <https://www.aljazeera.com/opinions/2021/9/30/vaccine-apartheid-the-global-south-fights-back>; Anis Chowdry and Jomo Kwame Sundaram, End Vaccine Apartheid Before Millions More Die, Inter Press Service News Agency, (March 23, 2021), <http://www.ipsnews.net/2021/03/end-vaccine-apartheid-millions-die/>

<sup>22</sup> Joseph Stiglitz and Lori Wallach, “Will Corporate Greed Prolong the COVID-19 Pandemic?” Market Watch, (May 6, 2021), <https://www.marketwatch.com/story/will-corporate-greed-prolong-the-covid-19-pandemic-11620327014>.



This reputational damage is only compounded by Moderna's decision to sell its doses almost exclusively to high-income countries in 2021.<sup>23</sup> Only 25% of the company's overall supply found its way to low- and middle-income countries, and the majority of these – 68% - were not sold directly to those states, but rather were donated by high-income countries after they had supplied their own citizens first.<sup>24</sup> The few middle-income countries that obtained Moderna doses were often required to pay prices significantly higher than those paid even by high-income countries.<sup>25</sup> Furthermore, the company failed to meet its production targets for 2021 – Moderna had originally stated it would manufacture between 800 million and one billion doses in 2021, yet only managed to manufacture 608 million doses,<sup>26</sup> a shortfall of 24-39%. This shortfall has resulted in an estimated profit loss of between \$3 and \$5 billion for Moderna,<sup>27</sup> to the detriment of investors. The fact that the company is failing to deliver on its own production targets in such a public fashion makes it more critical that Moderna enables other manufacturers to produce its COVID-19 vaccine.

#### **4. Moderna's refusal to share vaccine technology jeopardizes its long-term relationship with the US government in ways that create risk to investors.**

The U.S. government has both privately and publicly demanded that Moderna do more to ensure equitable access to its COVID-19 vaccine. Moderna has refused each entreaty from the U.S. government, despite the fact that U.S. government scientists co-created the vaccine with Moderna, provided \$2.5 billion in federal funding,<sup>28</sup> and purchased a half billion doses of the vaccine for \$8.1 billion.<sup>29</sup> Moderna has subsequently been criticized by the U.S. government for failing to do more to ensure equitable access to its vaccine, with news reports noting significant frustration within the Biden Administration with the company for undermining the government's public health objectives, especially given the federal government's significant financial outlays.<sup>30</sup> As one administration official noted to Politico, "[t]he U.S. government co-invented the vaccine. We've spent over \$8 billion."<sup>31</sup>

Furthermore, Moderna has also been locked in an IP dispute with the U.S. government.<sup>32</sup> High profile media covered the dispute and even the likelihood that this could boil over into litigation, with the New York Times reporting that the "N.I.H. had been in talks with Moderna for more than a year to try to resolve the dispute."<sup>33</sup> Forbes observed that the two had been embroiled in a "year-long spat over who invented key parts of Moderna's COVID-19 vaccine," and that "NIH director Dr. Francis Collins [confirmed] U.S. funded scientists played a role in developing Moderna's Covid-19 vaccine and deserve to be recognized for their work, [and] that the agency is prepared to defend its claim if needed."<sup>34</sup> Such press coverage is clearly problematic from a public relations standpoint: Moderna's stock price dropped on the day the New York Times and Forbes published stories about the dispute, and fell to a five-month low two days after those publications.<sup>35</sup>

---

<sup>23</sup> <https://www.nytimes.com/2021/10/09/business/moderna-covid-vaccine.html>

<sup>24</sup> These percentages are calculated using figures from Moderna's 2022 proxy statement, available here: <https://d18rn0p25nwr6d.cloudfront.net/CIK-0001682852/921c1e9a-816c-4794-bec2-367a06e9ee4e.pdf>

<sup>25</sup> <https://www.nytimes.com/2021/10/09/business/moderna-covid-vaccine.html>

<sup>26</sup> Airfinity data as of December 2021.

<sup>27</sup> <https://www.biopharmadive.com/news/moderna-covid-vaccine-sales-manufacturing-delay/609489/>

<sup>28</sup> <https://www.nytimes.com/2021/09/22/us/politics/covid-vaccine-moderna-global.html>

<sup>29</sup> <https://www.nytimes.com/2021/11/09/us/moderna-vaccine-patent.html>

<sup>30</sup> <https://www.politico.com/news/2021/10/07/biden-admins-moderna-international-donations-515537>

<sup>31</sup> <https://www.politico.com/news/2021/10/07/biden-admins-moderna-international-donations-515537>

<sup>32</sup> <https://www.nytimes.com/2021/11/09/us/moderna-vaccine-patent.html>

<sup>33</sup> Sheryl Gay Stolberg and Rebecca Robbins, Moderna and U.S. Government at Odds Over Vaccine Patent Rights, NY Times, (Nov. 11, 2021) <https://www.nytimes.com/2021/11/09/us/moderna-vaccine-patent.html> (emphasis added).

<sup>34</sup> Robert Hart, Government Battle Looms Over Who Should Take Credit for Moderna Vaccine, Forbes, (Nov. 11, 2021) <https://www.forbes.com/sites/roberthart/2021/11/11/government-legal-battle-looms-over-who-should-take-credit-for-moderna-vaccine/?sh=1897714824c4>.

<sup>35</sup> On November 13, 2021, Moderna's stock price sunk to its lowest level since June 2021 - \$225.82. (Note the stock had already started to dip as a result of disappointing Q3 report that showed Moderna had underdelivered on its promised vaccines by a significant volume). The history of Moderna's stock price may be found here: CNBC, Moderna, Inc., <https://www.cnbc.com/quotes/MRNA> (last accessed Dec. 11, 2021).



These actions by Moderna, and the reputational damage they have caused the company, could undermine its future relationship with the U.S. government with respect to access to new technologies developed by the federal government (or with federal funding), partnerships with the U.S. government to develop new technologies, as well as its commercial relationship with the U.S. government in a highly competitive market. Alienating an invaluable partner – particularly when a company has a single profitable product – presents a serious risk to investors. By contrast, taking steps to collaborate fairly with the U.S. government on IP sharing minimizes the risk of reputational damage, litigation from the U.S. government, and lost opportunities for future profitable partnerships.

#### **5. Donation-based model fails to ensure equitable access to vaccines.**

Finally, Moderna's response in its Statement of Opposition are inaccurate. First, it is simply not true that technology transfer is unduly difficult, or would take too long. One significant advantage of mRNA vaccines is that production is much simpler and faster, compared to traditional vaccine manufacturing.<sup>36</sup> Numerous experts confirm that it could take just a few months to transfer mRNA technology successfully:

- Moderna's former director of chemistry, Suhaib Siddiqi, has said that with enough sharing of technology and know-how, many modern factories should be able to start manufacturing mRNA vaccines within three or four months;<sup>37</sup>
- An analysis by Medecins Sans Frontieres (MSF) highlights 7 mRNA production deals with timeframes of 3 to 8 months from deal announcement to delivery of first batches of active ingredients;<sup>38</sup> and
- This NYT article cites experts confirming that mRNA production could begin within months (ranges from 6 to 18).<sup>39</sup>

When this rapid timeframe is held up against the 100+ manufacturers in low- and middle-income states that are equipped to produce the mRNA vaccine (already, manufacturers in India, Thailand and China have mRNA vaccine candidates in late-stage clinical trials<sup>40</sup>), it becomes even more clear that Moderna's refusal to transfer technology, not the overly complex or prolonged nature of such transfer, is what is stalling broad access.

Second, Moderna falsely claims that its limited personnel means they could not instruct all manufacturers worldwide how to produce the vaccine. Yet initiatives like the WHO's mRNA technology transfer hub were created to ease this burden by allowing Moderna to transfer the technology once for the benefit of many companies, while ensuring that recipient manufacturers meet global quality standards.

---

<sup>36</sup> <https://www.citizen.org/article/how-to-make-enough-vaccine-for-the-world-in-one-year/> (see section just below figure 1).

<sup>37</sup> <https://apnews.com/article/drug-companies-called-share-vaccine-info-22d92afbc3ea9ed519be007f8887bcf6>

<sup>38</sup> [https://msfaccess.org/sites/default/files/2021-09/COVID19\\_TechnicalBrief\\_MSF\\_mRNA\\_vaccines\\_ENG\\_20.9.2021\\_0.pdf](https://msfaccess.org/sites/default/files/2021-09/COVID19_TechnicalBrief_MSF_mRNA_vaccines_ENG_20.9.2021_0.pdf)

<sup>39</sup> <https://www.nytimes.com/interactive/2021/10/22/science/developing-country-covid-vaccines.html>

<sup>40</sup> <https://covid19.trackvaccines.org/vaccines/#phase-3>; <https://covid19.trackvaccines.org/vaccines/#phase-2>

---

Proponents would also like to debunk the notion that a donation-based model could suffice to end the pandemic. Not only do Moderna's production targets fail to meet global demand, but the company has fallen short of these targets<sup>41</sup> – meaning it cannot end the pandemic on its own, regardless of the number of doses it sells to COVAX. Selling vaccines to high-income countries which in turn donate these through COVAX to lower-income countries does not suffice. This model has repeatedly left recipient countries unable to receive and distribute adequate supplies of vaccines in time due in part to delayed shipments, short shelf lives and unpredictable arrival times. For example, according to MSF staff in the Central African Republic, “the Ministry of Health is consistently given only a few days’ warning of when shipments will arrive [from COVAX], leaving them struggling to secure appropriate supplies [that would be used to store and transfer the vaccines].”<sup>42</sup> This ad hoc approach to donations too often fails governments and people living in low- and middle-income countries, and then blames them for challenges resulting from poorly executed deliveries. Accordingly, proponents are not asking Moderna to continue relying on a donation-based approach, which leaves the majority of the world without reliable access.

Not only does Moderna's manufacturing capacity pale in comparison to what is needed to end the pandemic, but constructing a single additional manufacturing facility in Kenya that is owned and operated by Moderna, as Moderna recently announced it would do, will not deliver equitable access and will not be operational in time to supply urgently needed COVID-19 vaccines. Such a plant will take years to construct, and in the company's own words, this facility is intended to supply mRNA vaccines for “future pandemics”. Given the enormous scale of the public health crisis, it is critical that other manufacturers worldwide produce the mRNA vaccine independently so that low- and middle-income countries.<sup>43</sup>

There is substantial evidence that technology transfer can be done quickly, safely, and with ready and able manufacturers meeting international quality standards, including in low- and middle-income countries.<sup>44</sup> Already, manufacturers in India, Thailand and China have mRNA vaccine candidates in late-stage clinical trials.<sup>45</sup> Moderna's announcements of supply agreements with COVAX, its promise not to enforce IP rights throughout the pandemic, and its establishment of an mRNA vaccine facility on the African continent are insufficient.<sup>46</sup> there will be no manufacturer that has the capacity to produce the vaccine within two years without the company's support, meaning claims that they will not enforce IP rights are irrelevant, and a single additional facility represents a mere fraction of the world's required doses. The rapid diffusion of mRNA technology is the only way to protect Moderna investors from the long-term economic damage of reputational risk, regulatory risk, and lower returns across investors' entire portfolios.

### **III. CONCLUSION**

Moderna has failed to ensure that its vaccine is widely accessible around the world. This harms investors by giving competitors an incentive to emerge, damaging the global economy and thereby creating a drag on diverse portfolios, creating reputational risk, and jeopardizing the potential for Moderna to collaborate with the U.S. government in the future. Investors need a report on the feasibility of promptly transferring IP and know-how to facilitate the production of COVID-19 vaccine in order to adequately assess the alternatives Moderna proposes against this common-sense and prudent alternative.

Proponents urge investors to vote ‘For’ the Moderna Shareholder Proposal, which is item #4 on Moderna's proxy card.

---

<sup>41</sup> Airfinity data as of December 2021 shows that Moderna has produced only 608 million of the 800 million-one billion estimated doses.

<sup>42</sup> [https://msfaccess.org/sites/default/files/2021-12/COVID19\\_IssueBrief\\_Covax\\_1708\\_ENG\\_21.12.2021.pdf](https://msfaccess.org/sites/default/files/2021-12/COVID19_IssueBrief_Covax_1708_ENG_21.12.2021.pdf)

<sup>43</sup> Furthermore, Moderna's most recent statements amount to a backtracking for upper-middle-income countries that are now excluded from this “updated” commitment.

<sup>44</sup> <https://accessibsa.org/mrna/>; <https://www.nytimes.com/interactive/2021/10/22/science/developing-country-covid-vaccines.html>; <https://www.hrw.org/news/2021/12/15/experts-identify-100-plus-firms-make-covid-19-mrna-vaccines#>

<sup>45</sup> <https://covid19.trackvaccines.org/vaccines/#phase-3>; <https://covid19.trackvaccines.org/vaccines/#phase-2>

<sup>46</sup> <https://www.nytimes.com/2021/10/09/business/moderna-covid-vaccine.html>

---