

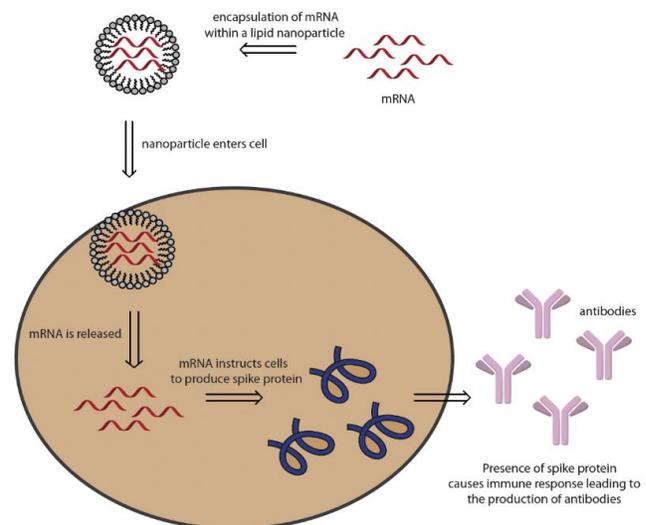
mRNA-1273 Vaccine Patent Landscape (For NIH-Moderna Vaccine)

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Safe and effective vaccines are key to combating the Covid-19 pandemic; however, patents and other intellectual property claims directed at vaccine technologies create legal barriers for equitable access and fair allocation. No corporation produces at scale to supply the world. Providing timely global access will depend in significant part on increasing supply, including by transferring technology to qualified manufacturers. Much of this technology is claimed as patented, proprietary, or confidential in nature.

The vaccine candidate co-developed by the U.S. National Institutes of Health (NIH) and Moderna, mRNA-1273 SARS-CoV-2, employs the use of lipid nanoparticle (NP) technology to deliver mRNA to cells. Once the lipid nanoparticle is injected into a patient, it travels into the cells and instructs them to produce the SARS-CoV-2 spike protein. The presence of this coronavirus protein is thought to trigger an immune response leading to the production of antibodies.¹ If the patient is infected with coronavirus, the antibodies will identify and bind to the virus, which triggers a series of events resulting in the elimination of the virus. mRNA-1273 is in Phase 3 clinical trials. The NIH and Moderna announced promising but preliminary trial results on November 16th.²



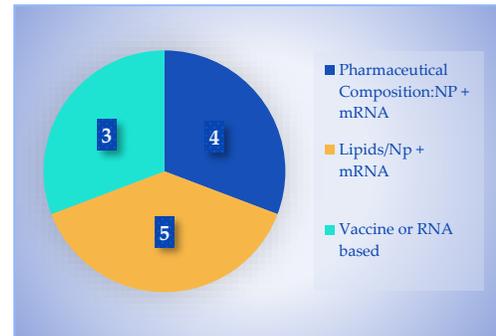
* Public Citizen's Access to Medicines Program

¹ <https://www.modernatx.com/mrna-technology/mrna-platform-enabling-drug-discovery-development>

² <https://investors.modernatx.com/news-releases/news-release-details/modernas-covid-19-vaccine-candidate-meets-its-primary-efficacy>

We identified several patents claimed by Moderna relating to the pertinent vaccine technologies.³ We placed them in four groups based on their description and their primary independent claim:

- Patents directed at an mRNA vaccine or RNA generally
- Patents directed at Lipids/NP + mRNA
- Patents specifically directed at pharmaceutical compositions involving lipid NP + mRNA.



Below is our non-exhaustive list. In a recent financial statement, Moderna suggested that it relies to a certain extent on trade secrets, know-how, and technology, which are not protected by patents, to maintain its competitive position.⁴ Moderna has announced that it will not enforce their patent rights against those making vaccines intended to combat the pandemic.

Patent/Published Application	Applicant/Assignee	Filing Date	Status	Invention Type
US 10,703,789	Moderna	June 12, 2019	Active	PC: Lipids/NP + mRNA
US 10,702,600	Moderna	February 28, 2020	Active	Betacoronavirus mRNA Vaccine
US 10,577,403	Moderna	June 12, 2019	Active	PC: Lipids/NP + mRNA
US 10,442,756	Moderna	December 18, 2017	Active	Lipids/NP + mRNA
US 10,266,485	Moderna	June 11, 2018	Active	Lipids/NP + mRNA
US 10,064,959	Moderna	April 21, 2017	Active	mRNA synthesis
US 9,868,692	Moderna	March 31, 2017	Active	Lipids/NP + mRNA
US2020/0206362	Moderna	October 11, 2019	Pending	PC: Lipids/NP + mRNA
US2020/0164038	Moderna	July 29, 2019	Pending	PC: Lipids/NP + mRNA
US2019/0015501	Moderna	September 27, 2018	Pending	Nucleic acid vaccine
WO2016/118724	Moderna	January 21, 2016	Published	Lipids/NP + mRNA
WO2016/118725	Moderna	January 21, 2016	Published	Lipids/NP + mRNA

³ Pharmaceutical companies are not the only claimants of key technology. The U.S. government claims a patent on a key technology which may be relevant for Moderna to stabilize the spike protein. See Public Citizen, Leading COVID-19 Vaccine Candidates Depend on NIH Technology (Nov. 10, 2020), <https://www.citizen.org/article/leading-covid-19-vaccines-depend-on-nih-technology/>.

⁴ If any trade secret, know-how, or other technology not protected by a patent were to be disclosed to or independently developed by a competitor, our business and financial condition could be materially adversely affected. Failure to obtain and maintain all available regulatory exclusivities and broad patent scope and to maximize patent term restoration or extension on patents covering our products may lead to loss of exclusivity and early biosimilar entry resulting in a loss of market share and/or revenue. Moderna, Quarterly Report, June 30, 2020 <https://www.sec.gov/Archives/edgar/data/1682852/000168285220000017/mrna-20200630.htm>