

# WHAT TO KNOW ABOUT mRNA and Vaccines



## What is mRNA?

Messenger RNA, or mRNA, is a genetic material that tells your body how to make proteins.<sup>1,2</sup> When mRNA is used in vaccines, it's like giving your body a recipe to help your immune system learn to recognize and fight a specific virus, without making any changes to your body's DNA. mRNA vaccines teach cells how to make copies of specific proteins, helping your body to recognize and fight the virus if exposed.<sup>3</sup>



## When was mRNA first discovered?

Scientists have been developing mRNA technology for decades.<sup>4</sup> mRNA was first discovered in the 1960s by scientists François Jacob and Jacques Monod.<sup>5</sup> Their work in understanding the role of mRNA in protein synthesis earned them a Nobel Prize in 1965.<sup>6</sup>

For over 20 years, mRNA technology has been researched, developed, tested, and used in vaccines for infectious diseases such as Ebola, Zika, and now, COVID-19.<sup>7</sup>



## How is mRNA being used to fight COVID-19?

### mRNA COVID-19 VACCINE DEVELOPMENT TIMELINE<sup>7,8</sup>

1984	2009	2010–2019	JANUARY 2020	MARCH 2020	MAY 2020	DECEMBER 2020
mRNA is first made in a lab.	The first mRNA vaccines are tested in humans.	Several mRNA vaccine clinical trials are conducted.	The SARS-CoV-2 (COVID-19) virus is genetically sequenced and COVID-19 vaccine development begins.	Moderna conducts clinical trials with the National Institutes of Health (NIH) for their mRNA vaccine.	Pfizer-BioNTech conducts clinical trials for their mRNA vaccine.	The FDA grants Emergency Use Authorization (EUA) to several mRNA vaccines for COVID-19 to aid in the fight against the pandemic.

### SINCE DECEMBER 2020

mRNA vaccines for COVID-19 have been recommended for use by the Centers for Disease Control and Prevention (CDC) and over 600 million doses have been administered across the U.S.<sup>9,10</sup> mRNA vaccines have undergone the most intensive safety monitoring in U.S. history and as updated vaccines are approved, mRNA vaccines remain a safe, trusted choice for protection against the virus.<sup>11,12</sup>



## What advantages does mRNA technology provide?

mRNA technology has revolutionized the vaccine development and production process due to its flexibility in responding to new variants of viruses and its ability to induce strong immune responses in the body.<sup>13</sup> In addition, mRNA technology brings great potential to medicine where scientists and researchers continue to develop and test its capabilities to treat new diseases.<sup>14,15</sup>

mRNA vaccines can be made quickly and in large batches, so they are well-suited in crisis or to address a pathogen that rapidly changes.<sup>16</sup> Given this attribute, they are being researched for future flu vaccines.

<sup>1</sup> [https://cdc.gov/coronavirus/2019-ncov/downloads/vaccines/COVID-19-mRNA-infographic\\_G\\_508.pdf](https://cdc.gov/coronavirus/2019-ncov/downloads/vaccines/COVID-19-mRNA-infographic_G_508.pdf)

<sup>2</sup> <https://cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines/how-they-work.html>

<sup>3</sup> <https://genome.gov/about-genomics/fact-sheets/Understanding-COVID-19-mRNA-Vaccines>

<sup>4</sup> <https://publichealth.jhu.edu/2021/the-long-history-of-mrna-vaccines>

<sup>5</sup> <https://sciencedirect.com/science/article/pii/S0960982215006065>

<sup>6</sup> <https://nobelprize.org/prizes/medicine/1965/monod/facts/>

<sup>7</sup> <https://covid19.nih.gov/nih-strategic-response-covid-19/decades-making-mrna-covid-19-vaccines>

<sup>8</sup> <https://publicgoodnews.com/2023/06/21/dispelling-myths-about-mrna-vaccines/>

<sup>9</sup> <https://aafp.org/news/health-of-the-public/20201214covidvacc.html>

<sup>10</sup> <https://statista.com/statistics/1198516/covid-19-vaccinations-administered-us-by-company/>

<sup>11</sup> <https://ec.europa.eu/research-and-innovation/en/horizon-magazine/five-things-you-need-know-about-mrna-vaccine-safety>

<sup>12</sup> <https://cdc.gov/coronavirus/2019-ncov/vaccines/reporting-systems.html>

<sup>13</sup> <https://ncbi.nlm.nih.gov/pmc/articles/PMC9123296/>

<sup>14</sup> <https://technologyreview.com/2023/01/05/1066274/whats-next-mrna-vaccines/>

<sup>15</sup> <https://pennmedicine.org/mrna>

<sup>16</sup> [https://www.pfizer.com/news/articles/what\\_does\\_mrna\\_mean\\_for\\_the\\_flu\\_vaccine](https://www.pfizer.com/news/articles/what_does_mrna_mean_for_the_flu_vaccine)