



## COVID-19

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## Understanding mRNA COVID-19 Vaccines

Updated Dec. 18, 2020

Messenger RNA vaccines—also called mRNA vaccines—are some of the first COVID-19 vaccines authorized for use in the United States.

### New Approach to Vaccines

mRNA vaccines are a new type of vaccine to protect against infectious diseases. To trigger an immune response, many vaccines put a weakened or inactivated germ into our bodies. Not mRNA vaccines. Instead, they teach our cells how to make a protein—or even just a piece of a protein—that triggers an immune response inside our bodies. That immune response, which produces antibodies, is what protects us from getting infected if the real virus enters our bodies.

### A Closer Look at How COVID-19 mRNA Vaccines Work

COVID-19 mRNA vaccines give instructions for our cells to make a **harmless piece** of what is called the “spike protein.” The spike protein is found on the surface of the virus that causes COVID-19.

COVID-19 mRNA vaccines are given in the upper arm muscle. Once the instructions (mRNA) are inside the immune cells, the cells use them to make the protein piece. After the protein piece is made, the cell breaks down the instructions and gets rid of them.

Next, the cell displays the protein piece on its surface. Our immune systems recognize that the protein doesn’t belong there and begin building an immune response and making antibodies, like what happens in natural infection against COVID-19.

At the end of the process, our bodies have learned how to protect against future infection. The benefit of mRNA vaccines, like all vaccines, is those vaccinated gain this protection without ever having to risk the serious consequences of getting sick with COVID-19.

### Facts about COVID-19 mRNA Vaccines

**They cannot give someone COVID-19.**

- mRNA vaccines do not use the live virus that causes COVID-19.

**They do not affect or interact with our DNA in any way.**

- mRNA never enters the nucleus of the cell, which is where our DNA (genetic material) is kept.
- The cell breaks down and gets rid of the mRNA soon after it is finished using the instructions.

## COVID-19 mRNA Vaccines Will Be Rigorously Evaluated for Safety

mRNA vaccines have been held to the same [rigorous safety and effectiveness standards \[332 KB, 24 pages\]](#) as all other types of vaccines in the United States. The only COVID-19 vaccines the Food and Drug Administration (FDA) will make available for use in the United States (by approval or emergency use authorization) are those that meet these standards.

## mRNA Vaccines Are New, But Not Unknown

Researchers have been studying and working with mRNA vaccines for decades. Interest has grown in these vaccines because they can be developed in a laboratory using readily available materials. This means the process can be standardized and scaled up, making vaccine development faster than traditional methods of making vaccines.

mRNA vaccines have been studied before for flu, Zika, rabies, and cytomegalovirus (CMV). As soon as the necessary information about the virus that causes COVID-19 was available, scientists began designing the mRNA instructions for cells to build the unique spike protein into an mRNA vaccine.

Future mRNA vaccine technology may allow for one vaccine to provide protection for multiple diseases, thus decreasing the number of shots needed for protection against common vaccine-preventable diseases.

Beyond vaccines, cancer research has used mRNA to trigger the immune system to target specific cancer cells.

### Related Links

[FDA's Vaccine Development 101](#)

[FDA's Emergency Use Authorization for Vaccines Explained](#)

[FDA Infographic: The Path for a COVID-19 Vaccine from Research to Emergency Use Authorization \[724 KB, 1 page\]](#)

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