

# HOW COVID-19 VACCINES WORK



## What Vaccines Do

Vaccines are medicines that help protect you from germs that can make you sick.

Vaccines teach your immune system—your body's defenses against infection—how to recognize and attack harmful germs.



## Kinds of COVID-19 Vaccines

Vaccines come in many forms. The U.S. Food and Drug Administration has OK'd two kinds of vaccines to protect you from the virus that causes COVID-19:

- mRNA vaccines
- Viral vector vaccines



## The COVID-19 Vaccines Are Safe

Over half of adults in the United States have now been fully vaccinated against COVID-19. Results from medical studies and ongoing safety monitoring are good. The vaccines work really well, and no long-term bad side effects have been seen.

## How the COVID-19 Vaccines Work

Both kinds of COVID-19 vaccines basically do the same thing:

- They give your cells the genetic instructions to make a harmless piece of the virus called a spike protein. (Your cells are like 3D printers for proteins.)
- The spike protein looks like an invading germ and triggers your immune system.
- Your immune system learns how to identify and attack the virus. But you're never exposed to the real virus, so you don't get sick.

The main differences between the two kinds of COVID-19 vaccines are:

- The technology scientists used to make the genetic instructions.
- The way of getting the genetic instructions to your cells.



## mRNA Vaccines Under the Microscope

mRNA (which stands for messenger ribonucleic acid) is a tiny molecule that cells make all the time. These molecules have instructions that cells use to do different things.

For the COVID-19 mRNA vaccines, scientists made an mRNA molecule with the spike protein instructions. mRNA is fragile and can't pass through a cell's wall on its own. To get around this problem, the mRNA molecules are coated in fat. The fat protects the mRNA and easily connects with a cell's wall so the mRNA can get inside. Your cells break down and get rid of the mRNA once they get the spike protein instructions.

### WHAT'S A SPIKE PROTEIN?



All over the surface of the virus that causes COVID-19 are spikes made of protein. In fact, it's this crown of spike proteins that coronaviruses are named for.

*Corona* means crown in Latin. These spike proteins are like keys that unlock your cells and allow the virus to enter and infect them.



## Viral Vector Vaccines Under the Microscope

A viral vector vaccine (vector means vehicle) uses a host virus to deliver genetic instructions to your cells by infecting some of them.

For the COVID-19 viral vector vaccines, scientists changed the genetic code of a virus that causes the common cold. They made the virus harmless and added the spike protein instructions. The virus is harmless because it can't make copies of itself once it gets in your cells. So it can't continue to infect other cells and make you sick.

For more information, visit [CDC.GOV/CORONAVIRUS](https://www.cdc.gov/coronavirus).