

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 Vaccines

Vaccines come in many forms. The U.S. Food and Drug Administration has OK'd three kinds of COVID vaccines:

- mRNA
- Viral vector
- Protein subunit



The COVID Vaccines Are Safe and Effective

Most people in the U.S. have gotten a COVID vaccine. Results from ongoing medical studies and safety monitoring show that the vaccines are safe. For the best protection, you need to get all the recommended vaccine doses.

How the COVID Vaccines Work

The different kinds of COVID vaccines basically do the same thing:

- They either directly introduce your immune system to a harmless piece of the virus called a spike protein or give your cells the instructions to make the spike protein.
- 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 the vaccines don't contain the coronavirus, so you can't get COVID from them.



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



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 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 are spikes made of protein. In fact, it's this crown of spike proteins that coronaviruses are named for.

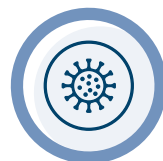
Corona means crown in Latin. These spike proteins are like keys that unlock your cells and allow the virus to enter and infect them.



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 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.



Protein Subunit Vaccines Under the Microscope

A protein subunit vaccine contains a harmless piece of the germ. For the COVID protein subunit vaccine, scientists used moth cells to create copies of the spike protein. The vaccine also has an ingredient called an adjuvant—made from soapbark trees—that increases the immune response to the spike proteins in the vaccine.