Explaining COVID-19 Vaccine Types

mRNA Vaccines

Manufacturer(s)

Moderna, Pfizer-BioNTech

Overview

mRNA vaccines are a new type of vaccine designed to protect against infectious diseases. Unlike traditional vaccines—which look to generate an immune response by placing a weakened or inactivated version or component of the germ into our bodies—mRNA vaccines instead teach our cells how to make a protein that triggers an immune response inside our bodies. That immune response produces antibodies to protect us from getting infected from the real coronavirus and, most importantly, prevents us from severe COVID-19 disease, hospitalizations and death if we get infected.

History

Until being authorized for COVID-19, there were no mRNA vaccines available in the United States. However, researchers have been studying and working with them 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 produced quickly, 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 coronavirus spike protein.

Testing and Evaluation

mRNA vaccines are being held to the same rigorous safety and effectiveness standards 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 U.S. are those that meet these rigorous standards. In clinical trials, about 30% of U.S. participants were Hispanic, Black, Asian, or Native American, and about half were older adults.

How It Works

COVID-19 mRNA vaccines give instructions for our cells to make a piece of what is called the "spike protein." The spike protein is found on the surface of the virus that causes COVID-19. Once our body receives the instructions (mRNA), each cell uses them to make the spike protein piece.

After the protein piece is made, the cell breaks down the mRNA instructions and gets rid of them. mRNA from the vaccine never enters the nucleus of the cell and does not interact with or change your DNA in any way. Your cell then displays the protein piece on its surface. Your immune system recognizes that the protein doesn't belong there and begins an immune response by making antibodies.

At the end of the process, these antibodies have taught our bodies how to protect against future infection from the COVID-19 virus

Number of Doses Needed

Moderna: Two doses administered 28 days apart.
Pfizer-BioNTech: Two doses administered 21 days apart.

Full protection occurs 2 weeks after receiving the second dose.

Side Effects

Though most people have no significant reactions, mRNA vaccines may cause side effects that can last 2 to 3 days, including:

- Fever
- Chills
- Muscle aches
- Headaches
- Redness/pain at the injection site
- Nausea

mRNA vaccines require 2 shots in order to get the most protection. You should get the second shot even if you had side effects after the first shot, unless your doctor tells you not to get it.

Efficacy

Moderna: 94.1% at preventing symptomatic COVID-19 infection.
Pfizer-BioNTech: 95% at preventing symptomatic COVID-19 infection.

Both mRNA vaccines are also extremely effective at preventing serious COVID-19 hospitalization and death if you do get COVID-19.

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Viral Vector Vaccines

Manufacturer(s)

Janssen

Overview

Viral vector vaccines differ from most traditional vaccines. They use a modified version of a different virus (or vector) to trigger the body's immune system to target the spike protein on the virus' surface. This immune response produces antibodies to prevent infection and—most importantly—prevent us from severe COVID-19 disease, hospitalizations and death if we get infected.

History

For decades, hundreds of scientific studies of viral vector vaccines have been conducted and published around the world.

Scientists have been creating viral vector vaccines since the 1970s. Besides being used in vaccines, viral vectors are also studied for gene therapy, to treat cancer.

Some vaccines recently used for Ebola outbreaks use viral vector technology, and a number of studies have focused on viral vector vaccines against other infectious diseases such as Zika, flu, and HIV.

Testing and Evaluation

Viral vector vaccines are being held to the same rigorous safety and effectiveness standards 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 U.S. are those that meet these rigorous standards. In clinical trials, nearly a third of all participants were Black, Asian, Native American or Pacific Islander, 45% were Hispanic, and about half were older adults.

How It Works

Viral vector vaccines use a modified version of a different virus (the vector) to deliver important instructions to our cells. For COVID-19 viral vector vaccines, the vector (not the virus that causes COVID-19, but a different, harmless virus) will enter a cell in our body and then use the cell's machinery to produce a harmless piece of the virus that causes COVID-19. This piece is known as a spike protein and it is only found on the surface of the virus that causes COVID-19.

When the cell displays the spike protein on its surface, our immune system recognizes it doesn't belong there. This triggers our immune system to begin producing antibodies and activating other immune cells to fight off what it thinks is an infection. Viral vectors cannot cause infection with COVID-19 or with the virus used as the vaccine vector. The genetic material delivered by the viral vector does not integrate into a person's DNA.

At the end of the process, these antibodies and immune cells have taught our bodies how to protect against future infection from the COVID-19 virus.

Number of Doses Needed

One dose. Full protection occurs 2 weeks after receiving a single dose of the vaccine.

Side Effects

Though most people have no significant reactions, the vaccine may cause side effects that can last for up to 2 days, including:

- Muscle aches
- Headaches
- Redness/pain at the injection site
- Fatigue
- Nausea
- Fever

Efficacy

72% effective at preventing moderate to severe disease from COVID-19.

85% effective at preventing severe disease.

100% effective at preventing COVID-19 related hospitalizations and and 75% effective in preventing death from any cause 28 days or more after vaccination. There were no COVID-19 related deaths among those who got the Janssen vaccine.