QUESTIONS & FACTS

ABOUT

COVID-19
VACCINES
VIRUSES
VARIANTS
IMMUNITY

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(A) Questions About COVID-19 Vaccination

(1) Can a COVID-19 vaccine make me sick with COVID-19?

No. None of the authorized and recommended COVID-19 vaccines, or COVID-19 vaccines currently in development, contain the live virus that causes COVID-19. This means that a COVID-19 vaccine **cannot make you sick with COVID-19**.

There are several different types of vaccines in development. All of them teach our immune systems how to recognize and destroy the virus so that it can not replicate itself in our bodies.

However, it is important to remember several things about developing immunity against COVID-19:

(a) Sometimes this process can cause symptoms, such as fever. These symptoms are normal and are a sign that the body is building protection against the virus.

(b) the process is not instantaneous. It typically takes a few weeks after vaccination for the body to build immunity against the virus. That means it's possible a person might have been infected with COVID-19 at the time of vaccination, or get infected shortly after, and still get sick. This is because the body has not had enough time to build up sufficient immunity to provide adequate protection.

(c) It is also important to remember that the efficacy of the immune system is not the same for all individuals, e.g. the build-up of immunity in a young healthy person may be quicker and the immunity more robust than in an older or immuno-compromized person.

(2) Will a COVID-19 vaccine protect me from getting sick with COVID-19?

Yes. COVID-19 vaccination works by teaching your immune system how to recognize and fight the virus and prevent it from replicating in your body, and this protects you from getting sick with COVID-19.

(3) After getting a COVID-19 vaccine, will I test positive for COVID-19 on a viral test?

No. Neither the recently authorized and recommended vaccines nor the other COVID-19 vaccines currently in clinical trials can cause you to test positive on viral tests. Viral tests are used to see if you have a current infection**.** If your body develops an immune response there is a possibility that you may test positive on some antibody tests. Antibody tests indicate you had a previous infection and that you may have some level of protection against the virus. Experts are currently looking at how COVID-19 vaccination may affect antibody testing results.

(4) If I have already had COVID-19 and recovered, do I still need to get a COVID-19 vaccine?

Yes. At this time, experts do not know how well and how long someone is protected from getting sick again after recovering from COVID-19. Also, the immunity someone gains from having an infection, called **natural immunity**, varies from person to person and some early evidence suggests natural immunity may not last very long. We won't know how robust **vaccine-induced immunity** will be and how long it lasts until we have more data on how well the vaccines work. Due to the severe health risks associated with COVID-19 and the fact that re-infection with COVID-19, or its variants is possible, best advice is: **get vaccinated regardless of whether you already had a COVID-19 infection.**

(5) How soon after vaccination will I be immune and how long will the immunity to COVID-19 last?

It varies. **I**t takes time to build up effective immunity and this will vary, depending on each person's immune system and the type of vaccine. It typically takes **a few weeks** for the body to build immunity to the virus that causes COVID-19. That means it's possible a person could be infected

with the COVID-19 virus just before or just after vaccination and still get sick. We won't know how long it will take to achieve **vaccine-induced immunity** and how long that immunity will last until we have more data on how well the vaccines work.

(6) Can someone vaccinated against COVID-19 still spread the virus?

Yes, a vaccinated individual could still be contagious, because
(a) The vaccine teaches your immune system to fight the virus that has infected your body, but it does NOT block the virus from entering your body
(b) the COVID-19 virus may be able to live in the nasal passage for weeks, meaning a vaccinated person could still infect others;
(c) As indicated in # 5 above, it takes time for immunity to develop and to eliminate the viral replication from a previous infection.
There is currently not much evidence that those in contact with an infected person who got the shot, are safe.
Until nearly everyone is vaccinated, it is best to assume that persons – even though they're vaccinated, don't have any symptoms and don't feel sick – may still get infected and infect others. And the **most effective barriers to viral transmission** will continue to be strict and widespread **adherence to the prescribed physical measures of proper masking, distancing, and isolating.** These measures **act as a wall or moat that prevents viruses from spreading.**
(For more details see Part (B) COVID-19 Viruses, Variants, Vaccines & Immunity)

(7) Will a COVID-19 vaccine alter my DNA?

No. COVID-19 mRNA vaccines do not change, or interact with, your DNA in any way.
Messenger RNA vaccines, also called mRNA vaccines, teach our cells how to make proteins that trigger immune responses designed to destroy the viruses. The mRNA from a COVID-19 vaccine never enters the nucleus of the cell, which is where our DNA is kept. This means the mRNA cannot affect or interact with our DNA in any way. Instead, COVID-19 mRNA vaccines work with the body's natural defences to safely develop immunity to disease. At the end of the process, our bodies have learned how to protect against future infection. That immune response and making antibodies is what protects us from getting infected if the real virus enters our bodies.

(8) Is it safe for me to get a COVID-19 vaccine if I would like to have a baby one day?

Yes. People who want to get pregnant in the future may get the COVID-19 vaccine. There is currently no evidence that antibodies formed from COVID-19 vaccination cause any problems with pregnancy and fertility .

(B) COVID-19 Viruses, Variants, Vaccines & Immunity

What is a virus?

Viruses are not like cells or bacteria. Viruses are not "alive". By themselves, they cannot carry on any metabolic activities, they cannot move or respond to stimuli, and most importantly, they are incapable of reproducing and multiplying on their own. They need a living cell. Apart from a living cell, a virus is like a very small inert particle, incapable of any functions. That's why scientists often refer to viruses as viral particles. The COVID-19 virus is a coronavirus, which has a central core of ribonucleic acid(RNA), enclosed in a protein coat with outer crown-like projections or spikes (hence, "corona"). The

RNA carries instructions for making more corona viruses (hence the name "messenger RNA, or mRNA), and the protein projections serve to attach the virus to the cell membrane.

How do COVID-19 viruses get from one person to another?

Transmission. COVID-19 viruses are trapped in the respiratory droplets of an infected person and can be transmitted to another person via the droplets or spray emitted by a sneeze, cough, while singing, shouting, speaking, or just the normal act of breathing.

How do COVID-19 viruses invade our bodies and multiply?

Coronaviruses enter the body mostly through inhalation via mouth or nose and attach to the surface of living cells, (e.g. in the respiratory tract or in the alveoli of the lungs), using the outer projections of the protein coat. The attachment stimulates the cell to engulf the virus. Once inside the cell, the protein coat of the virus is attacked by the cell's enzymes and the mRNA is freed. The instructions of the mRNA then subvert the cell's machinery to make new viral mRNA along with the proteins for the outer coat. The newly-formed mRNA and coat proteins are assembled by the cell's machinery, resulting in the formation of tens of thousands of new viral particles. These are freed, by rupture (lysis) of the host cell, to invade other cells in which the cycle is repeated, creating millions of copies of the original invader in the infected person. The transmission cycle of the newly-manufactured viruses can then be repeated and is only halted by blocking transmission and/or infection.

What drives the emergence of COVID-19 variants?

Case Loads. Every live human body infected with COVID-19 is a potential incubator for mass production of the virus. The more bodies infected, the greater the probability of mutations, and therefore a greater likelihood of the emergence of variants. They need not come from far away places.

Will the current Pfizer and Moderna COVID-19 vaccines protect against variants of the CORONA-19 strain?

The data are incomplete and there does not appear to be a clear answer – at least not yet. Limited evidence suggests that they may be less effective against a rapidly-spreading coronavirus variant. But it is important to note that the vaccines are still worth getting because they make infections less serious and markedly reduce hospitalizations and death.

How do Vaccines Work?

To understand how COVID-19 vaccines work, it helps to first look at how our bodies fight illness. Germs, such as the COVID-19 virus, invade our bodies and multiply. This invasion, called an infection, is what causes illness.

The Immune System—The Body's Defence Against Infection

Our immune system uses several tools to fight infection. Blood contains red cells, which carry oxygen to tissues and organs, and white or immune cells, which fight infection. Different types of white blood cells fight infection in different ways:

- **Macrophages** are white blood cells that swallow up and digest germs and dead or dying cells. The macrophages leave behind parts of the invading germs called antigens. The body identifies antigens as dangerous and stimulates antibodies to attack them.

- **B-lymphocytes** are defensive white blood cells. They produce antibodies that attack the pieces of the virus left behind by the macrophages.
- **T-lymphocytes** are another type of defensive white blood cell. They attack cells in the body that have already been infected.

The first time a person is infected with the COVID-19 virus , it can take several days or weeks for the body to make and use all the germ-fighting tools needed to get over the infection. After the infection, the person's immune system remembers what it learned about how to protect the body against that disease.

The body keeps a few T-lymphocytes, called **memory cells**, that go into action quickly if the body encounters the same virus again. When the familiar antigens are detected, B-lymphocytes produce antibodies to attack them. Experts are still learning how long these memory cells protect a person against the COVID-19 virus.

COVID-19 vaccines

COVID-19 vaccines help our bodies develop immunity to the COVID-19 virus without us having to get the illness. Different types of vaccines work in different ways to offer protection, but with all types of vaccines, the body is left with a supply of "memory" T-lymphocytes as well as B-lymphocytes that will remember how to fight that virus in the future.

It typically takes a few weeks for the body to produce T-lymphocytes and B-lymphocytes after vaccination. Therefore, it is possible that a person could be infected with the virus just before or just after vaccination and then get sick because the vaccine did not have enough time to provide protection. Sometimes after vaccination, the process of building immunity can cause symptoms, such as fever. These symptoms are normal and are a sign that the body is building immunity.

Types of COVID-19 Vaccines

Currently, there are three main types of COVID-19 vaccines that are, or soon will be, undergoing large-scale (Phase 3) clinical trials Below is a description of how each type of vaccine prompts our bodies to recognize and protect us from the virus that causes COVID-19. None of these vaccines can give you COVID-19.

- **mRNA vaccines** contain material from the virus that gives our cells instructions for how to make a harmless protein that is unique to the virus. After our cells make copies of the protein, they destroy the genetic material from the vaccine. Our bodies recognize that the protein should not be there and build T-lymphocytes and B-lymphocytes that will remember how to fight the virus that causes COVID-19 if we are infected in the future.
- **Protein subunit vaccines** include harmless protein parts instead of the entire COVID-19 virus. Once vaccinated, our immune system recognizes that the proteins don't belong in the body and begins making T-lymphocytes and antibodies. If we are ever infected in the future, memory cells will recognize and fight the virus.
- **Vector vaccines** contain a weakened version of a live virus—a different virus than theCOVID-19 coronavirus—that has genetic material from the virus that causes COVID-19 inserted in it (this is called a viral vector). Once the viral vector is inside our cells, the genetic material gives cells instructions to make a protein that is unique to the virus that causes COVID-19. Using these instructions, our cells make copies of the protein. This prompts our bodies to build T-lymphocytes and B-lymphocytes that will remember how to fight the COVID-19 virus if we are infected in the future.

Why do some COVID-19 Vaccines Require More Than One Shot?

Some of the COVID-19 vaccines require two shots. The first shot starts building protection. A second shot a few weeks later is needed to get the most protection the vaccine has to offer.

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*****The Bottom Line ****

Vaccination is critically important to protect yourself and others from COVID-19 transmission and infection. But stopping a pandemic requires using all the tools available. Vaccines work with your immune system so your body will be ready to fight the virus if you are exposed. Other measures, like masking, social distancing, isolating in your "bubble", hand sanitizing are highly effective in reducing your chances of being exposed to the virus and spreading it to others.
Together, COVID-19 vaccination and diligently following all the health advisory recommendations offer not only the best protection from COVID-19 and its variants but also the only way to stem the COVID-19 pandemic.

And everyone must accept the responsibility of participating.!!

Sources

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