

# COVID-19 VACCINES: Myth vs. Truth

Wint War (Vivian) Phyo, PharmD Candidate 2022



## MYTH 1: GETTING THE COVID-19 VACCINES WILL MAKE YOU SICK AND TEST POSITIVE FOR COVID-19

**Fact: COVID-19 vaccines cannot make you sick or test positive for COVID-19 because they do not contain live/actual virus.**

None of the authorized COVID-19 vaccines contain the live virus or genetic material to recreate COVID-19 inside the body, and the vaccines cannot infect the person with COVID-19. The Emergency Use Authorized COVID-19 vaccines, Moderna and Pfizer BioNTech, currently being administered in the United States produce spike proteins of the coronavirus in our body. Spike proteins are found on the surface of the coronavirus and cannot cause COVID-19 infection. After a person is vaccinated, the immune system recognizes that the protein does not belong in the body and builds an immune response. The body will then remember how to fight the COVID-19 virus if it comes into contact with the COVID-19 virus. Additionally, the Jansen (Johnson & Johnson) COVID-19 vaccines contain an inactivated adenovirus, which shows the body a picture of what the COVID-19 virus looks like to the body that creates an immune response. Inactivated means that the virus is modified so that the virus is no longer “alive” and cannot duplicate inside our body.

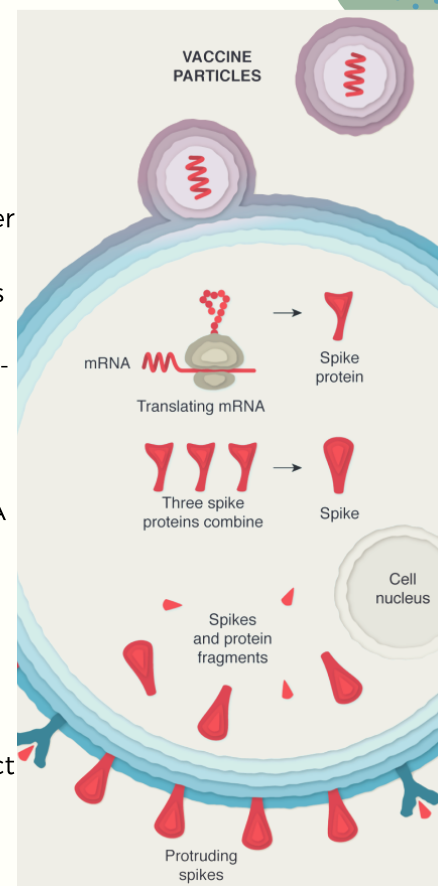
Currently, polymerase chain reaction (PCR) and the rapid antigen tests are approved to detect present COVID-19 infection. These are both viral tests that collect samples from your nose or mouth to find the coronavirus. Since none of the COVID-19 vaccine contains the coronavirus, you will not test positive for COVID-19. As it is required for persons entering the United States to present [a negative COVID-19 test](#), getting vaccinated with COVID-19 vaccine for travel will not cause you to test positive and delay reentry into the United States. Bremono Pharmacists recommend the COVID-19 vaccines for all persons traveling and able to receive COVID-19 vaccination. If you are traveling, Bremono also offers vaccine travel consults with in-depth education, a personal vaccine consult, and vaccinations for travel. For more information, click [here](#) or call (804) 288-8361 to make an appointment or send us a [secure message](#).

It is also worth noting that a vaccinated person may test positive for some COVID-19 antibody tests. Antibody tests are not the same as viral tests because antibody tests for antibodies created from prior infection by the COVID-19 virus or persons vaccinated with the COVID-19 vaccine. At this point, the [CDC](#) does not recommend getting an antibody test after vaccination to “see if the vaccine works.”

## MYTH 2: MRNA COVID-19 VACCINES WILL CHANGE YOUR DNA

**Fact: mRNA COVID-19 vaccines can never change or modify your DNA.**

Moderna and Pfizer-BioNTech COVID-19 vaccines are two of the three vaccines that utilize mRNA technology. To understand why mRNA vaccines can never alter your DNA, it is important to know how they work explained by the [CDC](#). mRNA, which stands for messenger RNA, is essentially a little piece of code that contains instructions on how to make “spike proteins.” Spike proteins are found on the surface of several families of viruses, including the coronavirus that causes COVID-19. When the vaccine is injected into a person’s body, the mRNA strands in the vaccine are released. Our immune cells will then bring mRNA strands inside the cells to produce spike proteins according to the instructions found on mRNA. As shown in the picture on the right, it is important to note that even though mRNA goes inside the cell, it cannot enter the nucleus because it does not possess the code to penetrate the membrane of our nucleus, where our DNAs are kept. Moreover, mRNA is short-lived and easily broken down by our cells as soon as spike proteins are made, making mRNA safer than they already are. Later, spike proteins are displayed on the surface of our cells. Other immune cells will recognize and begin building an immune response by making antibodies, like what happens in natural infection. When the vaccinated person comes to contact with actual coronavirus, later on, his/her immune system will kick in faster and protect the person from the consequences of COVID-19. The bottom line is that throughout this entire process, mRNA from the vaccine never gets to be in the same space as our DNA, so there is absolutely no way for mRNA vaccines to alter our DNA.



## MYTH 3: COVID-19 VACCINES CAUSE BLOOD CLOTS

**Fact: Not all COVID-19 vaccines are associated with blood clots, and even for some vaccines, blood clots are still an extremely rare side-effect.**

A small number of serious blood clots were reported in people who received AstraZeneca and Jansen (Johnson & Johnson) COVID-19 vaccines, which utilize viral vector technology. As of April 17, 2021, the [CDC](#) confirmed that there have not been any reported cases of blood clots from people who have received Pfizer-BioNTech or Moderna vaccines. Even though the cause of unwanted blood clot side-effect in viral vector vaccines is not yet well understood, the incidence is very rare based on [Vaccine Adverse Events Reporting System data](#). There were six reported cases of blood clots out of 6.8 million Jansen (Johnson & Johnson) COVID-19 vaccines administered, causing the vaccine to be paused for 10 days in the United States. The type of blood clot reported is called cerebral venous sinus thrombosis (CVST) in combination with thrombocytopenia (abnormally low levels of blood platelet count). Following the pause of Jansen (Johnson & Johnson) COVID-19 vaccines distribution, the New England Journal of Medicine published a [letter](#) from the company, claiming that there wasn't any evidence to link its vaccine to the CVST. In addition, a [study](#) conducted by the University of Oxford has found that CVST occurred in 39 in a million patients diagnosed with COVID-19. Hence, the risk of CVST is about 38-40 times higher in COVID-19 than with Jansen (Johnson & Johnson) COVID-19 vaccine. Overall, it is important to note that COVID-19 infection is much more likely than vaccines to cause blood clots and other serious complications.

Additionally, this response by the CDC and FDA to act quickly and pause the vaccine for investigation before continuing vaccination with the Jansen (Johnson & Johnson) COVID-19 vaccines shows the sensitivity, strength and safety of the vaccine monitoring systems in the United States with only six reported cases out of the 6.8 million vaccines administered. This should give you more confidence in the vaccines and the research and safety surveillance used to prevent adverse events.

Click [here](#) to learn more about other common but less serious side-effects of COVID-19 vaccines



## MYTH 4: COVID-19 VACCINES CAUSE INFERTILITY

**Fact: COVID-19 vaccines do not cause infertility.**

The American College of Obstetricians and Gynecologists (ACOG), the American Society for Reproductive Medicine (ASRM), and the Society for Maternal-Fetal Medicine (SMFM) made a [statement](#) in February 2021 that “as experts in reproductive health, we continue to recommend that the vaccine be available to pregnant individuals. We also assure patients that there is no evidence that the vaccine can lead to loss of fertility. While fertility was not specifically studied in the clinical trials of the vaccine, no loss of fertility has been reported among trial participants or among the millions who have received the vaccines since their authorization, and no signs of infertility appeared in animal studies. Loss of fertility is scientifically unlikely.” For more information, please visit ACOG’s Practice Advisory on [Vaccinating Pregnant and Lactating Patients Against COVID-19](#).

In December 2020, a German physician named Wolfgang Wodarg and Michael Yeadon, a former Pfizer employee, submitted a [petition](#) to the European Medicines Agency (the European Union counterpart to the FDA) to delay the study and approval of the Pfizer-BioNTech vaccine. In the petition, Wodarg and Yeadon falsely claimed that the vaccines may carry the risk of infertility based on slight DNA similarity between a protein called syncytin-1 in humans and the spike proteins of coronaviruses. Syncytin-1 is an important protein that is responsible for the development of the placenta in most mammals,

including humans. Since Pfizer and other vaccines cause our body to produce antibodies against spike proteins, they argued, the vaccines may also promote the body to attack and reject syncytin-1, potentially leading to infertility in women. Wodarg and his colleague presented this theoretical risk in their petition without supporting evidence.

A [study](#) by Malgorzata Kloc and colleagues analyzed and compared the amino acid sequences of syncytin-1 and spike protein. The study showed that human syncytin-1 and coronavirus spike protein shared only a few amino acids (two 2-amino acid stretches to be exact) and concluded that it is “unlikely that the vaccine will generate an immune response which is cross-reactive with syncytin-1 and affect fertility and pregnancy.”

## MYTH 5: THE MRNA TECHNOLOGY OF COVID-19 VACCINES IS NEW

**Fact: The COVID-19 mRNA vaccine is new, but the mRNA technology has existed and been studied for decades in research.**

The mRNA technology of Pfizer-BioNTech and Moderna vaccines may seem like a brand-new discovery, but according to [the Atlantic](#), the technology can be dated back to 1978 by a young Hungarian-born scientist named Katalin Kariko. In 1990, [researchers at the University of Wisconsin](#) carried out similar experiments on mice and got promising results from DNA and RNA transfer. In the early 2000s, Kariko and her research partner Drew Weissman, finally, found the [solution](#) to stop the body from rejecting the mRNA.

Kariko and Weissman’s accomplishment caught the attention of two groups of scientists in the U.S. and Germany, who helped found Moderna and BioNTech, respectively. By the time the coronavirus outbreak spread across the globe in early 2020, Moderna and BioNTech had already been refining their mRNA technology. On January, 11, 2020, [Chinese researchers](#) shared the genetic sequence of the COVID-19 virus, and with decades of work on mRNA research, both Moderna and BioNTech were able to easily utilize their mRNA technology to produce vaccines targeting the COVID-19 virus. Overall, the mRNA vaccines wouldn’t have been made in a short period of time if it weren’t for over 40 years of different researchers and science experiments.

**For more myths related to COVID-19 vaccines explained by the Mayo Clinic, visit [here](#)**