

Maybe you saw it on social media. Heard it from a friend or relative. Got it in an email. Or have just been wondering silently to yourself.

No matter where you heard that claim about the COVID-19 vaccines, it might be making you wary of getting vaccinated when it's your turn.

Or maybe you're pretty sure the scary claim is false, but you need a plain-English explanation of why.

If lies and myths about the vaccines spread so much that many people decide not to get vaccinated, more people will die and the pandemic will last longer. It's important to check out claims that you hear, with [reputable sources of information](#), and share [good information](#) with others. It will take all of us to fight back against *deadly misinformation*.

FACT: We have COVID-19 vaccines available now because science and health experts responded swiftly to a deadly public health crisis

Myths and fears: Many people have voiced concerns about how quickly the vaccines have become available, how short the testing process was, or how political the whole vaccine production effort has gotten because of the national election.

There are claims that it was rushed, or that “corners were cut” in the clinical trials or the government's safety review and approval process.

The bottom line: The entire process went faster than usual for explainable reasons, but *still followed the usual steps for testing and review*. The most important reasons for speed: modern scientific tools are faster than old ones, and there was a worldwide effort to [reduce or remove the usual barriers and delays](#) in vaccine research, production and distribution. A large number of ordinary people volunteered for clinical trials of the vaccines, which meant we got the answers to key questions about safety and protection quickly.

The vaccines still received independent review and approval, under [emergency rules put in place before this pandemic](#) for situations where the public's health is at serious and immediate risk, as it is now.

More detail: The effort started with rapid research on the genetics of the coronavirus, starting in January. Scientific tools have made it possible to “read” the genetic material of a virus in mere days, where it once took months.

Part of the delay in studying a new vaccine is the time it takes to design a high quality and safe clinical trial. For COVID-19, international organizations came together to agree on a study outline and goals.

Another big difference is that governments agreed to pay companies to produce large amounts of their vaccines in advance, even while trials were testing how well the vaccine actually worked in people.

If those clinical trials showed a vaccine didn't work, or had unacceptable side effects, it would be thrown out – but the company wouldn't lose money. On the other hand, if the trials showed a vaccine worked and was safe, the companies would be ready to ship it out – which is what's happening now.

Another source of speed: The fact that the pandemic was so out of control in the U.S. and other countries this summer and fall, when the clinical trials were going on. Because the people who volunteered to get the vaccine had a high chance of being exposed to the virus in their everyday lives, researchers could see within months how many of the ones who got actual vaccines got sick with COVID-19, compared with the people in the groups that got the placebos.

The [approval process through the FDA](#) had an independent panel of experts look at the data from the studies, and ask tough questions of the vaccine makers before voting to approve it on an emergency basis. The FDA is also requiring the companies to track what happens to people who took part in its studies, and the CDC will monitor what happens to people who get the vaccine outside the studies.

FACT: The mRNA-based vaccines do not change a person's DNA

Myths and fears: Because the mRNA approach to vaccines is new, you might have seen claims and worries about what might happen after it's injected into the body. These include the claim that the genetic material in the vaccine will find its way into your DNA permanently.

Some have even claimed that a person who gets vaccinated becomes a “chimera” or a “transhuman,” or that because the vaccine's mRNA was made in cells of a male, a woman receiving it will become partly male.

The bottom line: The first two COVID-19 vaccines contain a specific kind of genetic material called mRNA. The mRNA in the vaccines doesn't go into the nucleus of a cell, where your DNA is stored, in order to accomplish its mission of teaching the immune system how to recognize coronavirus.

More detail: The “m” in mRNA stands for “messenger”, and that's a good description of what the vaccine does. It brings a message into the body, to tell the immune system what to look for if coronavirus gets in.

This message first has to be decoded, like those radio transmissions written in secret code that you might see in a World War II movie. The mRNA gets decoded by structures in cells called ribosomes, but this happens outside the nucleus where the DNA is stored.

The decoded message then tells the cells of the immune system what some of the proteins on the outside of the coronavirus looks like. This helps them get ready to attack coronavirus in the future if you get exposed to it.

After the mRNA message is decoded, the cell's "garbage disposal" breaks the mRNA down. It doesn't stay intact, and can't just find its way into the nucleus. It's like the secret agent messages in an old TV show that would say "this message will self-destruct in five minutes."

FACT: COVID-19 vaccines can cause a short fever, headache, fatigue, sore arm or chills, especially after the second dose. Other reactions are extremely rare.

Myths and fears: Some people have seen claims that large numbers of people are getting seriously ill from the vaccine, that the risks of the vaccine aren't being reported, or that officials know there are long-term risks but are keeping them secret.

The bottom line: Tens of thousands of people have received the vaccines in clinical trials, and every day thousands more are getting it, now that the first two vaccines are approved. They are all being asked to track and report any symptoms they experience.

Just as with other vaccines, the COVID-19 vaccines can cause temporary effects soon after they enter the body and start teaching the immune system to go after the coronavirus. The most common reactions are headaches, arm pain, body aches, chills or fever lasting a few hours to a few days. Taking an over-the-counter painkiller can help ease these.

Health authorities have also reported a few cases of severe allergic reactions or a face-nerve condition called Bell's palsy among the hundreds of thousands of people vaccinated so far. These were extremely rare, but they have received a lot of attention.

Why these temporary effects happen: Vaccines work by getting the immune system to fight. So it is common for highly effective vaccines, like the tetanus shot, to give people some symptoms. This is a sign the vaccine is doing what it was meant to do: Wake up the immune system and prepare it to fight off an infection in the future. The COVID-19 vaccines tend to cause these same sorts of symptoms: Soreness in the muscle where the shot went in, some fatigue, and perhaps feverish. All of these symptoms are good news because they indicate the vaccine is working. And all can be made better with common over-the-counter painkillers like acetaminophen (Tylenol) or ibuprofen (Advil or Motrin.)

Coincidental infections: The COVID-19 vaccines don't contain coronavirus, so the vaccinated person can't get COVID-19 from the vaccine. But they or someone they live with might get sick from a virus or bacteria that they picked up around the time they got vaccinated.

Coronavirus is widespread right now, so a vaccinated person may have been exposed to it in the days before they got vaccinated. If post-vaccination symptoms last more than a day or two, or if they include a cough, shortness of breath, diarrhea, or loss of taste or smell, the vaccinated person should talk to their health provider and stay home in isolation (away from others) until they can get tested for the coronavirus.

We also don't know yet if a person who got the vaccine can still spread coronavirus if they come in contact with it. Those studies are underway. That's why vaccinated people still need to wear masks until researchers can study this more.

The flu and common cold viruses are also circulating now, so a person could have been exposed to these before they were vaccinated, and get symptoms from one of those viruses. If so, they should stay home, get rest, drink fluids and take basic painkillers to ease their symptoms. They should seek medical attention for high fever or prolonged symptoms.

Rare but more serious issues: There have been several cases of anaphylaxis, or severe allergic reaction, among people with a history of such reactions who received the COVID-19 vaccine.

Anyone who carries an Epi-Pen or has experienced an allergic reaction so serious that it made them unconscious or faint should mention this when they receive the vaccine. Right now, people who have had a serious allergic reaction (like anaphylaxis) to anything are being asked to stay in the vaccination location for about a half an hour after receiving the vaccine, with someone trained to care for serious allergic reactions watching them.

Long-term problems: No one has had the vaccine in their body for more than eight months (as of late December 2020), so the honest answer is we don't know yet if these vaccines cause long-term problems. Only time and accurate tracking will tell for sure; scientists have to look for unusual patterns of disease in groups of vaccinated people.

That's why everyone who gets vaccinated is being encouraged to track and report any symptoms they may feel in the short and long term, and to tell their health provider.

Health officials are already watching out for any patterns of problems that are out of the ordinary. So far, they have not seen any. But the scrutiny on these vaccines, and the fact that there are many more varieties of the COVID-19 vaccine now being tested, mean that we would have an early warning and alternatives.

Meanwhile, the threat of COVID-19 is very real right now. It is killing thousands of Americans every day, and leaving many others with lasting symptoms and disability from the disease.

FACT: The COVID-19 vaccines do not contain a live or whole coronavirus, microchips, tracer technology, fetal tissue, stem cells, mercury, aluminum, luciferase, the Mark of the Beast, pork products or preservatives

Myth and fears: All of these things, and more, have been mentioned in claims that we've seen on the internet, or heard about from people who contacted us. People who hear these claims may be worried about health effects, being tracked wherever they go, or even faith-related problems.

The bottom line: The first two vaccines to reach the market contain only snippets of genetic material, salt, sugar and fat. The other vaccines being developed will contain weakened or inactive forms of “common cold” viruses, and substances commonly found in many vaccines.

What about metals? The most common uses of metals in vaccines are in substances called preservatives and adjuvants. The first two COVID-19 vaccines don't have [preservatives](#), which is why they must stay frozen until they are thawed for injection. They also don't contain additives called [adjuvants](#) that have been used in other vaccines to help them work better.

What about chips or tracers? There is no microchip, RFID device or other electronic device in the world that's small enough to fit inside the needles used to inject vaccines. People with concerns about being traced or tracked should focus their concern on technology used in smartphones, social media sites and web browsers.

What about viruses? The first two vaccines to reach the market don't contain any viruses at all. They only contain bits of mRNA that tell the vaccinated person's cells to make proteins that also appear on the coronavirus. The immune system learns to recognize these proteins, which means the body will be ready to fight back if any coronavirus does get in.

What about pork? People of certain faiths, and vegetarians and vegans, may be concerned about reports that the COVID-19 vaccine was created using gelatin, which can be derived from pigs. The two vaccines already approved in the U.S., Canada and other countries, and the next one likely to come up for approval, have been certified gelatin-free. Some vaccines being developed for developing nations may not be able to achieve this certification. But faith leaders have said publicly that receiving a vaccine containing a tiny amount of gelatin is permissible for Muslims and Jews because it does not involve eating pork, and because it has a clear benefit in preventing disease.

What about the “Mark of the Beast”? People of faith may have concerns about claims that the vaccine will “mark” vaccinated people in some way, related to the Mark of the Beast that's mentioned in the Book of Revelation in the Bible.

This may have originated with a misunderstanding about a substance called luciferase that's used in COVID-19 research. Luciferase is not present in the vaccine.

Luciferase is the substance that makes fireflies glow on summer nights. The scientist who named it more than 120 years ago chose that name from the Latin word for “light-bearer.” Today, scientists use luciferase's natural glow to tell them what's going on in their Petri dishes, including in research about how COVID-19 infects cells.

The same Latin word that gave luciferase its name is also one of the names for the Devil in Christian theology, but this is a coincidence. Religious leaders from many religions have said the COVID-19 vaccines are acceptable for use by people of faith.

FACT: People who are pregnant, breastfeeding or want to become pregnant can get vaccinated against COVID-19. But they should talk to their medical provider.

Myths and fears: You might see claims that the COVID-19 vaccine can make someone infertile or impotent, harm a developing fetus in the womb, make the immune system attack the placenta, or hurt a baby who is breastfeeding from a recently vaccinated mother.

The bottom line: There's no evidence for any of these claims, and no scientific reason to think that any of them are true. But there is an urgent need to protect pregnant women from COVID-19, including through vaccination, because we now know they face a high risk of getting seriously ill if they catch the coronavirus. The virus also increases their risk of miscarriage or stillbirth.

FACT: The COVID-19 vaccine can end the pandemic much sooner, and with fewer lives lost. This could especially help people in the highest risk groups, including people of color.

Myths and fears: Rumors have been circulating that the vaccine is designed to control or eliminate certain groups within our society, to allow for "mind control" of vaccinated people, or to allow certain "elite" members of society to rule the rest of us.

The bottom line: All of these are false. The vaccine will be available to everyone in the United States, in an order that's determined by two things: each person's risk of being exposed to COVID-19 at work or where they live, and their risk of getting seriously ill or dying from COVID-19 because of their age and underlying health conditions.

Studies have shown that people who are older or have certain medical conditions – including being overweight or obese, and smoking – are more likely to get seriously ill if they catch the coronavirus.

The more virus a person is exposed to, and the more often they're exposed, the higher their chance of getting sick. Exposures can happen at work or at home, especially when many people live together.

Studies of COVID-19 patterns have shown that people in certain groups – Black, Native American and Latino people, for example – have a higher risk of severe or fatal COVID-19 than people in other groups. This is probably due to multiple factors including group-level differences in health, type of employment, living situation and access to health care.

But priority order for vaccination is based on the individual's own personal risk, not the group they belong to, their skin color, what languages they speak at home, their income or their education level.

For instance, a healthy person in their 30s who works from home via the internet will be further back in the vaccine line than an older, heavier person with diabetes who works in a hardware store. Meanwhile, a pregnant woman working in a grocery store would be

behind an 80-year-old who lives in a nursing home, but ahead of a healthy middle-aged person who farms with their family.

It is understandable that some people may be more likely to mistrust the COVID-19 vaccine because of discrimination against people like them in other aspects of modern life or history. Our country also has an unequal distribution of access to health care, preventive health services and health education.

Every person must decide what they will do, but they should consider both their personal risks of COVID-19 and the benefits of vaccines in reducing that risk for themselves and society.