COVID-19 Vaccine FAQs

1) What is an mRNA vaccine and how is it different from other vaccines?

Messenger RNA (mRNA) vaccine technology uses mRNA (single stranded genetic code) to provide a template that the body's cells use to create proteins. mRNA are molecules that already exist inside the body and are the building blocks of every protein we have. Vaccine researchers strung together these same molecules in a lab in such a way that a human cell could "read" the message to create one identical to COVID-19's "spike protein". Once these fake spike proteins are made, the body then reacts to them as if COVID-19 was trying to infect the cell. This leads to the making of COVID-19-specific antibodies which can be used in the future to fight off a real infection. The spike protein is a good choice for an antibody target because it is one of the key-ways COVID-19 enters the human cell.

There are several advantages to mRNA vaccine technology and this kind of vaccine has been in development for decades before finding a use in the COVID-19 fight.

- mRNA is cheaper, safer and easier to produce then growing a virus itself and then inactivating that virus or chopping it up in some way to get it into the body and stimulate an immune response.
- mRNA cannot cause active infections.
- mRNA created in the lab are so similar to natural mRNA that they can get inside the body's cell without triggering an immune reaction before the cell can actually use it to create virus-like proteins. This means they are very easily broken down in the body (within hours to days) and reused in other protein building projects. The short time the mRNA is in your body also would likely reduce the risk of serious side effects.

The mRNA vaccine currently approved for use in the US is from Pfizer. There is a second one that will be coming shortly from a company called Moderna that specializes in this mRNA technology. Both of these vaccines use fatty molecules to cover the mRNA so that it doesn't get broken down before getting into the body's cells. They both have shown to be extremely effective in clinical trials but require very cold temperatures to keep the fat-covered mRNA stable and usable.

2) How effective is the vaccine?

According to Pfizer data from its largest clinical trial, nearly 22,000 people were vaccinated and another 22,000 got a placebo (fake) vaccine made of water. In the approximately four months after the first dose, a total of 170 people contracted COVID-19 and 162 of those had not received the vaccine. That's about 95% fewer cases in the vaccinated group, and 90% fewer cases of severe COVID-19 (1 vaccinated person developed severe symptoms in contrast to 9 non-vaccinated participants). Assuming all participants faced roughly the same risk of infection (not something we can say with certainty, but the high number of participants is reassuring), these numbers are incredibly promising!

Importantly, the end results were measured greater than one week but mostly less than three months after the second dose – raising some concerns that real world results will be less dramatic over a longer time period. It is also important to know we have no data on whether the vaccine prevents asymptomatic infection. Given the important role this type of low-grade infection plays in virus transmission, we need more data in the coming months to help guide public health policy as the vaccine is rolled out to communities nationwide.

For comparison, the flu vaccine is typically around 40-60% effective at reducing infections severe enough to warrant clinic or hospital visits. If the COVID-19 vaccine is only as effective as the flu vaccine, it will still save hundreds of thousands or even millions of lives in the US (if 2/3 or more of the population completes 2 doses).

3) What are the known risks?

All vaccines are associated with some typical side effects and in some people those side effects may be more severe. The most common side effect is local injection site reactions (muscle ache, redness, swelling). Additionally, people may feel as if they are getting sick (body aches, fevers, headache or fatigue) which are all symptoms commonly associated with activation of the immune system — this is actually a good sign that the body is responding to what it perceives as an infection, and is fighting it off!

A review of the Pfizer trial data tells us a few important things.

- Most people will experience a mild to moderate injection site reaction (roughly 80% in the patients <55 years old and 70% in patients >55 years old).
- Symptoms were reported more frequently by people <55 years old.
- Symptoms were reported more commonly after the 2nd dose.
- About 10-15% of people reported fevers, and 50-70% of these fevers were lower than 101.1 F.
- About 30-50% of people reported mild to moderate fatigue, headache and/or aches and pains. However, so did 15-30% of the placebo group. These symptoms are extremely common in the general population and cannot entirely be explained by the vaccine. These symptoms should be manageable with ibuprofen and/or Tylenol. The side effects appear to be more common in younger people and more pronounced after the second dose. It is unclear how long such symptoms last, but it would be unwise to attribute similar symptoms to vaccination if they present more than a day or two after injection.

Generally speaking, these reported rates of vaccine reactions are higher than for the influenza vaccine and similar overall to the Shingrix vaccine. These side effects may be very unpleasant for some people. Patients need to be adequately prepared to expect some mild and short-lived symptoms of illness and will need guidance on self-management.

Adverse events data is available for up to two months for most patients enrolled in the trial. Nearly all known vaccine-related complications – including serious ones like auto-immune nervous system diseases (i.e. Guillain Barre Syndrome) or hemolytic diseases (i.e. thrombocytopenic purpura) – happen within six weeks of vaccination, so the two-month follow-up period does provide reasonable assurance that the vaccine is quite safe.

4) What are the unknown risks?

We do not have long-term safety data for mRNA vaccines as a whole or for the COVID-19 vaccines specifically.

Pregnant/breastfeeding people, children, the very elderly (>85y) and some immunocompromised people were excluded from the vaccine trials and so current evidence cannot be applied to these individuals. That said, COVID-19 has many known risks (including death and long-term disability) and none of the more than 100,000 vaccine recipients to date have experienced any remotely similar vaccine related complications.

5) What if I am pregnant, plan to become pregnant or am breastfeeding?

You will be offered the vaccine. Pregnancy and breastfeeding are not contraindications to receiving the vaccine, but it is important to understand that we have no final data to determine the true risks.

The Society for Maternal and Fetal Medicine has reviewed the vaccine data and recommends that pregnant/breastfeeding people discuss the pros and cons of vaccination with their provider. They note that the vaccine is likely to be very low risk in these groups, while it likely will provide significant benefit. Pregnant people are at higher risk for COVID-19 complications than women of a similar age and breastfeeding people would also get the benefit of passing the antibodies on to their newborns through breast milk.

6) Will the vaccine affect my DNA?

Due to misinformation and a misunderstanding of the role of mRNA in cells, some people fear that mRNA vaccines have the potential to change or control our DNA. This is false. Messenger RNA do not create or "re-write" DNA, but rather are the way our DNA communicates to the cell what it needs to produce. In the cell, mRNA are copied *from* pieces DNA that code for certain proteins. Then, the cell's machinery uses that template to actually print out the desired protein. After the desired amount of protein is produced (i.e., after several hours to several days), the cell rapidly gobbles up the mRNA and recycles its components to be used in other building projects. Because mRNA are so easily broken down, these vaccines are theoretically lower risk than vaccines that contain live attenuated/inactivated virus or related proteins.

7) How is the vaccine administered?

The Pfizer vaccine is designed to be given intramuscularly in 2 doses 21 days apart. You must get the second dose to have protection.

You are advised to get both doses from the same maker (i.e. Pfizer).

8) How long will the vaccine last?

The immune cells responsible for generating the COVID-19 antibodies can remember some infectious diseases for years or even decades. Unfortunately, we just don't know at this point given how new are both COVID-19 and the vaccines.

While natural immunity may decline in several months (like for other coronaviruses or influenzas), it is very likely immunity from vaccines will last longer. This is the case with several other important infectious diseases where natural infection does not create as strong of an immune response as vaccination. (Tetanus, pneumococcus, Hib and HPV are well known examples.)

In short — we don't really know but likely at least a year.

9) I've had COVID — should I get the vaccine?

Yes. It may be reasonable able to wait up to three months after infection given we believe most people have some degree of immunity during that time, but boosting your immunity with a COVID-19 vaccine will be important for longer term protection.

10) Once I get vaccinated can I stop wearing masks and social distancing?

No. We have no data yet that demonstrates these vaccines work in real world settings over a meaningful period of time. Particularly we do not know its effect on preventing asymptomatic infection or spread. We need to use all the tools in the toolkit to slow the spread of COVID-19 and masks and social distancing are two of the most important.

11) When can we get back to normal?

The number of people who actually get vaccinated and the real-world effectiveness of vaccines will determine how quickly we can stop our social distancing measures. It will take at least three to six months for the initial vaccine roll out to healthcare workers and highly vulnerable groups. The general (low risk) public may not be offered vaccines until the summer, and then the number of people that accept them (and get both doses) will drive the kind of herd protection that we rely on for many other deadly viral infections we know of today. If people will treat this vaccine the way they do the influenza vaccine, however, our region will not successfully limit COVID-19 infections and related deaths. (Approximately on 30% of people in our region get the flu vaccine every year.)

Some have argued that natural herd immunity would be a more effective way of achieving "normalcy". This is false. Natural immunity to COVID-19 is not likely to last longer than a few months to a year and some asymptomatic infections may not ever mount a good enough immune response to protect against reinfection.

To achieve herd protection with COVID-19, roughly 70% of the population needs to be immune before the virus stops spreading under normal (i.e. non-social distancing) conditions. And if natural immunity disappears after six months to a year, this cycle would need to happen every one to two years. This means we cannot ever achieve herd protection without a vaccine.

Even if immunity was lifelong (unlikely), if 70% of the population got COVID-19 over the next 2-3 years, anywhere from 1.5 to 4 million people would die in the US alone. Now that we have multiple vaccines to fight this disease, many of those deaths would be preventable and to advocate against mass vaccination would be unethical.

This information was compiled and written by Lakewood Family Practice Physician, Dr. Alex Harsha.