The Purpose of this Unit Resource and Why It is Important

This resource provides a brief introduction to some of what we know so far about the vaccines that have been developed for SARS-CoV-2/COVID-19. Keep in mind that these unit materials were developed in mid-March 2021 and distribution of the vaccines as well as research into their efficacy is ongoing.

It is important to understand what we currently know and what we are still learning so that we can make decisions for ourselves, our families, and our communities, and think about how our actions and decisions impact ourselves and others.

How the COVID-19 vaccines work

Vaccines have been saving millions of lives worldwide from infectious diseases like smallpox, tetanus, and measles for decades. Like other vaccines, the COVID-19 vaccines train your body's immune system to recognize and fight off the virus so that if you're exposed to it in the future, you will not get sick. The three COVID-19 vaccines approved for use in the United States work by teaching our own cells to make a harmless piece of the virus called the spike protein. When our cells display the spike protein on their surface, the immune system responds and makes antibodies, which then can protect us against further infection. It is normal to experience side effects (such as soreness at the injection site, headache, fever, and tiredness) while your body builds up immunity, but these only last a few days and not everyone has them. Since the vaccines do not use the actual SARS-CoV-2 virus, you cannot get COVID-19 from the vaccines. The side effects you may feel are your body's way of telling you that it is building up immunity. They do NOT mean that you have COVID-19.

More details about how mRNA vaccines (like Pfizer's and Moderna's) work can be found here: https://www.cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines/mrna.html

More details about how viral vector vaccines (like Johnson & Johnson's) work can be found here: https://www.cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines/viralvector.html

How COVID-19 vaccines were developed and approved

Before the COVID-19 pandemic, vaccines often took years to develop, test, and approve. However, the reasons other vaccines have taken so long to develop were not obstacles for development of the COVID-19 vaccines. For example, scientists often have to wait for funding to develop vaccines, but because COVID-19 has had such a large-scale impact, organizations, governments, foundations and companies were willing to put a lot of money into research, development, and manufacturing for COVID-19 vaccines. Generally, it takes a long time to find volunteers for the three stages of vaccine trials, and then it takes even longer for those participants to be exposed naturally to the virus and compare their reactions to those in placebo groups. In this case, it was not a problem to find the tens of thousands of people who participated in clinical trials and since COVID-19 has been so widespread, researchers had results of those trials much faster than usual. Finally, the COVID-19 vaccines were approved for emergency use to make them available as soon as possible. It is important to know that there were no “shortcuts” taken to research and develop the vaccine. The development happened more quickly because of the availability of money, lots of volunteers willing to try it, and COVID-19 being so widespread.

For more details about the development process and clinical trials for the COVID-19 vaccines, see here: https://hackmd.io/@scibehC19vax/vaxprocess

For more information about Emergency Use Authorization, see here: https://www.fda.gov/vaccines-blood-biologics/vaccines/emergency-use-authorization-vaccines-explained

What we know about the COVID-19 vaccines and what we’re still finding out

We know that the COVID-19 vaccines are safe and effective at preventing illness from COVID-19. In clinical trials, all three FDA-approved vaccines were 100% effective at preventing death and hospitalization from COVID-19. It does take some time for your body to build up immunity to the virus, so it would be possible to get COVID-19 shortly after vaccination; people are considered fully protected two weeks after their final dose of the vaccine.

We do not yet know how long the vaccine will protect us. We are still learning whether people who have been vaccinated can transmit the virus to others, though early data indicate that vaccinated people with no symptoms probably do not easily spread the virus.

As millions of people are vaccinated worldwide, data about side effects and possible reactions are still being collected. As in the earlier trials, the rate of vaccinated people affected by a reported side effect is compared with the rate of people in the general population affected by that same condition to help determine if that issue might have been a result of vaccination or just a coincidence. As with any medicine or health procedure, the overall benefit of the vaccine must be weighed against the risk of rare reactions.
Vaccine distribution and issues of equity

Many people are looking forward to getting vaccinated when it’s their turn as vaccines will protect ourselves and others from getting sick, eventually allow for a return to more pre-pandemic activities, and help prevent recurring outbreaks from variants.

Although many people have gotten the vaccine, many others are either still waiting for their turn or are hesitant to get it. People who have not yet been vaccinated can be generally be grouped into three categories:

1) those who want to get the vaccine but can’t yet (for various reasons described below),
2) those who are hesitant (for various reasons – see next section) but may decide to get it, and
3) those who have already decided not to get it (see final section).

As of March 2021, many people who want to get vaccinated are not yet eligible for the vaccine because the supply is limited. And unfortunately, there have been barriers to accessing the vaccine for many people who are already eligible. For example, most states have been using online appointment systems which limit access to those with reliable internet service. For many people, vaccination sites are far away, requiring transportation and time to get there, which often means requesting time off work. Information about the vaccines and how to get appointments is often only available in English. These barriers to vaccine access are impacting people of color more than white people, further amplifying the inequities highlighted by the COVID-19 pandemic, as Black people, Indigenous people, and people of color have suffered more cases and deaths than white people have compared to their share of the general population.

The following articles provide more information about inequities in vaccine distribution:

- [https://www.latinorebels.com/2021/02/16/latinosvaccine/](https://www.latinorebels.com/2021/02/16/latinosvaccine/)

Vaccine hesitancy

Some people understand the benefits of vaccination for COVID-19 but are hesitant about it because they need more information about its cost or safety. However, vaccination is free and you cannot get COVID-19 from the vaccine, the potential side effects are temporary, and serious adverse reactions are very rare. (See here for more details: [https://www.cdc.gov/coronavirus/2019-ncov/vaccines/facts.html](https://www.cdc.gov/coronavirus/2019-ncov/vaccines/facts.html).) Some people feel like they don’t need to be vaccinated; however the risks of becoming ill with COVID-19 for weeks or much longer, spreading the disease to others, and possible death are a higher toll than the inconvenience of being vaccinated. (See here for more details: [https://hackmd.io/@scibehC19vax/riskperception](https://hackmd.io/@scibehC19vax/riskperception).) Finally, some groups of people are hesitant to be vaccinated because discrimination in healthcare—both historical and ongoing—has caused them to distrust the medical/research community. Some such communities, such as some Indigenous communities, have been leaders in developing strategies for building trust among elders and other community members around the vaccine. (For examples, see this report [https://www.pbs.org/newshour/show/health-officials-try-to-rebuild-trust-of-vaccines-among-indigenous-americans](https://www.pbs.org/newshour/show/health-officials-try-to-rebuild-trust-of-vaccines-among-indigenous-americans) and this report [https://www.npr.org/2021/02/16/967011614/in-tuskegee-painful-history-shadows-efforts-to-vaccinate-african-americans?utm_source=twitter.com&utm_campaign=npr&utm_medium=social&utm_term=nprnews](https://www.npr.org/2021/02/16/967011614/in-tuskegee-painful-history-shadows-efforts-to-vaccinate-african-americans?utm_source=twitter.com&utm_campaign=npr&utm_medium=social&utm_term=nprnews).
Vaccine denial and conspiracy theories

Some people are more set in their decision not to get the COVID-19 vaccination. People who fall into this group frequently deny the science of vaccines and/or believe in conspiracy theories about them. Although this group is relatively small, the misinformation involved can be quite loud.

For more information about common vaccine misinformation, see: https://hackmd.io/@scibehC19vax/misinfo_antivax and for misinformation specific to the COVID-19 vaccine see here: https://hackmd.io/@scibehC19vax/misinfo_myths#Myths-about-COVID-19-vaccination.

For more information about conspiracy theories related to COVID-19 vaccination, see here: https://hackmd.io/@scibehC19vax/misinfo_conspiracytheories.

Ideas for Family Discussion

People all over the world are having discussions with family, friends, and others in their communities about vaccines, especially those for SARS-CoV-2.

Here are some questions and prompts you can ask family members (and friends and others in your community, too) to support discussions about vaccines. What other questions would you add to this list?

- Was there information we thought we knew about vaccines that we have recently learned was not exactly right or was wrong? What was that information and what do we now know instead?
  - I used to think __________. Now I think __________.
- We need to keep learning new information about COVID-19 vaccines as it becomes available. Why is that important? What sources do we want to use to keep learning and why?
- How are we feeling about vaccines? Why do we feel that way?
Consider exploring some of the following websites to continue to learn more about the vaccines for the SARS-CoV-2 virus / COVID-19 disease. This is not an exhaustive list, but the websites listed are credible and contain a variety of resources.

**Credible Resources to Consult for Additional Information**

- **Centers for Disease Control and Prevention (CDC) Vaccine Information:**

- **The World Health Organization (WHO):**


- **Video explaining mRNA vaccines:**
  https://www.youtube.com/watch?v=4keWTrpKTYM&feature=emb_logo Dr. Asher Williams from Cornell University explains how mRNA vaccines work.