

## COVID-19: Vaccine Hesitancy: Separating the Facts from Fake News



Rumors about the safety of COVID-19 vaccines have been circulating on social media for months and with the AstraZeneca vaccine recently making headlines over potential risks, public anxiety about receiving COVID-19 vaccines—or vaccine hesitancy—has been expressed.

It's understandable that you may be wary of receiving one of the vaccines approved by Health Canada. It has been a year filled with rapid change, fear, uncertainty, grief and loss. We've been inundated with information about COVID-19 and our lives have been impacted in so many ways.

The speed at which COVID-19 vaccines were developed may be causing apprehension that vaccine development was rushed and safety may have been compromised. These worries, added to our already overloaded brains, can create skepticism which may affect your decision about receiving a vaccine.

These concerns are natural. However, it is important to look to the science and facts, rather than to follow gossip and “fake news” on social media. The risk of serious illness or death from COVID-19 far outweighs risks from vaccines. Across the globe, over 476 million people have received at least one dose of a vaccine. At the time that this article was written, no deaths in Canada have been linked to vaccines, while nearly 23,000 Canadians have lost their lives to COVID-19.<sup>1</sup>

This article presents facts about COVID-19 vaccine development, safety surrounding the vaccines, and potential side effects.

### **How did vaccines get developed so quickly?**

**Existing Knowledge.** The virus that causes COVID-19 is a coronavirus. While this particular virus (SARS-CoV-2) is new, scientists have been studying coronaviruses for over 50

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years and already had basic information about this type of virus (e.g., the structure, genome, and life cycle). As Dr. Eric J. Yager, an Associate Professor of microbiology at Albany College of Pharmacy and Health Sciences explains, scientists were able to uncover the viral sequence just 10 days after the first cases were reported in Wuhan, China.<sup>2</sup> Researchers already had knowledge of the “spike protein”<sup>3</sup> and had evidence that it was a good target for creating an effective vaccine. Previous vaccine research gave scientists a head start.

**Investment.** Because officials worldwide understood the seriousness of COVID-19, the response to develop vaccines was swift. International collaboration was immediate and billions of dollars were invested by governments, the private sector, and the Coalition for Epidemic Preparedness (CEPI). Researchers had immediate access to funding allowing pharmaceutical companies to work quickly.<sup>4</sup> Because this was a global crisis and funding wasn’t an issue, researchers were able to focus their time on vaccine development rather than writing funding proposals or finding recruits for trials.

**Parallel Trials and Rolling Reviews.** The usual steps for testing and review were followed. No steps were skipped. Typically, clinical trials run in sequence (e.g., Phase 2 occurs once Phase 1 is complete, etc.), but because of the immediate need, trials ran at the same time. Additionally, pharmaceutical companies provided data to regulators as it was coming in, rather than waiting until all trials were complete. This allowed for “rolling reviews,” thereby reducing the time it would normally take for regulators to approve the vaccines.<sup>5</sup>

## **Do the vaccines contain harmful substances? Will they change my DNA? Do the vaccines have the COVID-19 virus in them?**

No! So many claims have been circulating on social media about what’s in the vaccines and how vaccines will affect our bodies. Again, it’s important to look at the facts, to consider what we have experienced in the past with vaccinations (such as with the flu, tetanus, and measles vaccines), and to look at the source of claims made on social media.

Health Canada has approved four vaccines: Moderna, Pfizer-BioNTech, AstraZeneca/COVISHIELD, and Janssen. Currently the Moderna, AstraZeneca, and Janssen vaccines are approved for people 18 years of age and older and the

Pfizer-BioNTech vaccine is approved for people 16 years of age and older.<sup>1</sup> The Janssen vaccine has not yet been rolled out in Canada due to challenges around its production. The AstraZeneca vaccine is being prioritized for certain high-risk groups (e.g., for workers in food processing plants, farms, and greenhouses in British Columbia and for those over 60 years of age in Ontario).

## **The vaccines fall under one of two types of COVID-19 vaccine “platforms”:**

1. Moderna and Pfizer-BioNTech COVID-19 vaccines are mRNA vaccines. Despite claims made on social media, mRNA does **not** change a person’s DNA.

**What is mRNA and how is it being used for vaccine creation?** mRNA, or messenger RNA, gives instructions (or messages) to our cells. In the case of COVID vaccines, the instructions are for our cells to make a protein piece called a spike protein. Once the instructions are in immune cells, the cells use the mRNA to make the protein piece. After the piece is made, the cell no longer needs the mRNA and so the cell breaks it down and gets rid of it. Our cells display the protein piece on their surface. Our immune system recognizes that the protein doesn’t belong and builds an immune response by making antibodies, like what happens in natural infection against COVID-19. At the end of the process, our bodies have learned how to protect us against future infection. Use of mRNA has been used in cancer research and mRNA vaccines have been studied for use in other diseases for decades.<sup>6</sup> mRNA **does not** enter the nucleus of the cell (where the DNA is kept) so it is not possible for the vaccine to interact with, or cause changes to DNA.

2. AstraZeneca/COVISHIELD and Janssen vaccines are viral vector-based vaccines.

**What are viral vector-based vaccines?** A modified version of an adenovirus (a cold virus) delivers instructions to cells in the body. The modified virus is the vector. As with mRNA vaccines, the cells produce the spike protein. The immune system recognizes that the spike protein doesn’t belong there and triggers the immune system to produce antibodies and activates the immune system to fight off what it thinks is an infection. At the end of the process, our bodies have learned how to protect us against future COVID-19 infections. Viral vectors have been used for

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decades and studied for gene therapy, treating cancers, and a number of studies have used viral vector vaccines for Zika virus, HIV, and flu.<sup>6</sup>

## What if I'm pregnant or breastfeeding? Can I still get the vaccine?

Pregnant people are at increased risk for serious illness from COVID-19 and may be at increased risk of adverse pregnancy outcomes (e.g., preterm birth). Because people who were pregnant and breastfeeding were excluded from clinical trials, little information is available; however, experts believe that vaccines are unlikely to pose a risk.<sup>7</sup> Speak to your obstetrician, midwife, or family doctor; they will help you decide what's right for you after reviewing the risks and benefits of the COVID-19 vaccine.

## What are the side effects of these different vaccines?

In general, the side effects of all of these vaccines are similar to what you might experience with other vaccines you've had in the past. In clinical trials, the most common side effects included:

- pain at the injection site
- body chills
- feeling tired
- feeling feverish
- headache
- muscle pain, and
- nausea

These side effects are good! They occur as a result of your body building immunity.<sup>1</sup>

With all vaccines—as with all medications—there's a chance for serious side effects, including allergic reactions, but these are rare. Speak to your healthcare professional before you receive the vaccine if you have serious allergies or known allergies to ingredients in the vaccines. While some cases of anaphylaxis have been reported (~50 cases in Canada for over 2.8 million vaccines administered), anaphylaxis is treatable with epinephrine, unlike COVID-19.<sup>1</sup>

## I've heard that the AstraZeneca vaccine can cause blood clots in rare cases. Is this true?

There have been a few reports of blood clots occurring in people receiving the AstraZeneca vaccine in Europe. Over 45 million doses of the AstraZeneca vaccine have been administered globally with about 30 reports of blood clots occurring. No cases have been reported in Canada. In an abundance of caution however, Canada's National Advisory Committee on Immunization (NACI) has recommended that the AstraZeneca vaccine be paused in people under the age of 55 pending further investigation on reported cases of vaccine-induced prothrombotic immune thrombocytopenia (VIPIT) in Europe.<sup>8</sup> NACI will continue to review evidence as it emerges.

While this news may heighten vaccine hesitancy, it in fact shows that the systems in place to protect the public are working. Regulators will continue to evaluate the benefits of the vaccine to prevent COVID-19 (which itself causes clotting problems and can be fatal) in comparison with the risks.

Patients who show symptoms of a blood clot (e.g., headache, dizziness, impaired vision, breathlessness, pain in the chest or stomach, small bruises) after vaccination should seek prompt medical attention.

Health Canada continues to monitor the safety of all vaccines by working in close collaboration with the provinces, territories, and vaccine manufacturers.

The information contained within this document is valid as of March 30, 2021.

**The bottom line.** The COVID-19 pandemic will end much sooner, with fewer lives lost the sooner people are vaccinated.

## Fast Facts

- Vaccine creation was not rushed. Steps weren't skipped.
- Viral vector vaccines cannot cause infection with COVID-19 or the virus used as the vaccine vector.
- mRNA vaccines do not change our DNA.
- It remains riskier to you, your friends, and family members to stay unvaccinated.
- Vaccines only work if people take them. Ending the pandemic requires the majority of people to become vaccinated to reach herd immunity.

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- Vaccination is something that you can do to help protect your family, friends, and community.
- Side effects may include pain at the injection site, body chills, feeling tired, and feeling feverish.
- Speak to family, friends, or neighbours who may have had the vaccine. Discuss side effects they had.
- Speak to your healthcare provider if you have lingering concerns. Your physician or nurse practitioner likely has received their COVID-19 vaccine. Ask them what their experience was like.
- Speak to your healthcare provider if you have serious allergies or known allergies to the ingredients in the vaccine.
- People who are pregnant, breastfeeding, or want to become pregnant can get vaccinated against COVID-19. Speak to your healthcare professional.

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