



Nurses and
Nurse Practitioners
of British Columbia



COVID-19 Vaccines

And What to Expect

Types of COVID-19 Vaccines

The following is a list of several COVID-19 vaccines that are either currently undergoing advanced stage trials or are at the point of approval in some jurisdictions. Vaccine manufacturers around the world are producing different types of COVID-19 vaccines, each of which are held to a high standard of quality and efficacy before they are approved. Some of these vaccine types include messenger RNA or 'mRNA', adenovirus-based, protein-based and inactivated vaccines, all of which can be equally effective at preventing infection from COVID-19

LPN

NP

RN

RPN

Pfizer-BioNTech



BIONTECH

Name of vaccine: **BNT162b2, Comirnaty, or tozinameran**

The Pfizer-BioNTech vaccine was approved in Canada on December 9, 2020. This vaccine uses messenger RNA, also known as 'mRNA' which are made up of a gene from the coronavirus that is surrounded by an oily lipid nanoparticle shell. This lipid shell is very fragile and needs to be kept at a very cold temperature prior to use (-70 degrees Celsius).

Once the mRNA vaccine is injected the vaccine particles start doing their job. These particles fuse with our cells and release the mRNA. Our cells read the 'instructions' provided by the mRNA, and spike proteins are formed. Our bodies recognize that these spike proteins are foreign, and our immune system starts to fight them off and it will do it again if exposed to COVID-19.

Based on studies involving 44,000 participants, the Pfizer-BioNTech vaccine has demonstrated a 95% efficacy rate just one week after the second dose is administered.ⁱ



Did you know?

Messenger RNA vaccines are quicker and easier to make than other types of vaccines. These types of vaccines are relatively new, but mRNA has been tested in humans before, specifically for rabies, influenza, cytomegalovirus and zika.ⁱⁱ

Moderna



Name of vaccine: **mRNA-1273**

The Moderna vaccine is similar to the Pfizer-BioNTech vaccine in that it also uses messenger RNA or mRNA. The Moderna vaccine was approved in Canada on December 23, 2020.

The Moderna vaccine also needs to be maintained at cold temperatures. Moderna has said that their vaccine can be kept at -20 degrees.

Once the vaccine is injected, the vaccine particles fuse with our cells and the process of creating spike proteins and an immune system response begins. This gives our immune system a preview of what the real COVID-19 virus would look like, so it can pre-emptively design antibodies that can fight off the real virus if it ever needs to.

Based on studies involving approximately 30,000 participants, the Moderna vaccine has demonstrated a 94.1% efficacy rate within just two weeks of the second dose.ⁱⁱⁱ



Adenovirus-Based Vaccines

Oxford-AstraZeneca



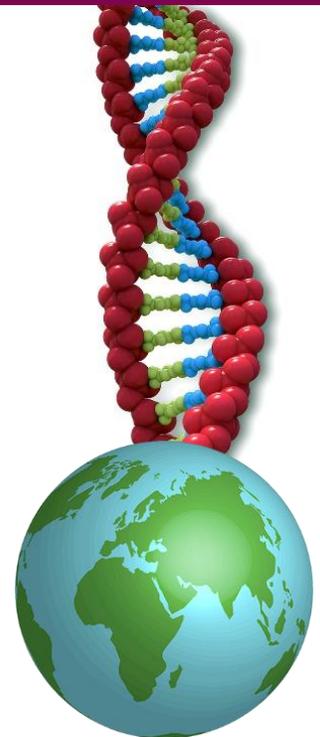
Name of vaccine: **ChAdOx1 nCoV-19, AZD1222 or Covishield (version)**

The University of Oxford partnered with British-Swedish company AstraZeneca to begin working on an adenovirus-based vaccine. Britain approved this vaccine for emergency use in December 2020, and India approved the Covishield version of this vaccine in January 2021. This vaccine is made with the use of an adenovirus, which is another type of virus that commonly causes cold- and flu- however it cannot replicate inside the body.^{iv} Once inside the body, the adenovirus is transmitted into cells, and those cells send out a warning signal that provokes the immune system to respond.^v

Adenovirus-based vaccines use COVID-19 DNA rather than mRNA. DNA is not as fragile as mRNA, meaning that the vaccine does not need to be maintained at the same extremely low temperatures as the Pfizer-BioNTech or Moderna vaccines. Oxford-AstraZeneca states that their vaccine lasts for at least 6 months when refrigerated between 2 and 8 degrees Celsius.

The Oxford-AstraZeneca vaccine requires two injections given 8 to 12 weeks apart. This vaccine has demonstrated a 63.1% efficacy rate.^{vi}

Oxford-AstraZeneca is a non-profit COVID-19 vaccine that can be deployed all around the world for truly global use.^{vii} The 6-month shelf-life at standard refrigeration temperatures will allow for easier shipping and storage.



Johnson & Johnson (Janssen Pharmaceutica)



Name of vaccine: **Ad26.COV2.S or JNJ-78436735**

The Johnson & Johnson vaccine is another adenovirus-based vaccine where the genetic material from COVID-19 is combined with an adenovirus that acts as a carrier when inserted into the human body. The adenovirus used is known as adenovirus serotype 26 or 'Ad26', and Johnson & Johnson has used the same adenovirus to formulate vaccines for other diseases before, such as the one they created for Ebola.^{viii, ix} Like the Oxford-AstraZeneca vaccine, the adenovirus triggers an immune response, but does not replicate inside human cells. However, unlike all other advanced stage vaccines to date, Johnson & Johnson has been testing a vaccine that only requires one injection, rather than two.

Johnson & Johnson's commitment to producing an effective single-injection vaccine would allow them to help vaccinate up to one billion people each year.^x Advanced stage trials are expected to wrap up toward the end of February, and North Americans could see an approved Johnson & Johnson vaccine around March.^{xi}

PHARMACEUTICAL COMPANIES
OF *Johnson & Johnson*



Novavax

NOVAVAX

Name of vaccine: **NVXCoV2373**

The Novavax vaccine is protein-based, meaning that it contains a coronavirus protein mixed with a proprietary MatrixM™ 'adjuvant' which is injected into the body and prompts an immune system response. The coronavirus protein is modified so that it cannot replicate, making it safe for injection. This vaccine is also manufactured inside of moth cells, which is much faster than manufacturing a vaccine through more traditional mammalian cells.^{xii}

An adjuvant is a special ingredient that can be used in a vaccine to make it work better.^{xiii} Studies show that immune system results are stronger when the protein is combined with the adjuvant, compared to when the vaccine is administered with the protein alone.^{xiv}

The Novavax vaccine requires two injections. Through Phase 3 trials, researchers discovered that the vaccine produced both disease-fighting antibodies as well as T-lymphocyte cells, which are an immune system cell that help to fight off infection.^{xv}



Did you know?

Other protein-based vaccines have been used before for diseases such as Hepatitis B and shingles.^{xvi}

Medicago

Medicago

Name of vaccine: **VIR-7831**

The Medicago vaccine is another unique vaccine made by injecting coronavirus proteins into a plant known as *Nicotiana benthamiana*. Once the proteins have been injected, the plant produces something called "virus-like particles" which upon injection, promote an immune response in humans.^{xvii} Medicago is also testing their vaccine by combining it with various adjuvants, and has noted encouraging results from the different combinations.

Medicago has discovered that growing these virus-like particles inside of plants is much quicker than developing a vaccine traditionally by incubation inside of chicken eggs. In fact, Medicago was able to formulate an early version of their vaccine within only 20 days of receiving the genetic sequence information for COVID-19.^{xviii}

Medicago has two primary locations in North America. One manufacturing plant is in North Carolina, and the other smaller plant just outside of Quebec City is currently undergoing some large-scale expansions.



Sinopharm



国药集团
SINOPHARM

Name of vaccine: **BBIBP-CorV**

Sinopharm developed their vaccine in collaboration with the Beijing Institute of Biological Products and it has already been approved for emergency and full use in several countries including United Arab Emirates, Bahrain and Egypt.^{xix} The Sinopharm vaccine is made using inactivated coronaviruses, meaning that these viruses are either weakened or killed before they are used to create a vaccine. The Sinopharm vaccine cannot cause COVID-19 infection when it is injected into the human body. An adjuvant is then added to the dead coronaviruses, which prompts the body to start its immune response.

This method of creating vaccines with an inactivated virus has been used for over a century and is the same method that Salk employed to create the polio vaccine in the 1950s.^{xx}

Approximately one million people in China received this vaccine by November 2020. As of early February, this vaccine had been administered to 31 million people. China plans to vaccinate 50 million people by early April 2021.^{xxi}



The Nursing Role in Understanding COVID-19 Vaccines

As the COVID-19 vaccines are approved around the world, doses of these vaccines will be deployed. Canada has currently approved the Pfizer-BioNTech vaccine as of December 9, 2020 as well as the Moderna vaccine on December 23, 2020. The goal is that as Phase 3 trials are completed, other equally effective vaccines can be approved for general use in Canada.

Nursing is guided by science and scientific evidence. All nurses have a professional obligation to be part of health promotion and disease prevention public health strategy that will save future lives. Through decades of research and clinical testing, vaccines have been proven to be both safe and effective. Because nurses consistently rank as one of the most trusted professions, nurses are integral to sharing this information with the public. When science is combined with a patient and family centered care approach, there is an opportunity to inform and clarify. NNPBC encourages all nurses to share this information and bring clarity and facts to patients and clients around COVID-19 vaccines.

Further Reading

[BCCDC: Vaccines for COVID-19](#)

[CBC News: Coronavirus vaccine tracker](#)

[NNPBC Blog- Tackling Vaccine Hesitancy](#)

[What you need to know about Vaccine Roll-Out](#)

[ImmunizeBC: How do vaccines work?](#)

[WHO: How do vaccines work?](#)

[WHO: Coronavirus disease \(COVID-19\) advice for the public](#)



Endnotes

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- ^{xiii} CDC website. Aug 14, 2020. *CDC: Centers for Disease Control and Prevention*. "[Adjuvants and Vaccines.](#)"
- ^{xiv} Novavax. Nov 9, 2020. *Novavax*. "[Novavax COVID-19 Granted Fast Track Designation by U.S. FDA.](#)"
- ^{xv} Christensen, J. Sep 2, 2020. *CNN*. "[Novavax coronavirus vaccine is safe, published results show.](#)"
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- ^{xvii} Jarvis, C and Campanella, E. Jan 11, 2021. *Global News*. "[Canada's COVID-19 vaccine contender: Medicago's breakthrough, ties to Big Tobacco and warnings a pandemic was coming.](#)"
- ^{xviii} Ibid.
- ^{xix} Corum, J, Zimmer, C and Wee, S. Feb 11, 2021. *New York Times*. "[Coronavirus Vaccine Tracker.](#)"
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- ^{xxi} Liu, J, O'Brien, E and Che, C. Feb 8, 2021. *Bloomberg News*. "[Facing Resistance, China Pushes Back 50 Million Vaccine Target.](#)"