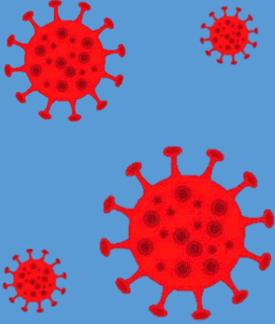


# **COVID-19 VACCINES**

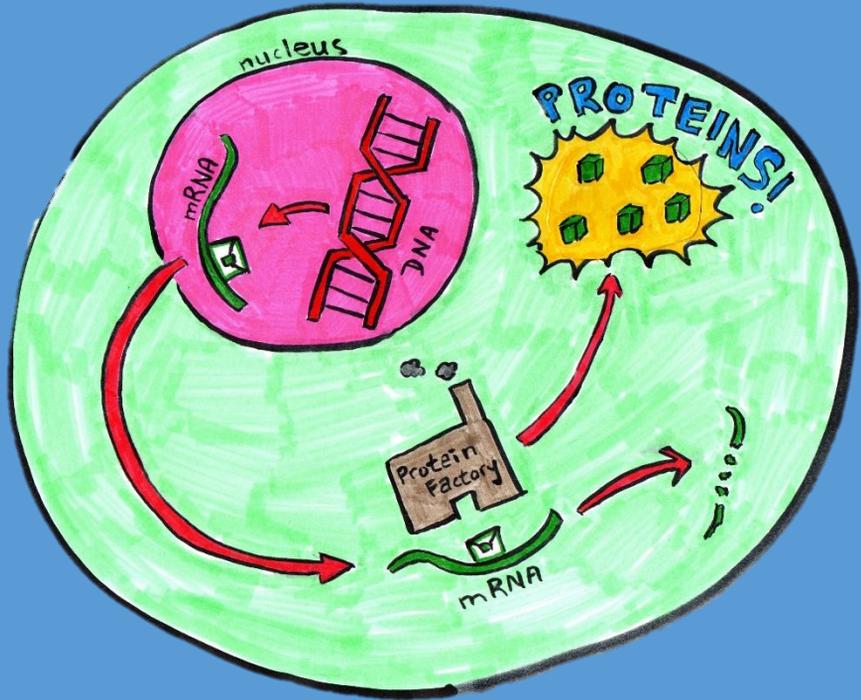
**What you need to know**  
**Part 1: The Basics**

Allison Barre MSc PharmD RPh  
Illustrated by Derrick Yeung MSc MLT

# What is mRNA?

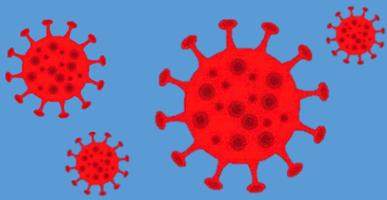


mRNA is found in all of your cells



It is the Messenger (get it!) that transfers info from the DNA in the nucleus to the protein factories outside, making all the proteins that make you, you!

mRNA is like a photocopy or snapchat – it gets deleted once its job is done



# Vaccines

Usual Suspects

VS.

mRNA Vaccine

Dead virus



Viral proteins on  
a friendly virus



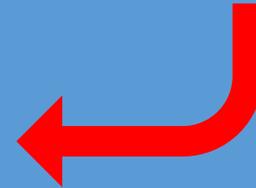
Instructions to make  
viral proteins



Weakened virus



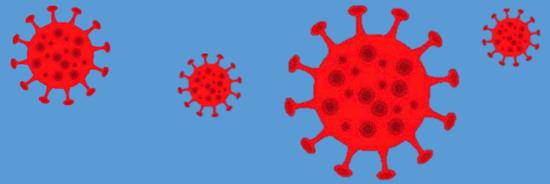
Viral proteins



Vaccines work by showing your body a piece of virus so it can prepare for a later attack

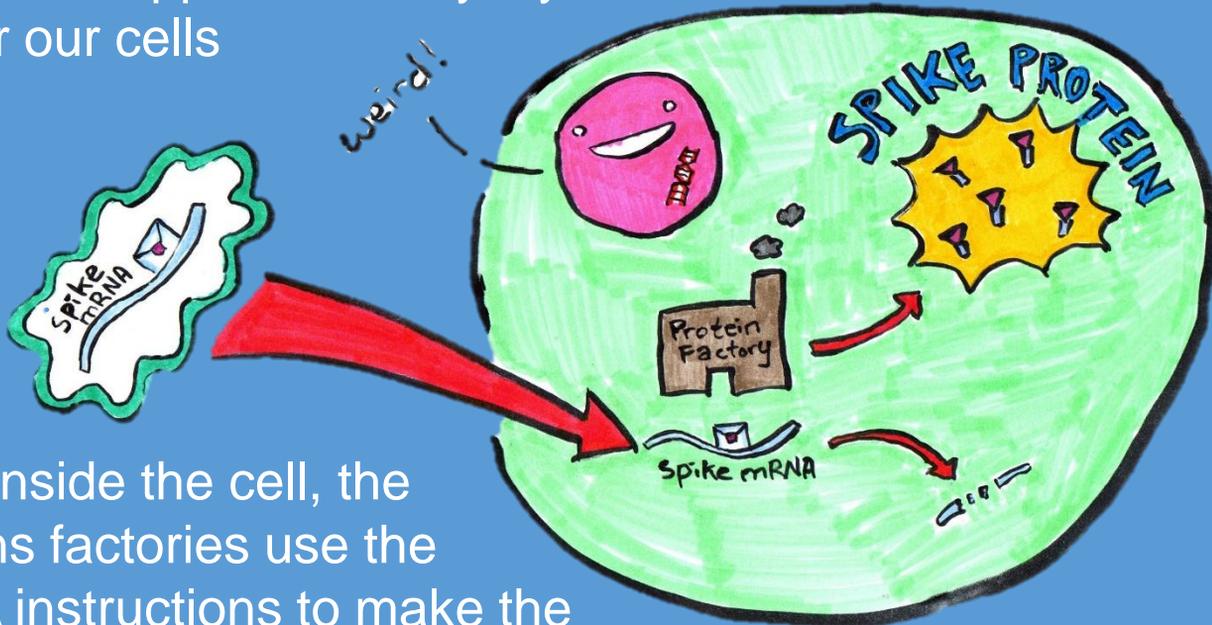
mRNA vaccines start 1 step earlier – they give your body instructions to make a virus protein instead of injecting the protein or virus itself

# STEP 1



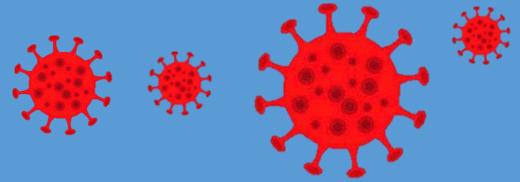
Coronaviruses use the spike protein on its surface to attach and enter your cells

The mRNA vaccine contains instructions for this spike protein wrapped in a fatty layer to allow the mRNA to enter our cells



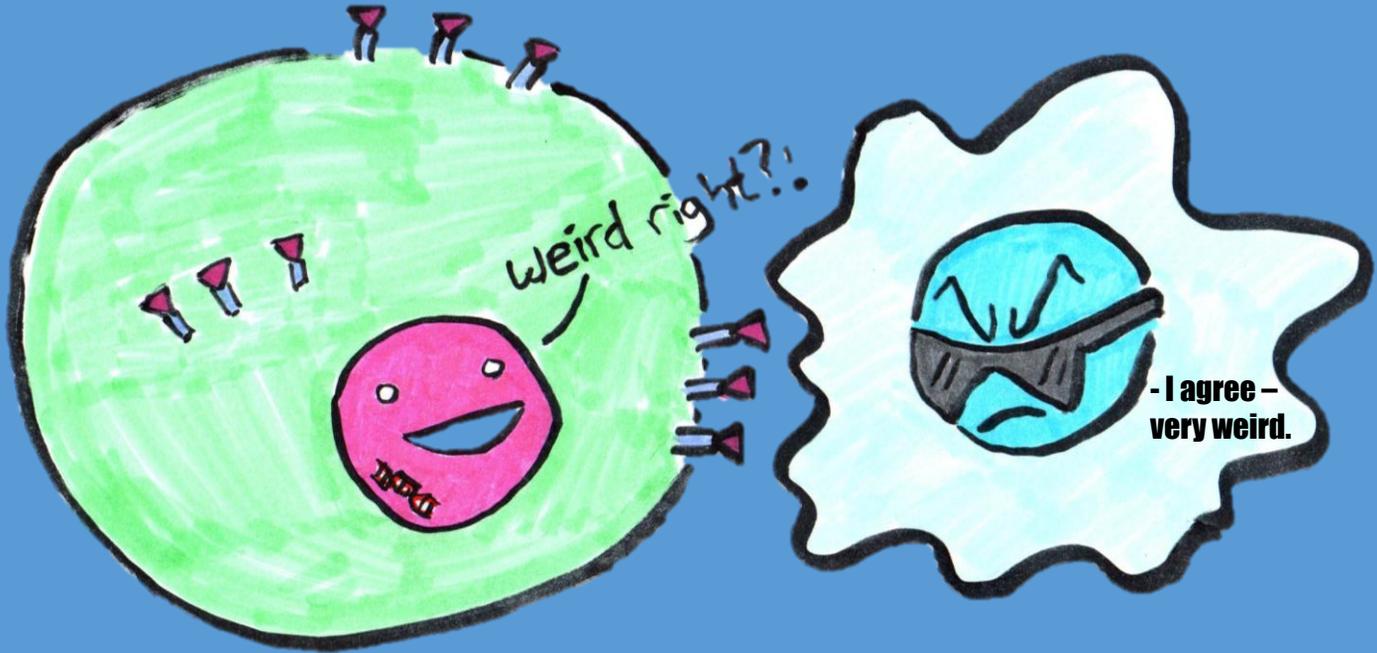
Once inside the cell, the proteins factories use the mRNA instructions to make the spike protein. The mRNA then degrades

# STEP 2

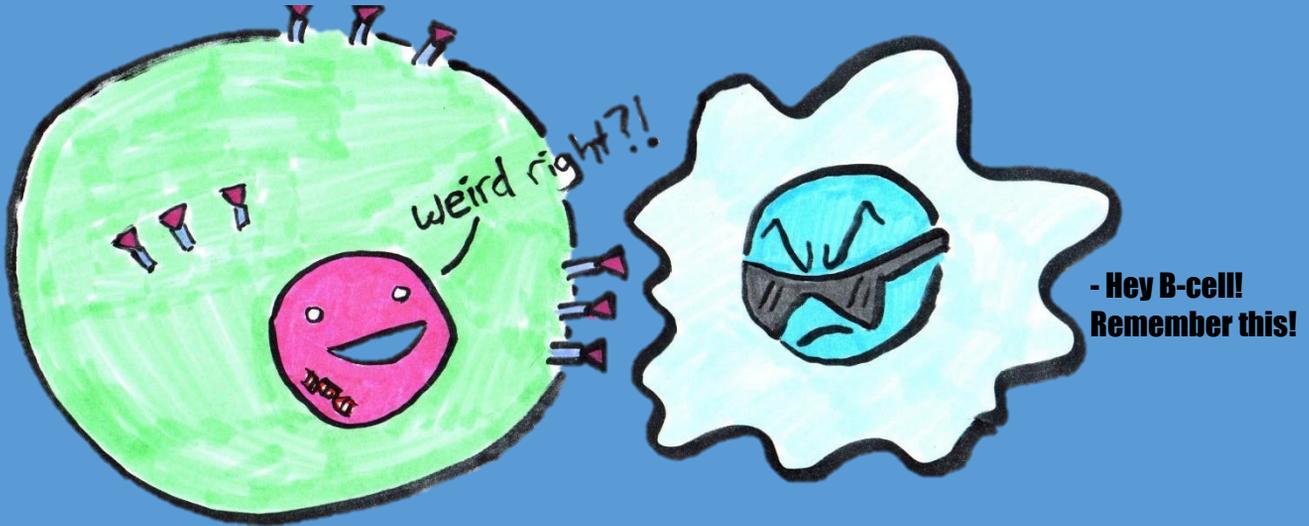
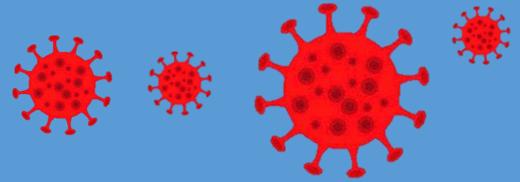


The cell knows this protein doesn't belong, so it sends it to the surface.

Immune cells recognize the weird proteins, mounting a controlled attack



# STEP 3



Now the immune system looks to the future

Special B cells are activated and told to remember this protein by making antibodies in case of a future COVID-19 attack



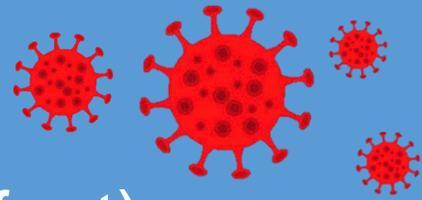
# STEP 4



If COVID-19 ever tries to enter the body, these antibodies are a fast-track system. They allow your body to create a defense much faster than if you had never been exposed.

This prevents you from getting sick and possibly passing the virus on.

# Side Effects



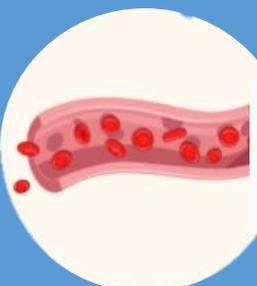
(or, as I prefer, the MAIN effect)



Vaccine injection triggers the immune system

Result = initial symptoms at the site

- Pain, redness, swelling



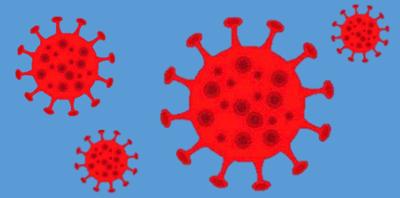
The body then generates a full immune response through signals in the blood

Result = general symptoms

- Headache, fever, tiredness



# Ingredients



**1 mRNA – the active ingredient**



**2 Fats – protective outer layer**

((4-hydroxybutyl)azanediyl)bis(hexane-6,1-diyl)bis(2-hexyldecanoate)

2[(polyethylene glycol)-2000]-N,N-ditetradecylacetamide

1,2-distearoyl-sn-glycerol-3-phosphocholine

cholesterol

**3 Salts – stabilize the vaccine**

Potassium chloride

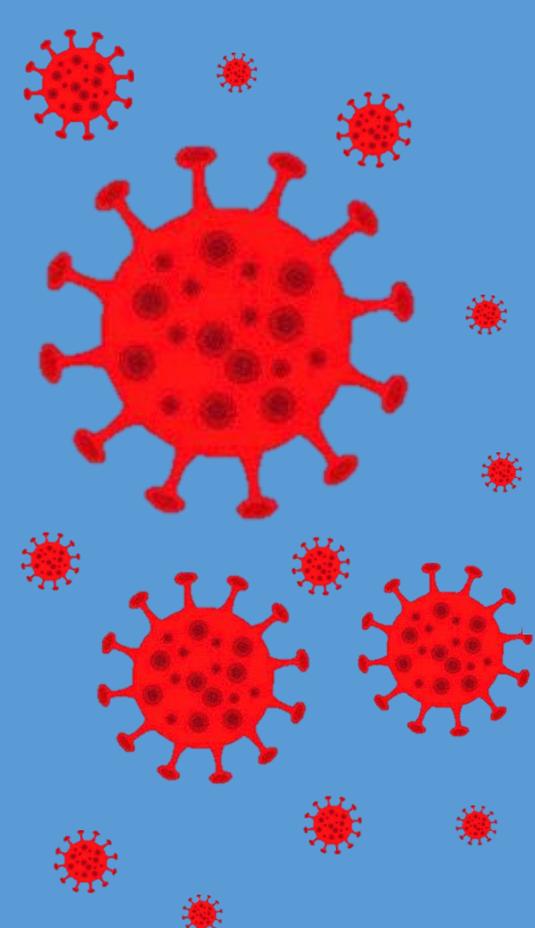
Monobasic potassium phosphate

Sodium Chloride

Dibasic sodium phosphate dehydrate



**4 Sucrose – protects the fatty layer while freezing**



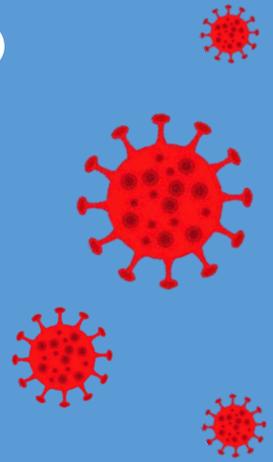
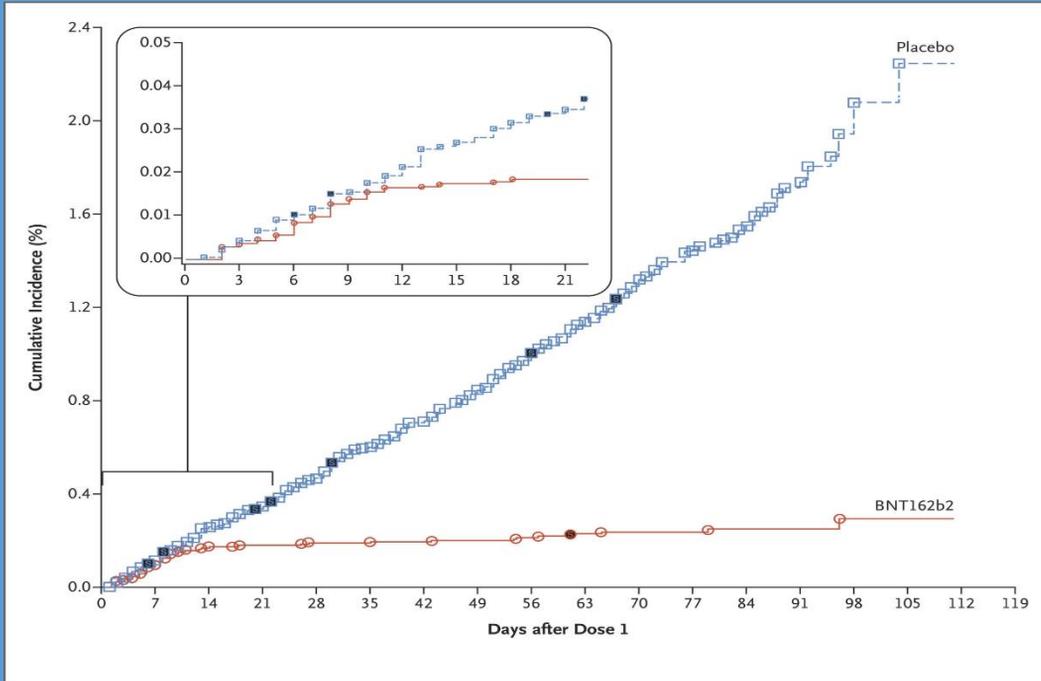
# COVID-19 VACCINES

**What you need to know**

**Part 2: FAQs**

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# Does it work?

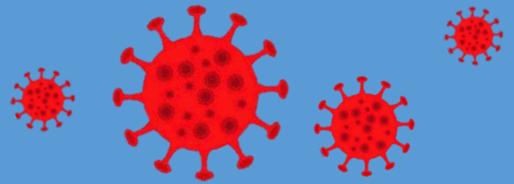


**YES – both mRNA vaccines are around 95% effective**

The BLUE line shows those in the placebo group who did not get the vaccine – their infections kept rising over time

The RED line shows those who were vaccinated – very few were infected over the 4 months shown (only 8 out of 21,720 people!!!)

# Is it safe?



**All the current evidence shows these vaccines are very safe for use**

Vaccines go through a **rigorous testing phase with extremely high barriers set** by regulatory agencies – the highest of any product you use  
(WAY higher than supplements or skin care products!)

**Most serious vaccine effects are seen in the first 2 months** – we have over 6 months of data so far

**Monitoring is ongoing** – we have seen nothing significant with over 14 million doses currently administered

**Anaphylaxis** is a risk with any vaccine for certain people but remember those who administer a vaccine are specifically trained to deal with this situation. Tell your vaccinator if you have a history of severe allergic reactions!

# What about DNA?

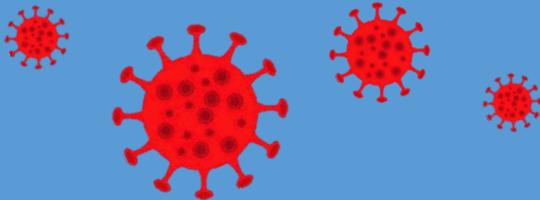
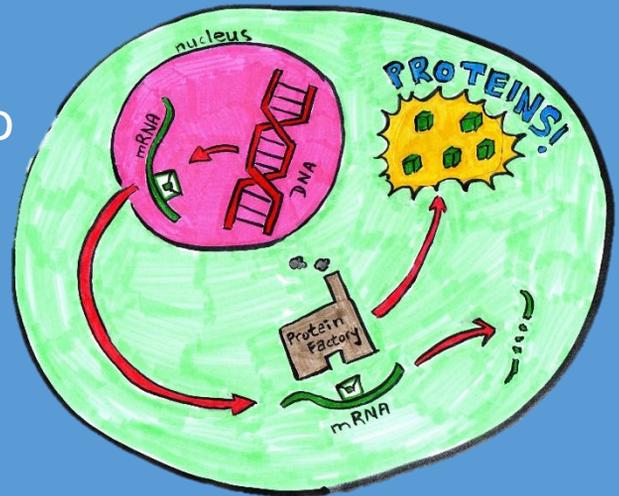
## mRNA VACCINES WILL NOT ALTER YOUR DNA

DNA and mRNA are not the same

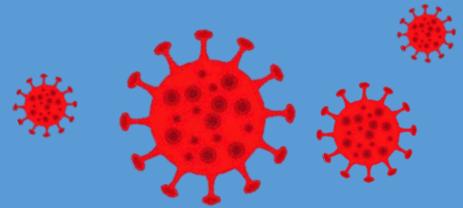
mRNA is a copy of the info in DNA, which is highly protected in the nucleus

mRNA cannot easily travel into the nucleus **AND** our bodies do not have the ability to convert mRNA into DNA

Finally, mRNA breaks down quickly after doing its job



# Too fast?

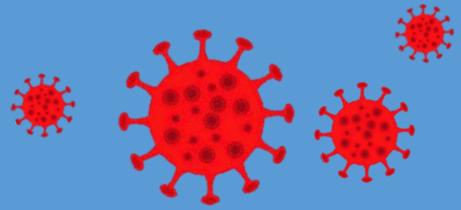


This the fastest a vaccine has ever been developed.

BUT this is due to many positive factors and is a MAJOR ACHIEVEMENT

- 1 Increased partnership and funding from across the world
- 2 Streamlined government approval process
- 3 RNA technology has been in development for about 30 years, with +++ advancement in the last 10 years
- 4 SARS and MERS gave us a head start
- 5 mRNA can be made more efficiently vs. other types of vaccines

# Pregnancy



Ontario recently updated its recommendations to allow pregnant and breastfeeding people access to the vaccine

You should base your decision on a risk-benefit discussion with your physician. **Remember that the risk of pregnancy and COVID infection is high.**

## Kids

Pfizer is only approved for kids 16 and older

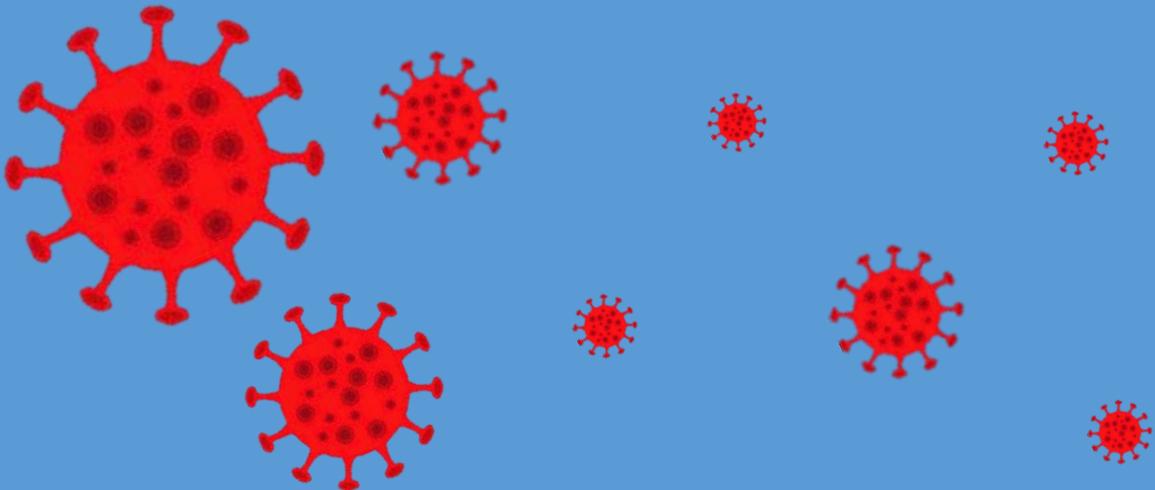
Moderna is only approved for those 18 and older

Further data will be coming!

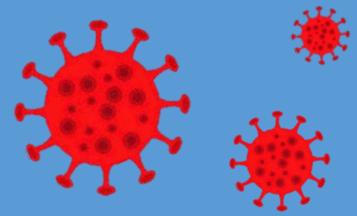
# Immunocompromised

People who are immunocompromised might be at increased risk of severe COVID but they were not included in the trials, so there is not enough information.

Immune compromised individuals can choose to receive the vaccine after a thorough discussion with their health care providers.



# What next?



**How long will the protection last?**

We don't know yet! But this is being closely followed



**Can I stop wearing a mask?**

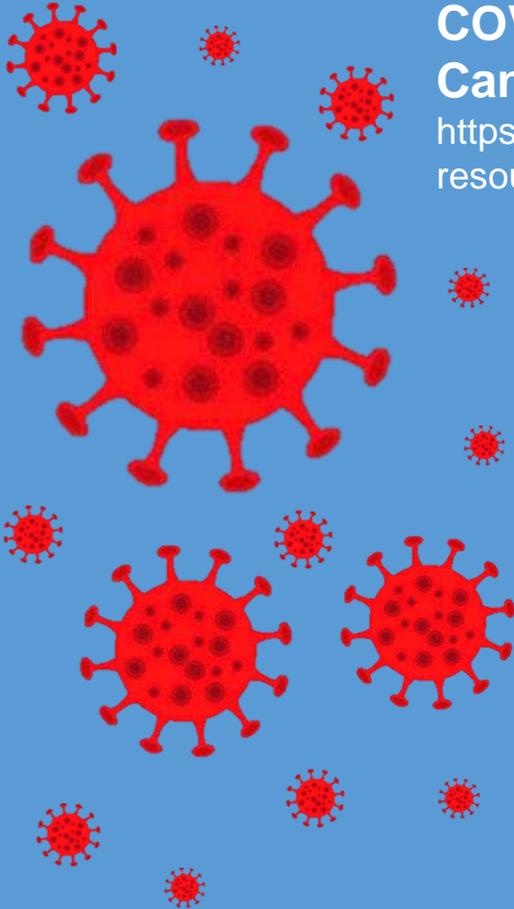
**No.**

We don't know yet if the vaccine prevents asymptomatic infections and the spread of COVID.

**What about the mutations?**

Mutations in the COVID virus do not mean the vaccine will not work. Scientists are testing this now.

# Resources



## **COVID-19 Vaccine info from the Canadian Centre for Effective Practice:**

<https://tools.cep.health/tool/covid-19-vaccines/#top-resources>

## **American Pharmacy Association COVID-10 Vaccines – Key Points**

[https://www.pharmacist.com/sites/default/files/audience/APhACovidKeyPointsHandout\\_1220\\_web.pdf](https://www.pharmacist.com/sites/default/files/audience/APhACovidKeyPointsHandout_1220_web.pdf)

## **Ontario COVID-19 Vaccine Program**

<https://covid-19.ontario.ca/covid-19-vaccines-ontario>

## **Canada COVID-19 Vaccine Information**

<https://www.canada.ca/en/health-canada/services/drugs-health-products/covid19-industry/drugs-vaccines-treatments/vaccines.html>