MAURICE WILKINS CENTRE
FOR MOLECULAR BIODISCOVERY

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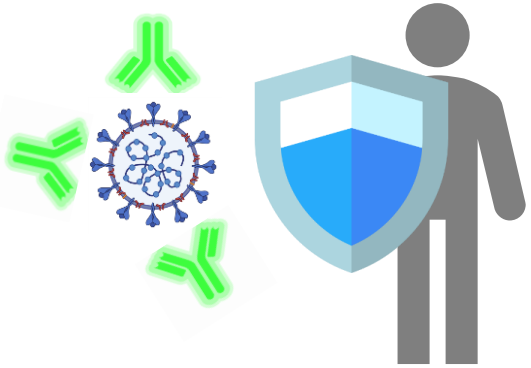
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

Vaccinations kōrero

Dr Natalie Netzler

Virologist, University of Auckland



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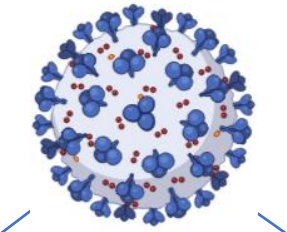
Viruses kill millions of people each year



Antivirals

Vaccinations

Prevention is always better than a cure…

Photo credits: The Tribune and Reuters

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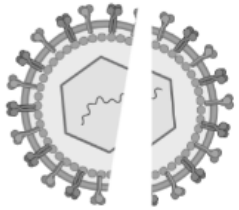
What are the different types of vaccines and how do they work?

Types of vaccines

Inactivated/killed

e.g. polio, hepatitis A, influenza

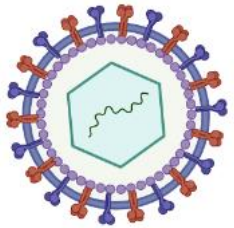


Live attenuated

e.g. MMR, chickenpox, rotavirus

Viral vector

e.g. AstraZeneca/Oxford COVID



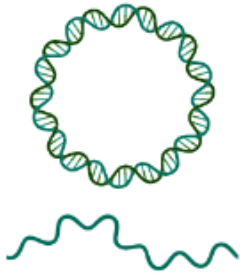
Whole virus or bacterium

Part of virus or bacterium

Genetic material only

RNA (or DNA)

e.g. Pfizer COVID-19



Virus like particle

e.g. HPV

Toxoid

e.g. Diptheria, tetanus, whooping cough

Protein subunit/conjugate

e.g. hepatitis B, influenza, pneumococcal, *Haemophilus influenzae*

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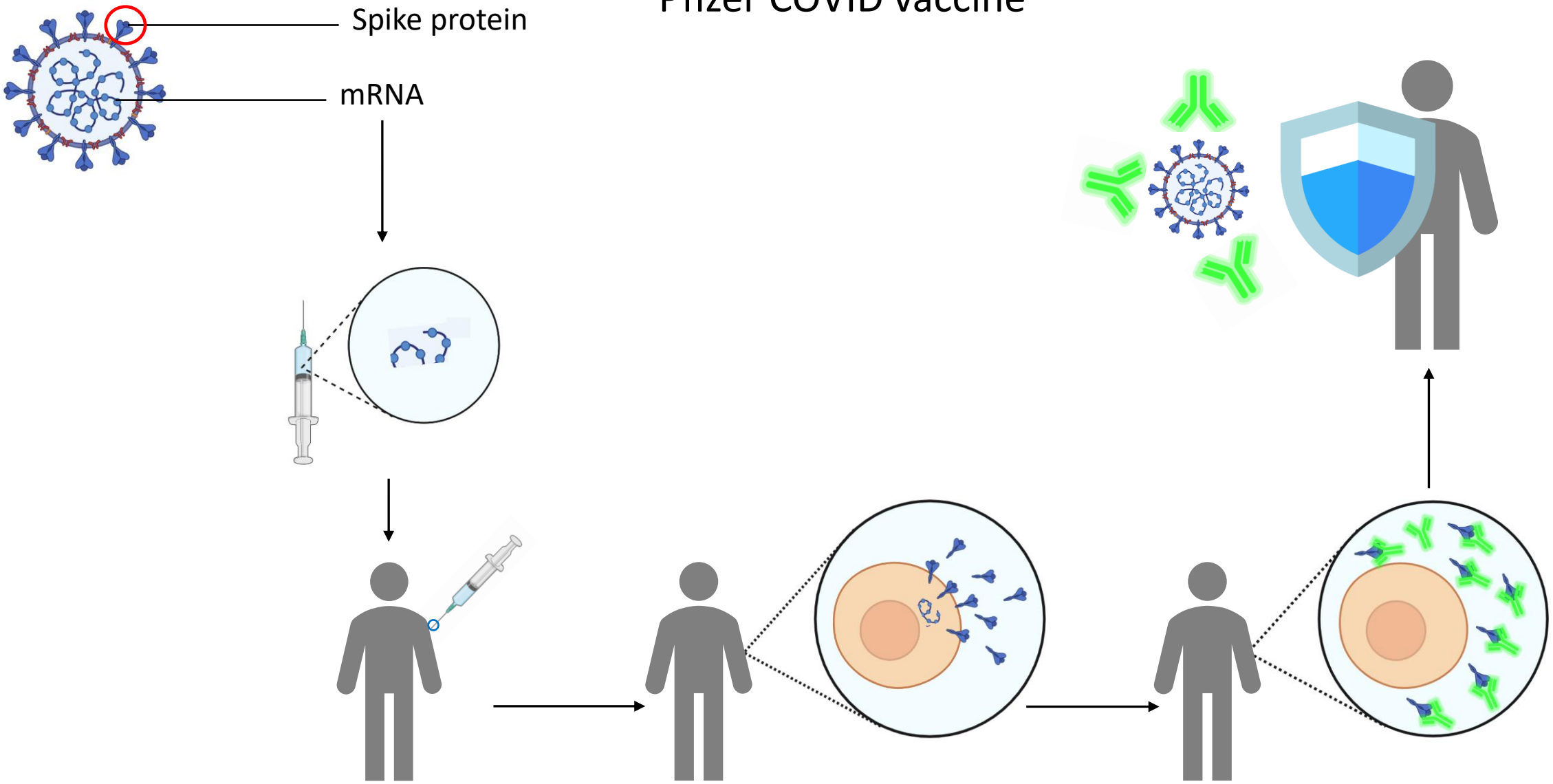
Icon credits: Biorender and World Health Organization: https://www.who.int/news-room/feature-stories/detail/the-race-for-a-covid-19-vaccine-explained

What do vaccines do in our body?

How vaccines make protection in our body

Pfizer COVID vaccine



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What are the usual vaccine side effects?

Some expected effects after vaccinations

These **expected effects are a sign your immunity is making protection** and usually pass within 24-48 hours.

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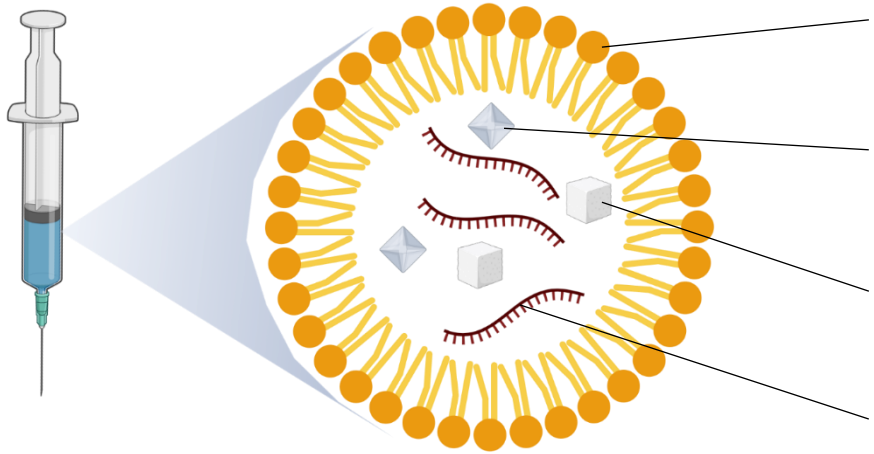
What is in the Pfizer COVID-19 vaccine?

What is in the Pfizer COVID vaccine?



Lipid: Protects mRNA and helps with delivery

Salts: Maintains pH to be compatible with the body

Sugars: Protects the vaccine during freezing

mRNA: Instructions to make the spike protein

Icon credits: made in BioRender

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How do we know vaccines are safe for us and our tamariki?

Vaccine safety

- Clinical trials ensure the vaccine is safe and effective before use:
  - Strict protections in place
  - Decades of research before tested in human trials
  - Trial results show if the vaccine is safe and effective enough for approval
- Ongoing monitoring by FDA, Medsafe and other medical safety committees
- Real world data – millions of people have been vaccinated safely worldwide
- All vaccines used in Aotearoa have a good safety record and ongoing monitoring

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What else can we do to protect our tamariki from infectious diseases?

Layers of protection for our tamariki

- Keep everyone around our kids up to date with their vaccinations (COVID, flu, MMR, whooping cough)
- Teach our tamariki to wash their hands properly (sing the songs/lots of soap bubbles)
- Ask friends and whānau who are sick to stay away until they are well
- Show them to sneeze and cough into their elbow
- **Always** keep them home if unwell
- Answer all their vaccination questions as best you can to reassure them

→ **Prevention is best way to keep children safe!**

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Why should we have the MMR vaccine?

Measles

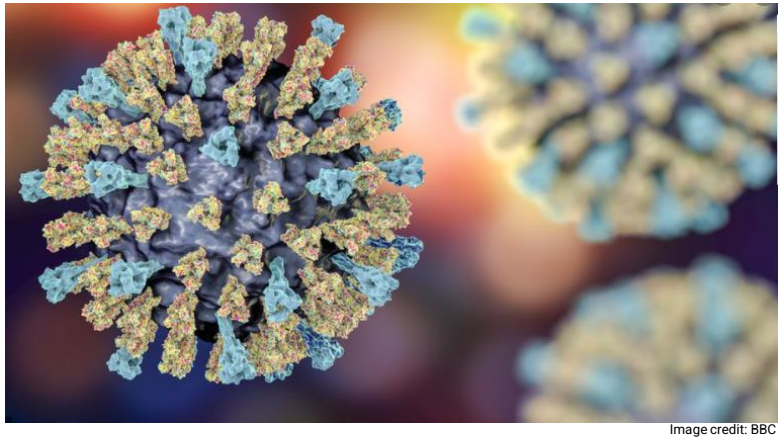


Image credit: BBC

Why is measles so dangerous?

- ~2.6 million deaths each year before 1963 (WHO)
- Highly contagious, small number of viruses can infect
- Airborne for two hours post-sneeze
- Long incubation period (10-14 days)
- Complications ~30% cases, 1 in 10 need hospitalisation
- Makes our immune system ‘forget’ previous protection
- 2019 outbreak in Samoa killed 83 people, mostly under four years
- 2019 Auckland outbreak, 700 people hospitalised

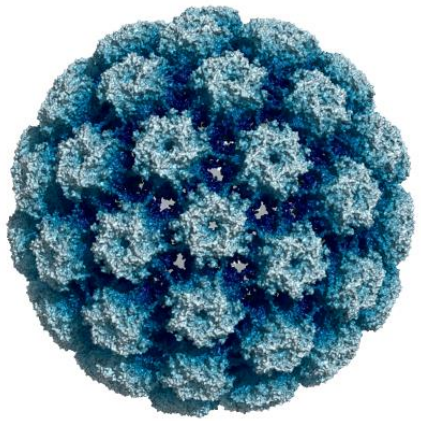
Image credit: RNZ

Measles is prevented by the MMR vaccine:

- Live attenuated vaccine; weakened measles, mumps and rubella viruses
- Kids vaccinated at 12 and 15 months
- Measles protection is over 99% from double vaccination

What about the HPV vaccine?

Human papilloma virus (HPV)



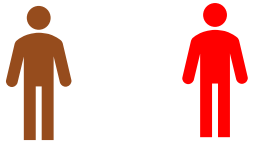
HPV infection can cause cancer

- 91% cervical cancers caused by HPV infection
- **The Gardasil®9 vaccine protects us from HPV**
- Vaccine prevents ~90% of cancer-causing HPV infections
- Virus-like particle vaccine – very safe
- Vaccinated between 11 and 12 years of age (2 doses, 6 months apart)
- Cervical pre-cancer rates reduced 89% in vaccinated women

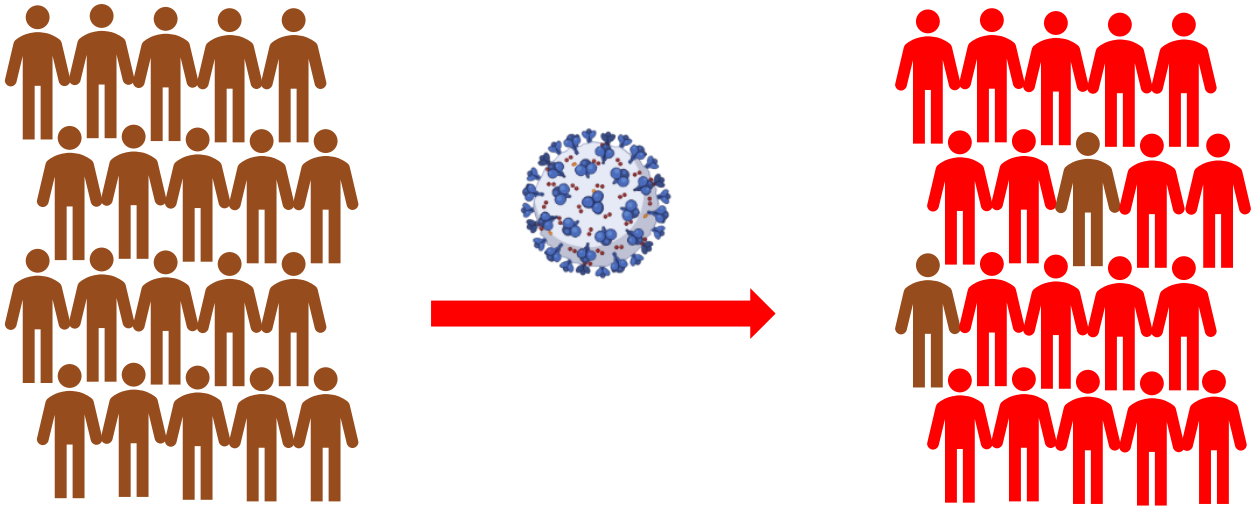
  → expected to reduce cervical cancers by 90%

Image credits: HPV virion – Wikipedia Commons; Gardasil9 – immune.org.nz

Population (herd) immunity and how it works



Unvaccinated Infected



Naïve population Infected population

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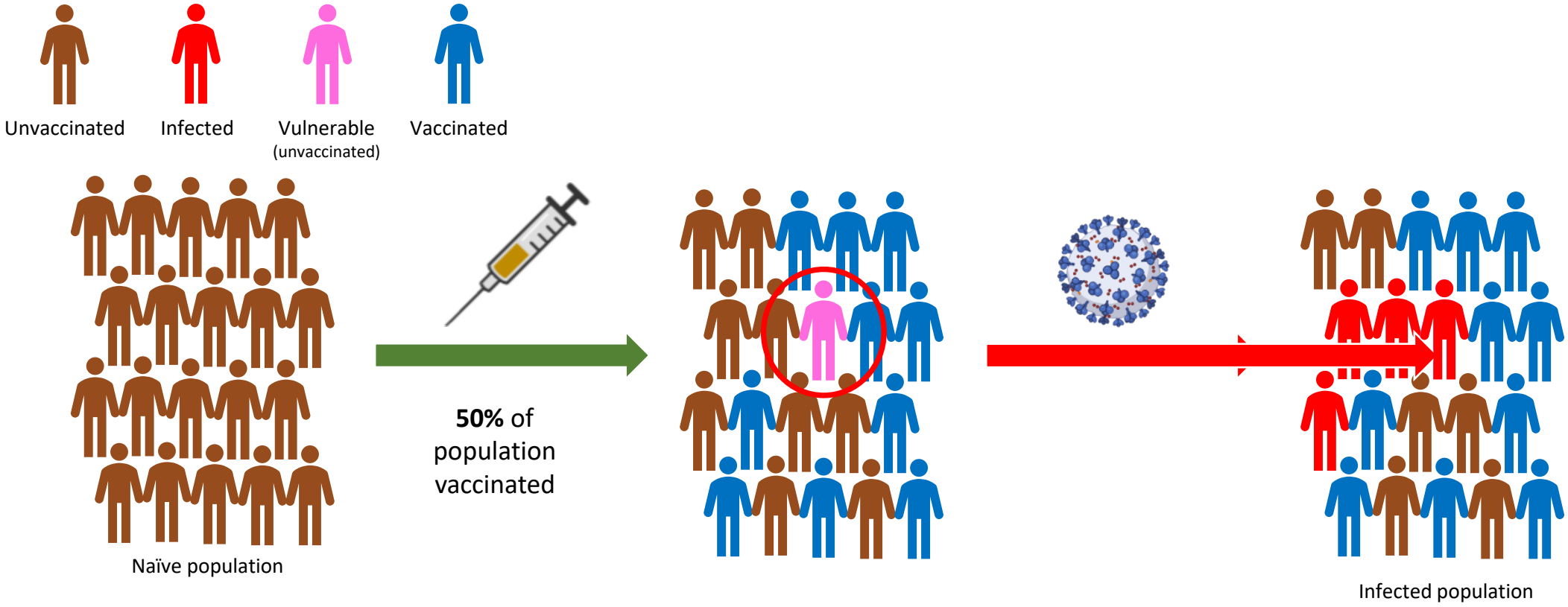
Population immunity and how it works



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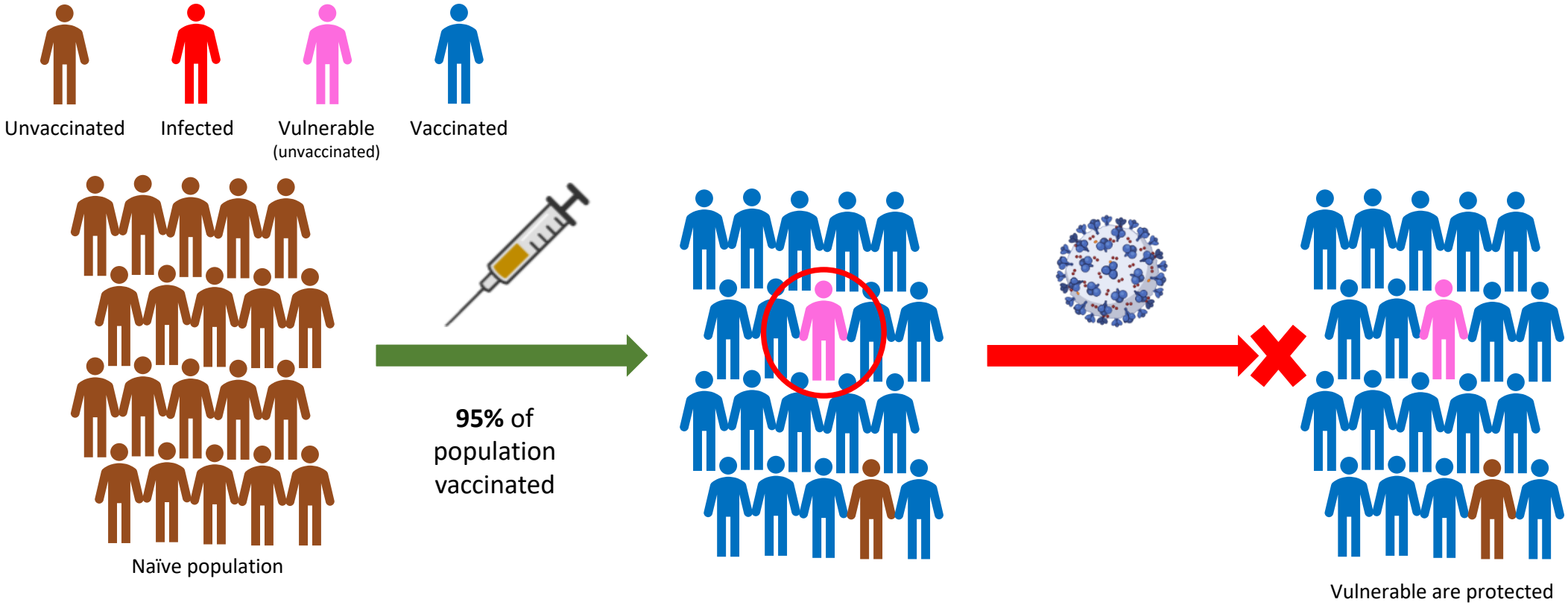
Population immunity and how it works



Imagery made using Biorender

Ngā mihi nui

University of Auckland
Maurice Wilkins Centre
Health Research Council
Professor Peter Shepherd
Chris Puli'uvea

Thank you for listening

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Vaccine and immunity kōrero

Dr Natalie Netzler

Please feel free to ask pātai and discuss vaccinations and immunity.

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