

TB VACCINE TYPES UNDER DEVELOPMENT

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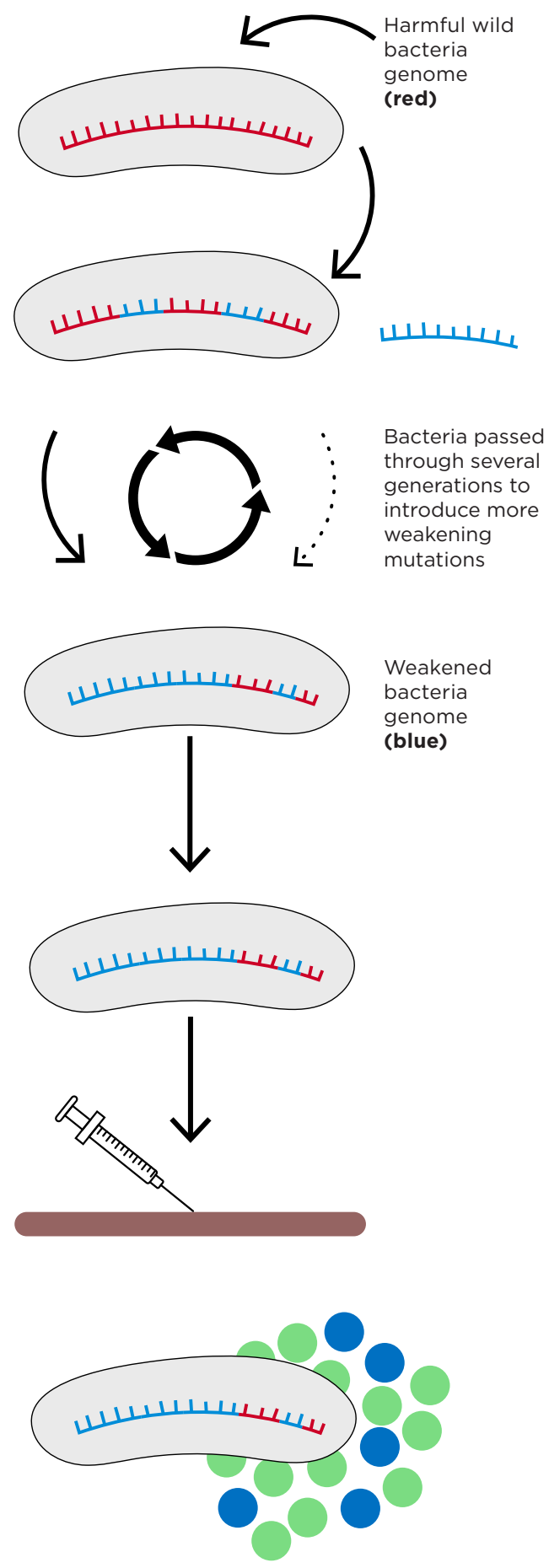
Mycobacterial Live Attenuated Vaccine

Live attenuated vaccines use a weakened version of the disease-causing pathogen to trigger protective immunity against it without causing disease.

First Introduced
1798 - Smallpox

Considerations:
They create strong immune responses.

Some attenuated vaccines may not be suitable for people with compromised immune systems.



These vaccines teach the immune system what MTB looks like to prepare for a future exposure to MTB

Examples of Existing Live Attenuated Vaccines:
Measles/Mumps/Rubella (MMR); Chickenpox; Polio (OPV)

TB Vaccines in Pipeline:
Phase 3:
• BCG (re)vaccination
• MTBVAC
• VPM1002

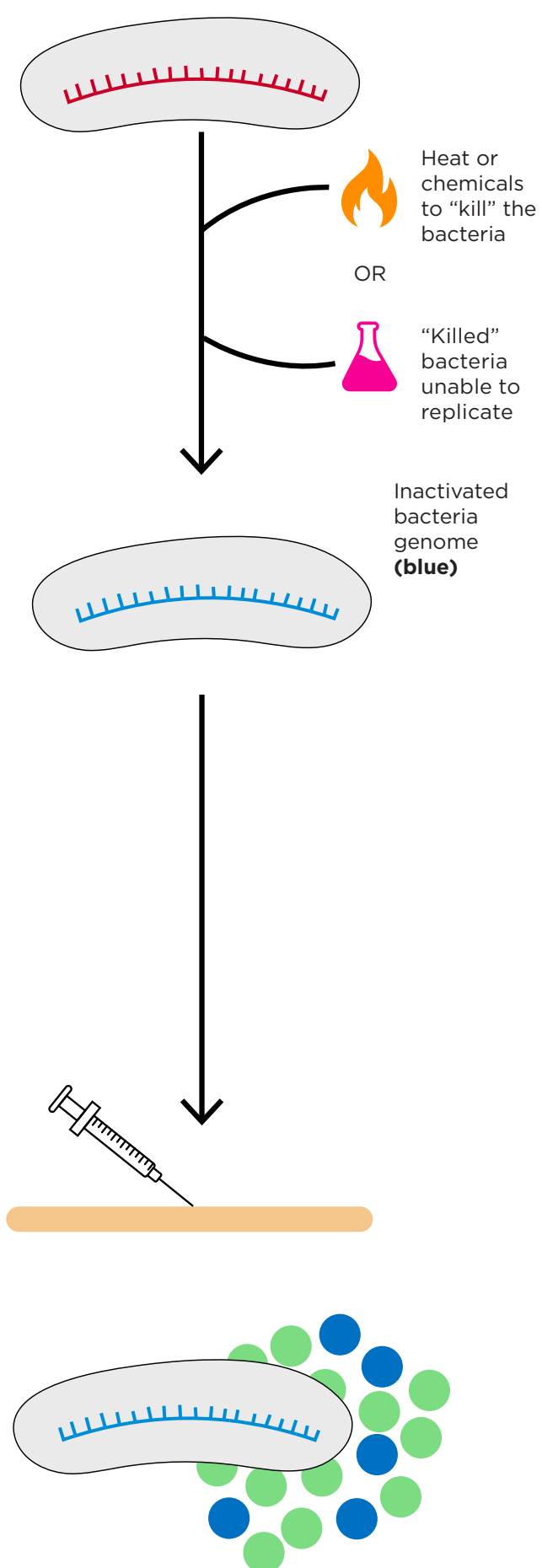
Mycobacterial Inactivated Vaccine (Whole cell or extract)

Inactivated whole cell vaccines use a deactivated version of the disease-causing pathogen to trigger protective immunity against it.

First Introduced
1986 - Typhoid

Considerations:
They are considered safer as the pathogen is already dead.

Protection conferred is usually not as strong as live vaccines, so booster doses are often required.



Examples of Existing Inactivated Whole-Cell Vaccines:
Polio (IPV/Salk), Influenza

TB Vaccines in Pipeline:
Phase 2b:
• DAR-901
• RUTI
Phase 3:
• Immuvac (MIP)

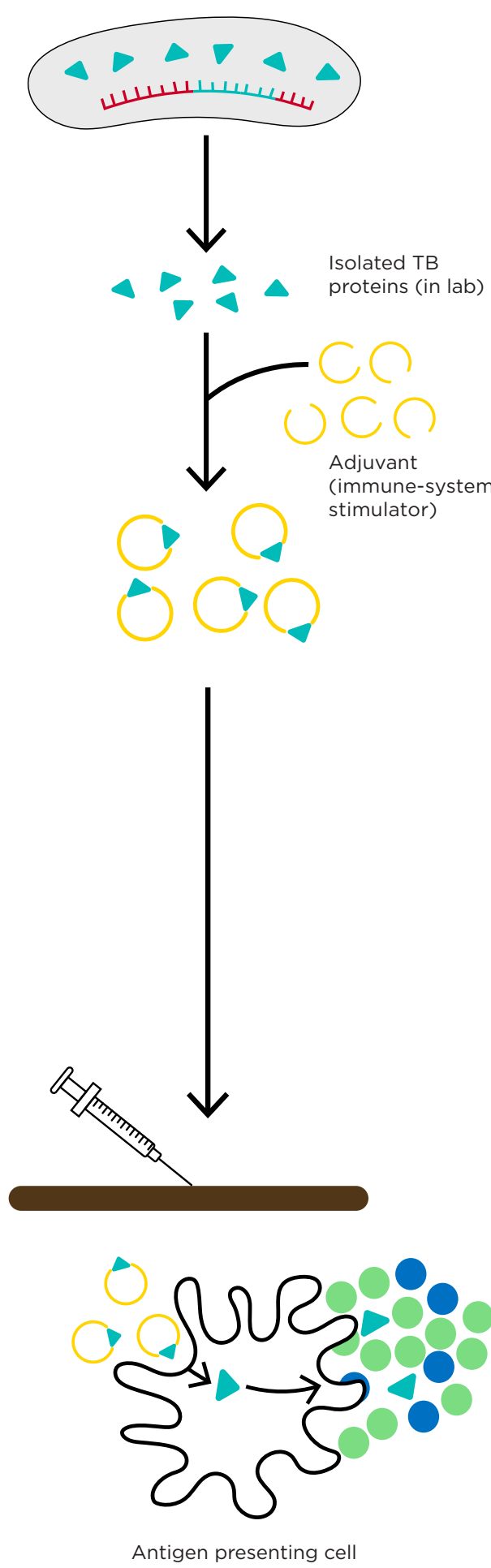
Subunit Vaccine (Protein / Adjuvant)

Protein subunit vaccines use specific proteins from the disease-causing pathogen to trigger protective immunity against it. Often paired with **adjuvants**: something that boosts the body's immune response to the proteins.

First Introduced
1970 - Anthrax

Considerations:
They can help target the immune system to the most relevant part of a pathogen.

They may require multiple doses for long term immunity and require adjuvants to generate a stronger immune response.



Examples of Existing Subunit Vaccine:
Hepatitis B, Shingles, COVID19 (Novavax), HPV

TB Vaccines in Pipeline:
Phase 1:
• H107/CAF10b
Phase 2a:
• AEC/BCO2
Phase 2b:
• ID93+GLA-SE (also called QTP101)
Phase 3:
• GamTBVac
• M72/AS01E

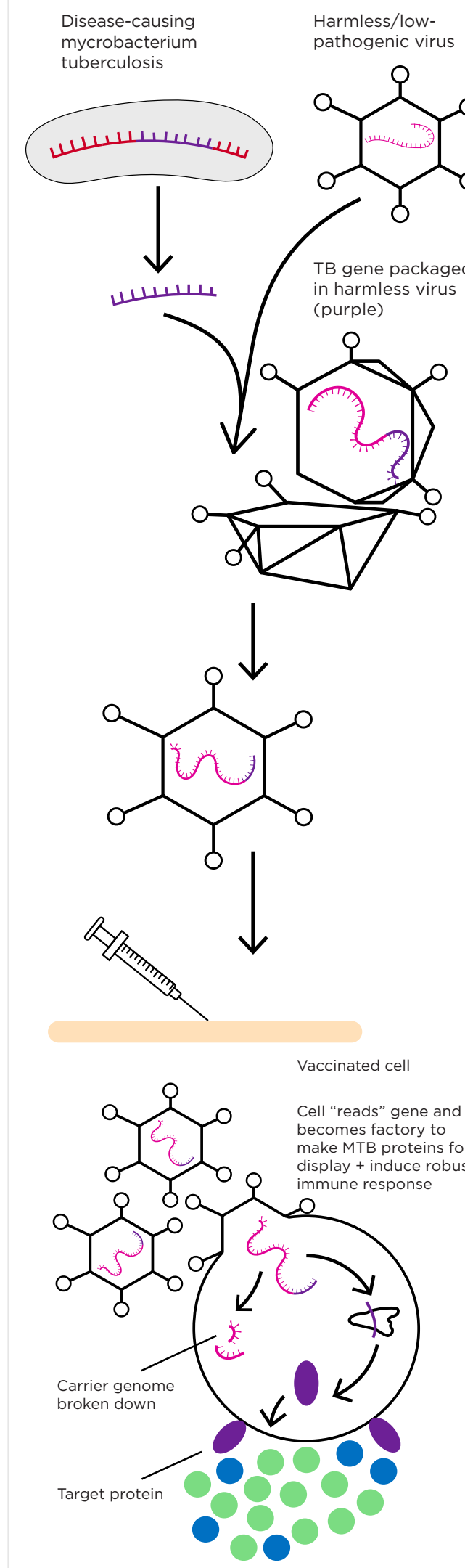
Viral Vector Vaccines

Viral vector vaccines use a harmless virus to deliver instructions to your body's cells to make proteins from a target pathogen, triggering protective immunity against it.

First Introduced
2019 - Ebola
2020 - SARS-CoV-2

Considerations:
They create a strong immune response.

They may not be appropriate for those who are immune to the delivery virus.



Immune system recognizes target protein and creates a memory of it to prepare for a future exposure to MTB

Examples of Existing Viral Vector Vaccines:
COVID19 (Astrazeneca, J&J)

TB Vaccines in Pipeline:
Phase 1:
• AdHu5AG85A
• TB/FLU-05E
Phase 2a:
• ChAdOx2.85A+MVA85A

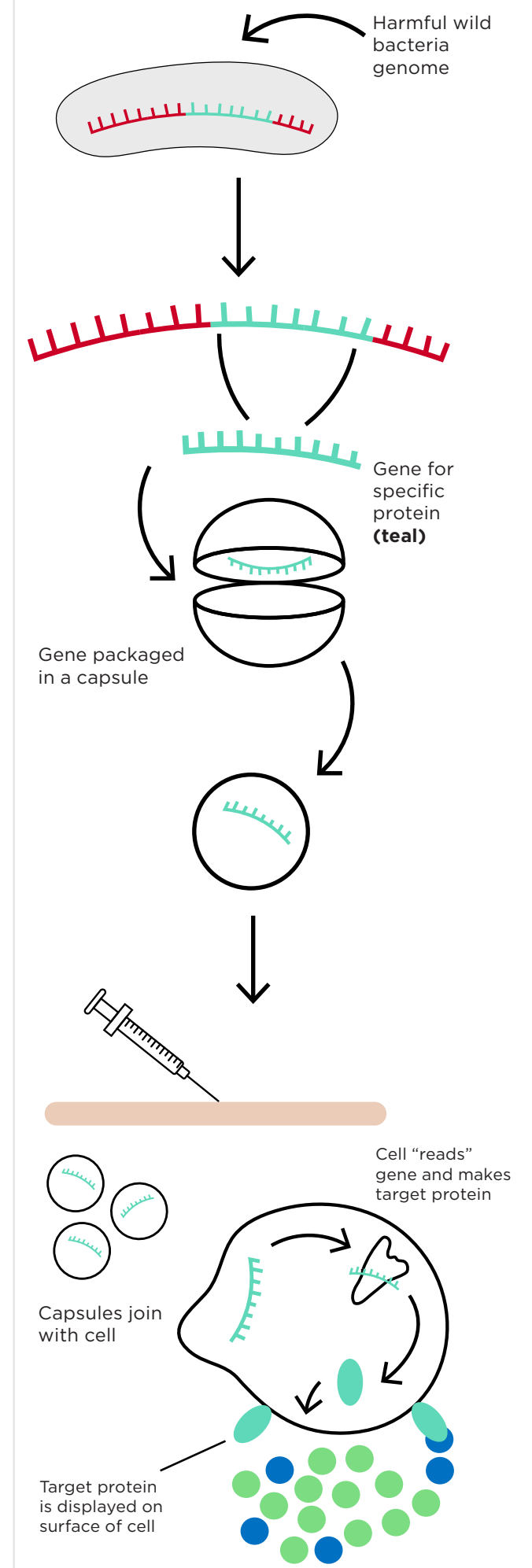
mRNA Vaccines

mRNA vaccines deliver a piece of genetic material (mRNA, or messenger RNA) that instructs the body to make a protein from the disease-causing pathogen to trigger protective immunity against it.

First Introduced
2021 - COVID19

Considerations:
These vaccines can be quickly produced or updated to respond to changing disease dynamics.

They often need to be kept at very cold temperatures, creating access issues.



Examples of Existing mRNA Vaccines:
COVID19 (Moderna, BioNTech/Pfizer)

TB Vaccines in Pipeline:
Phase 1:
• BNT164a1
• BNT164b1

RESOURCES:

- <https://sites.bu.edu/covid-corps/projects/science-communication/types-of-vaccines-infographics/#types-vaccines>
- http://newtbvaccines.org/wp-content/uploads/WGNV-TB-Vaccine-Platform-Factsheet_DEC2022.pdf
- <https://www.gavi.org/vaccineswork/there-are-four-types-covid-19-vaccines-heres-how-they-work>
- <https://www.hhs.gov/immunization/basics/types/index.html>
- https://www.pfizer.com/news/articles/understanding_six_types_of_vaccine_technologies

