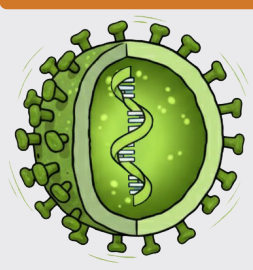
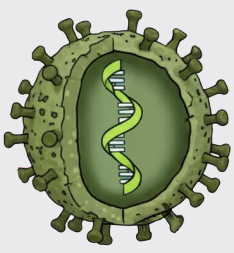
GLOBAL HEALTH PRESS

VACCINE TYPES

Licensed Vaccine Types Include



live attenuated (bacterial viral)



non-live vaccines (bacterial viral)

Live vaccines are contraindicated in severely immunocompromised individuals and in pregnancy and may be contraindicated for **certain close contacts** because of the risk of uncontrolled replication or transmission. Non-live vaccines can be administered in principle, but may not be effective in severely immunocompromised hosts.

Main Vaccine Categories

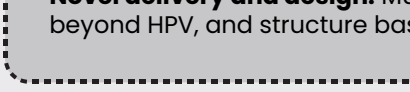
- **Live vaccines** are contraindicated in severely immunocompromised individuals and in pregnancy and may be contraindicated for certain close contacts because of the risk of uncontrolled replication or transmission. Non-live vaccines can be administered in principle, but may not be effective in severely immunocompromised hosts.
- **Inactivated (non live) vaccines** use

Whole organisms *or* Purified fractions *or* Recombinantly engineered proteins

Such preparations cannot cause disease but induce protective immunity. They are usually adjuvanted and are given as a primary series (e.g., 2 doses 4 weeks apart), followed by a booster (e.g., after >6 months), and may require additional booster doses (e.g., every 10 years).

- **Additional platforms** (subunit, toxoid, polysaccharide, conjugate, recombinant protein, mRNA, DNA, vector and mucosal vaccines) expand options within the non-live vaccine group.

Types of Vaccines



Whole Cell Bacterial
- Whole-cell pertussis
- Inactivated ***Vibrio cholerae***

Whole Virus (Inactivated)
- Hepatitis A
- Influenza
- Japanese encephalitis
- Tick-borne encephalitis (TBE)
- Poliovirus (IPV)
- Rabies
- Inactivated whole-virion SARS-CoV-2

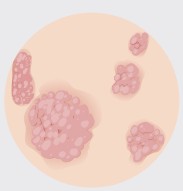
Toxoid Vaccines
- Diphtheria toxoid
- Tetanus toxoid
- Pertussis toxoid (in acellular pertussis)

Polysaccharide Vaccines
- Meningococcal A, C, W, Y
- Pneumococcal 23-valent
- ***Salmonella*** Typhi (Vi polysaccharide)

Conjugate Vaccines
- Hib (*Haemophilus influenzae* type b)
- Meningococcal A, C, W, Y
- Pneumococcal 7-, 10-, 13-, 15-, 20-valent

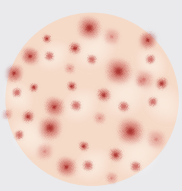
Recombinant Protein / VLP
- Hepatitis B
- HPV VLP vaccines
- Protein-based MenB vaccines
- Other recombinant pneumococcal & streptococcal protein vaccines

Live Viral Vaccines



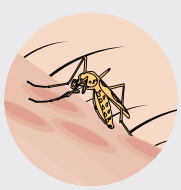
Measles vaccine

Mumps vaccine



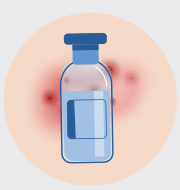
Rubella vaccine

Varicella zoster vaccine



Yellow fever vaccine

Oral poliovirus vaccine (OPV)



Rotavirus oral vaccines

Live attenuated intranasal influenza vaccine (LAIV)

Live Bacterial Vaccines

BCG vaccine (*Mycobacterium bovis* BCG) against tuberculosis.

Oral Ty21a typhoid vaccine.

Live oral cholera vaccine and other live oral *S. Typhi*

Critical Safety Message About Live Vaccines

- Live attenuated bacterial and viral vaccines must not be used in subjects with compromised immune systems (inborn or acquired e.g. due to cancer, HIV infection, or immunosuppressive therapy), because attenuated organisms can replicate uncontrolled in these subjects and may cause severe disease and even death.
- Live vaccines are generally contraindicated in pregnancy, as live organisms can in principle be transmitted to the unborn in utero.
- Live vaccines that are potentially shed by the vaccine recipient (e.g., varicella, OPV, rotavirus; consult the package insert for local regulations) may also need to be avoided for some close contacts of non-immune pregnant women or severely immunocompromised patients when there is concern about transmission of vaccine strains.

Future and Novel Vaccine Types

- **Protein subunit and multi component vaccines:** Reverse vaccinology designed proteins (e.g. MenB), optimized subunits for pneumococcus, streptococci and others.
- **Conjugate innovations:** Higher valent pneumococcal and meningococcal conjugates, improved carriers and schedules.
- **mRNA vaccines:** Lipid nanoparticle formulated mRNA encoding viral antigens (e.g. licensed SARS CoV 2 vaccines), adaptable for many pathogens.
- **DNA vaccines:** Plasmid DNA encoding antigens, including candidates for SARS CoV 2 and other diseases.
- **Viral vector vaccines:** Non-replicating and replicating vectors (e.g., adenovirus) carrying genes of target pathogens (e.g., SARS-CoV-2, TB, Ebola). Issue: pre-existing immunity to the vector may reduce immunogenicity.
- **Novel delivery and design:** Mucosal vaccines, microneedle patches, outer membrane vesicles, virus like particles beyond HPV, and structure based antigen design (e.g. RSV pre fusion F).

References

1. Palazzi Sáfadi MA. Vaccine Types. VacciTUTOR. 2021;Chapter 6. doi:10.33442/vt202106
2. Pollard AJ, Bijker EM. A guide to vaccinology: from basic principles to new developments. Nat Rev Immunol. 2021;21(2):83-100.

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