

TYPES OF VACCINES

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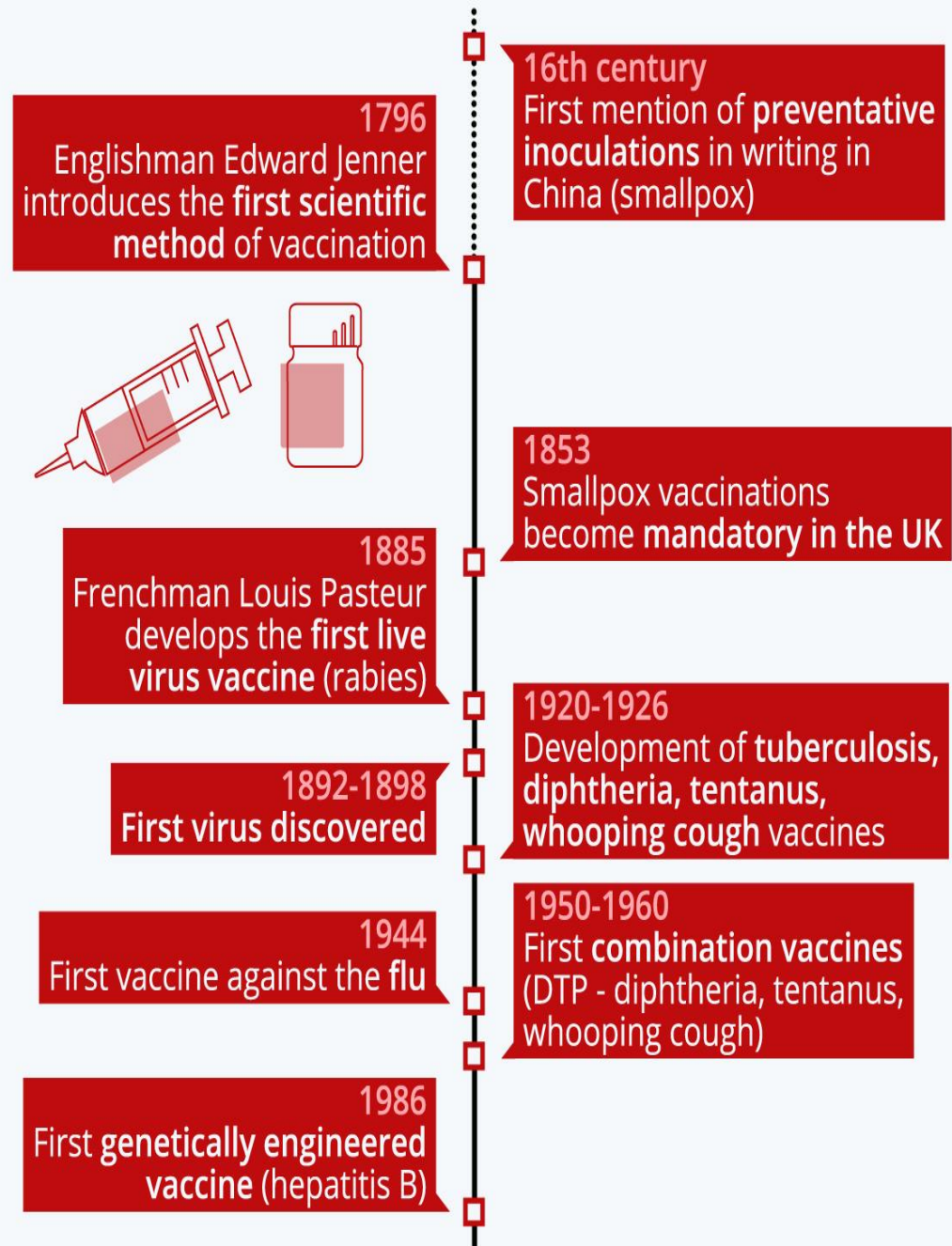
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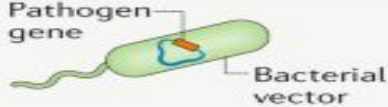

VACCINE {ACTIVE IMMUNOPROPHYLAXIS}

- Vaccine is an immunobiological preparation that provides specific protection against a given disease.
- Following vaccine administration, the immunogen (active ingredient of the vaccine) stimulates the immune system of the body to produce active immunity in the form of protective antibody/immunocompetent T cell response.

HISTORY

- The terms **vaccine** and **vaccination** are derived from "Variolae vaccinae" (smallpox of the cow) the term devised by Edward Jenner in 1796 to denote cowpox.



| Type of vaccine | | Licensed vaccines using this technology | First introduced |
|--|---|--|-------------------------------------|
| Live attenuated (weakened or inactivated) |  | Measles, mumps, rubella, yellow fever, influenza, oral polio, typhoid, Japanese encephalitis, rotavirus, BCG, varicella zoster | 1798 (smallpox) |
| Killed whole organism |  | Whole-cell pertussis, polio, influenza, Japanese encephalitis, hepatitis A, rabies | 1896 (typhoid) |
| Toxoid |  | Diphtheria, tetanus | 1923 (diphtheria) |
| Subunit (purified protein, recombinant protein, polysaccharide, peptide) |  | Pertussis, influenza, hepatitis B, meningococcal, pneumococcal, typhoid, hepatitis A | 1970 (anthrax) |
| Virus-like particle |  | Human papillomavirus | 1986 (hepatitis B) |
| Outer membrane vesicle |  | Group B meningococcal | 1987 (group B meningococcal) |
| Protein-polysaccharide conjugate |  | <i>Haemophilus influenzae</i> type B, pneumococcal, meningococcal, typhoid | 1987 (<i>H. influenzae</i> type b) |
| Viral vectored |  | Ebola | 2019 (Ebola) |
| Nucleic acid vaccine |  | SARS-CoV-2 | 2020 (SARS-CoV-2) |
| Bacterial vectored |  | Experimental | – |
| Antigen-presenting cell |  | Experimental | – |

TYPES OF VACCINES

1. **LIVE ATTENUATED VACCINE**: They are prepared from live (usually attenuated) organism that lose the ability to induce full blown disease, but retain their immunogenicity.

e.g. BCG vaccine, measles.

2. **INACTIVATED/KILLED VACCINE**: It consist of organisms which are grown in culture under controlled conditions, and the killed by using methods like heat or formaldehyde.

e.g. Typhoid vaccine, Salk vaccine (IPV)

| <u>LIVE ATTENUATED BACTERIAL VACCINE</u> | <u>LIVE ATTENUATED VIRAL VACCINE</u> |
|--|---|
| <p>BCG Vaccine Typhoral vaccine</p> | <p>Measles vaccine Mumps vaccine Rubella vaccine Rotavirus vaccine Oral Polio Vaccine (Sabin Vaccine) Influenza Vaccine, Hepatitis A vaccine</p> |
| <u>KILLED/INACTIVATED BACTERIAL VACCINE</u> | <u>KILLED/ATTENUATED VIRAL VACCINE</u> |
| <p>Typhoid, Cholera, Pertussis, Plague vaccine</p> | <p>IPV or Salk vaccine, Killed influenza vaccine, Rabies vaccine, Hepatitis A vaccine</p> |
| <u>TOXOID VACCINE</u> | |
| <p>DT (Diphtheria toxoid), TT (Tetanus toxoid)</p> | |

3. **TOXOID VACCINE**: The exotoxins produced by certain bacteria can be detoxicated to form toxoid by treating with acidic pH, formalin or by prolonged storage.

e.g. Diphtheria toxoid, Tetanus toxoid.

4. **SUBUNIT VACCINE**: For certain viruses only a particular subunit of the virus is necessary to initiate the infection, e.g. Hepatitis B surface antigen (HBsAg) is the immunogenic component of hepatitis B virus.

e.g. Human Papillomavirus vaccine (HPV)

5. **COMBINED VACCINE**: If more than one immunizing agents are included in vaccine preparation, it is called combined vaccine.

e.g. in DPT vaccine, the pertussis component acts as an adjuvant, which increases the immunogenicity of both diphtheria toxoid and tetanus toxoid.

| | |
|---|---|
| <u>SUBUNIT VACCINE</u> BACTERIAL | VIRAL |
| | Hepatitis B vaccine HPV (Human Papilloma Virus) Vaccine |
| <u>COMBINED VACCINE</u> BACTERIAL | VIRAL |
| DPT vaccine (Diphtheria, Pertussis and Tetanus) Pentavalent vaccine (DPT+Hib+ Hepatitis B) | Mumps, Measles, Rubella (MMR) vaccine |