

Child vaccination and immunization

Taleb Ismael, MD.

Vaccines

- The word “vaccine” originates from the Latin *Variolae vaccinae* (cowpox), which Edward Jenner demonstrated in 1798 could prevent smallpox in humans.
- Today the term ‘vaccine’ applies to all biological preparations, produced from living organisms, that enhance immunity against disease.
- Vaccines composed of either the entire disease-causing microorganism or some of its components.

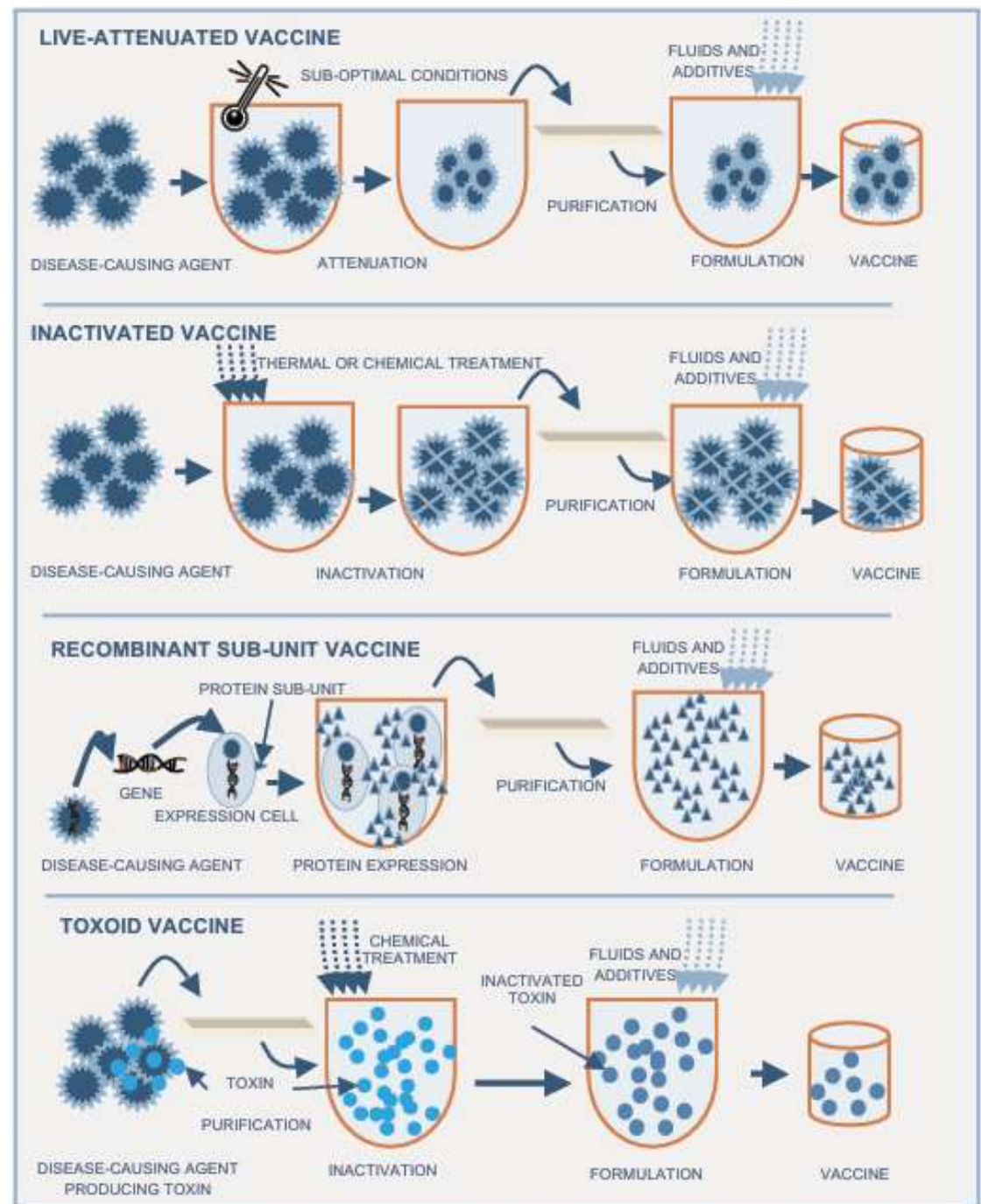
Types of vaccines

Type of vaccine	Examples
Live-attenuated	Measles, Mumps, Rubella, Varicella zoster
Inactivated	Hepatitis A, Influenza, Pneumococcal polysaccharide
Recombinant sub-unit	Hepatitis B
Toxoid	Tetanus, Diphtheria
Conjugate polysaccharide-protein	Pneumococcal, meningococcal, <i>Haemophilus influenzae</i> type b (Hib)

Figuer 1

Vaccines are composed of either the entire disease-causing microorganism or some of its components.

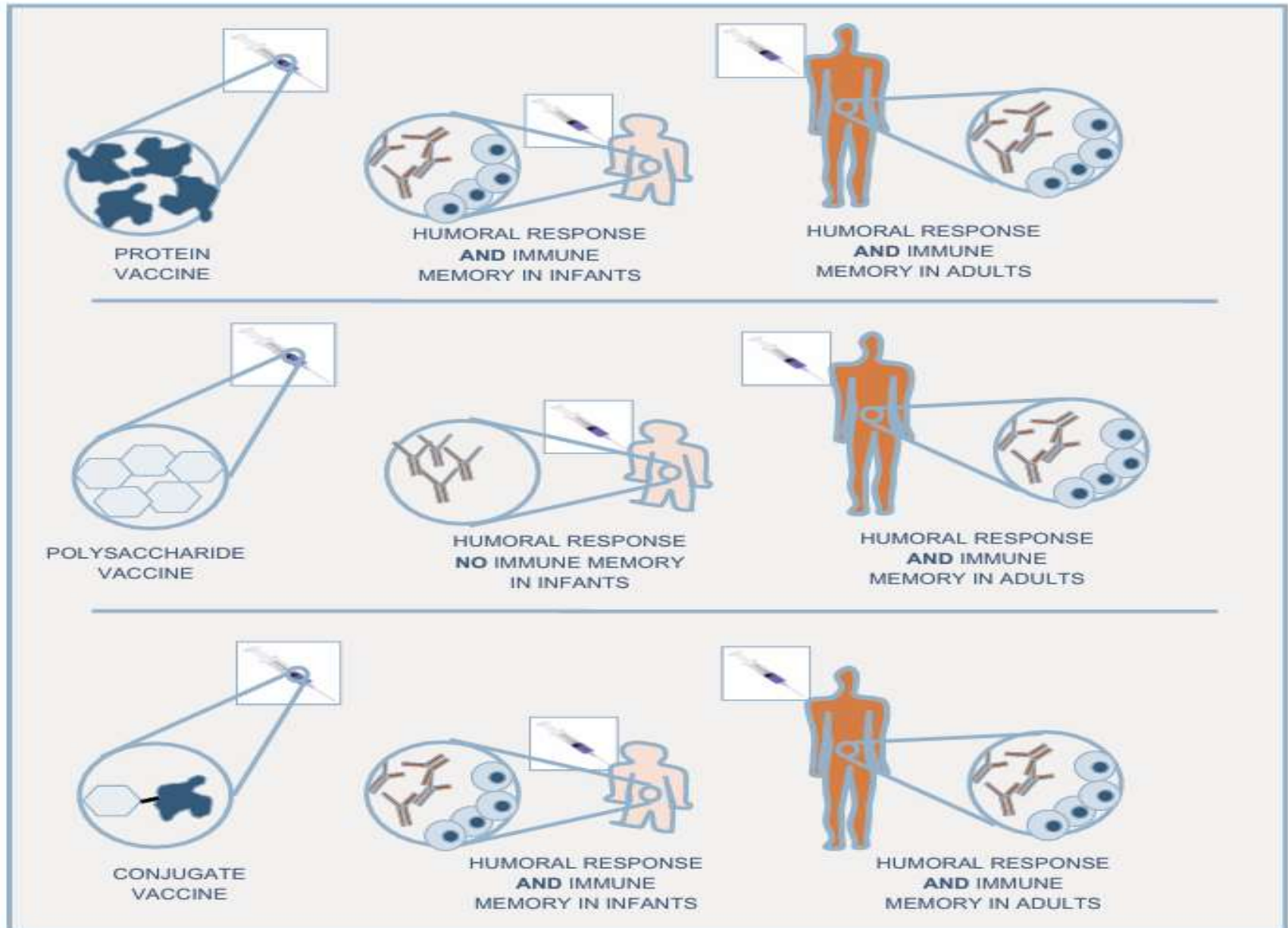
They may be constructed in several ways.



Live attenuated

- **Live attenuated**: weakened living organisms, by cultivation under sub-optimal conditions (also called attenuation), or genetic modification.
- **Inactivated**: whole organisms inactivated by chemical, thermal or others.
- **Recombinant**. the insertion of the DNA section responsible for encoding the antigen.
- **Toxoid**. inactivated toxins.
- **From conjugation**: of polysaccharides to proteins: meningococcal, pneumococcal, H.inflenza

From the linkage (**conjugation**) of polysaccharides to proteins
(this increases the effectiveness of polysaccharide vaccines in young children



COMMON COMBINATION PEDIATRIC VACCINE CONTAINING MULTIPLE MULTIPLE VACCINES

(e.g. 13-valent **pneumococcal conjugate** vaccine), vaccines against different disease-causing organisms can be combined to provide protection against several different diseases. Combination vaccines against **different diseases** such as diphtheria, tetanus, pertussis, *Haemophilus influenzae* type b, Hepatitis B, and polio, are commonly used in childhood immunization schedules. These vaccines incorporate both viral and bacterial vaccines and contain toxoids, purified protein sub-unit vaccine, conjugated polysaccharide vaccine, recombinant protein vaccine, and inactivated viral vaccine respectively.

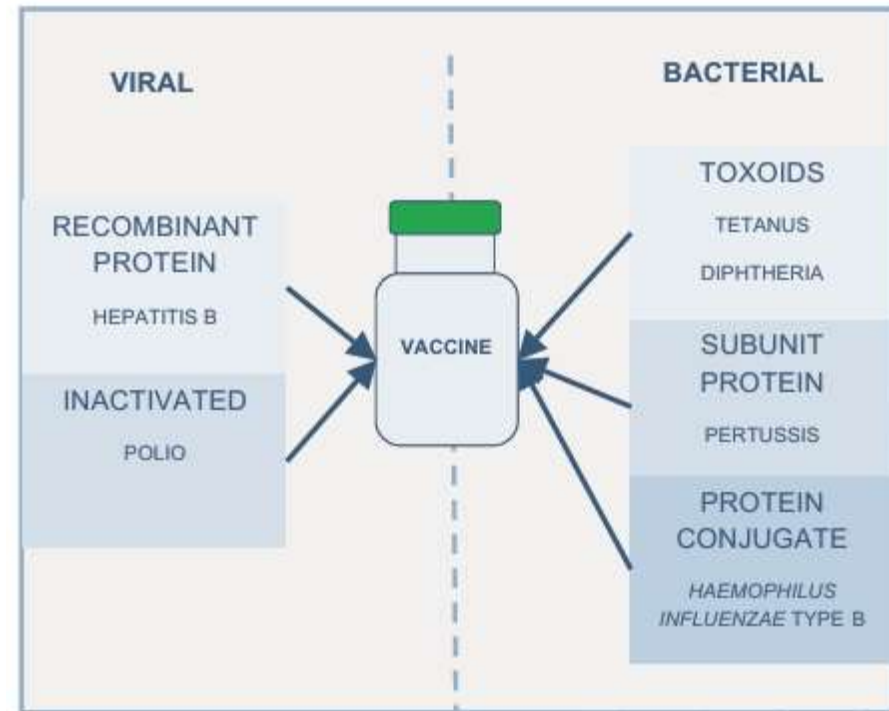


FIGURE 3. COMMON COMBINATION PEDIATRIC VACCINE CONTAINING MULTIPLE ANTIGENS OF MULTIPLE VACCINE TYPES

Adjuvanted vaccines

A vaccine adjuvant is any material which is incorporated with a vaccine for the purpose of enhancing the immune response of the vaccine. have a higher, earlier, and longer-lasting immune response than a non-adjuvanted vaccine.

TABLE 3. EXAMPLES OF ADJUVANTED VACCINES²

Adjuvanted Vaccine	Type of Adjuvant
Hepatitis A	Aluminum salt
Hepatitis B	Aluminum salt
Diphtheria, Tetanus, acellular Pertussis combinations (DTaP or Tdap)	Aluminum salt
<i>Haemophilus influenzae</i> type b (Hib)	Aluminum salt
Human Papilloma Virus (HPV)	Aluminum salt or AS04 (aluminum salt and monophospholipid A)
Pneumococcal conjugate	Aluminum salt
Japanese encephalitis	Aluminum salt
H1N1 influenza	MF59 (oil in water emulsion) [one vaccine]

TABLE 3. EXAMPLES OF ADJUVANTED VACCINES²

TABLE 2. EXAMPLES OF VACCINES WITH PRESERVATIVES

Preservative	Vaccines
Phenol	Typhoid, pneumococcal polysaccharide
Benzethonium chloride	Anthrax
2-phenoxyethanol	Inactivated polio
Thimerosal	Multi-dose influenza

TABLE 2. EXAMPLES OF VACCINES WITH PRESERVATIVES¹

How vaccines work

When inactivated or weakened disease-causing microorganisms enter the body, they initiate an immune response. This response mimics the body's natural response to infection. But unlike disease-causing organisms, vaccines are made of components that have limited ability, or are completely unable, to cause disease.

FIGURE 4. COMPARISON OF THE IMMUNE RESPONSE TO A DISEASES-CAUSING ORGANISM AND TO A **VACCINE**

DISEASES-
CAUSING
ORGANISM

Vaccine

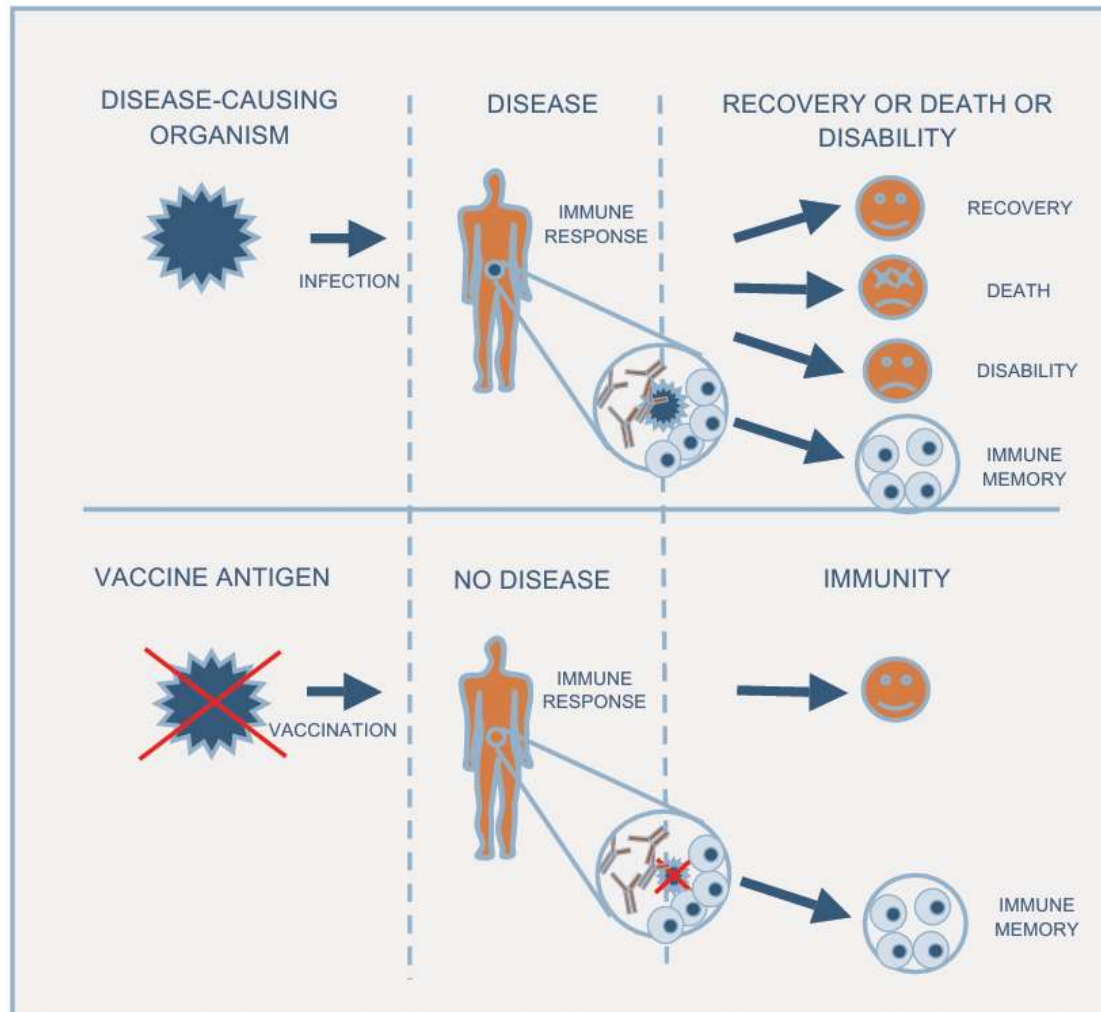


FIGURE 4. COMPARISON OF THE IMMUNE RESPONSE TO A DISEASES-CAUSING ORGANISM AND TO A VACCINE

Microorganism or vaccine immune response

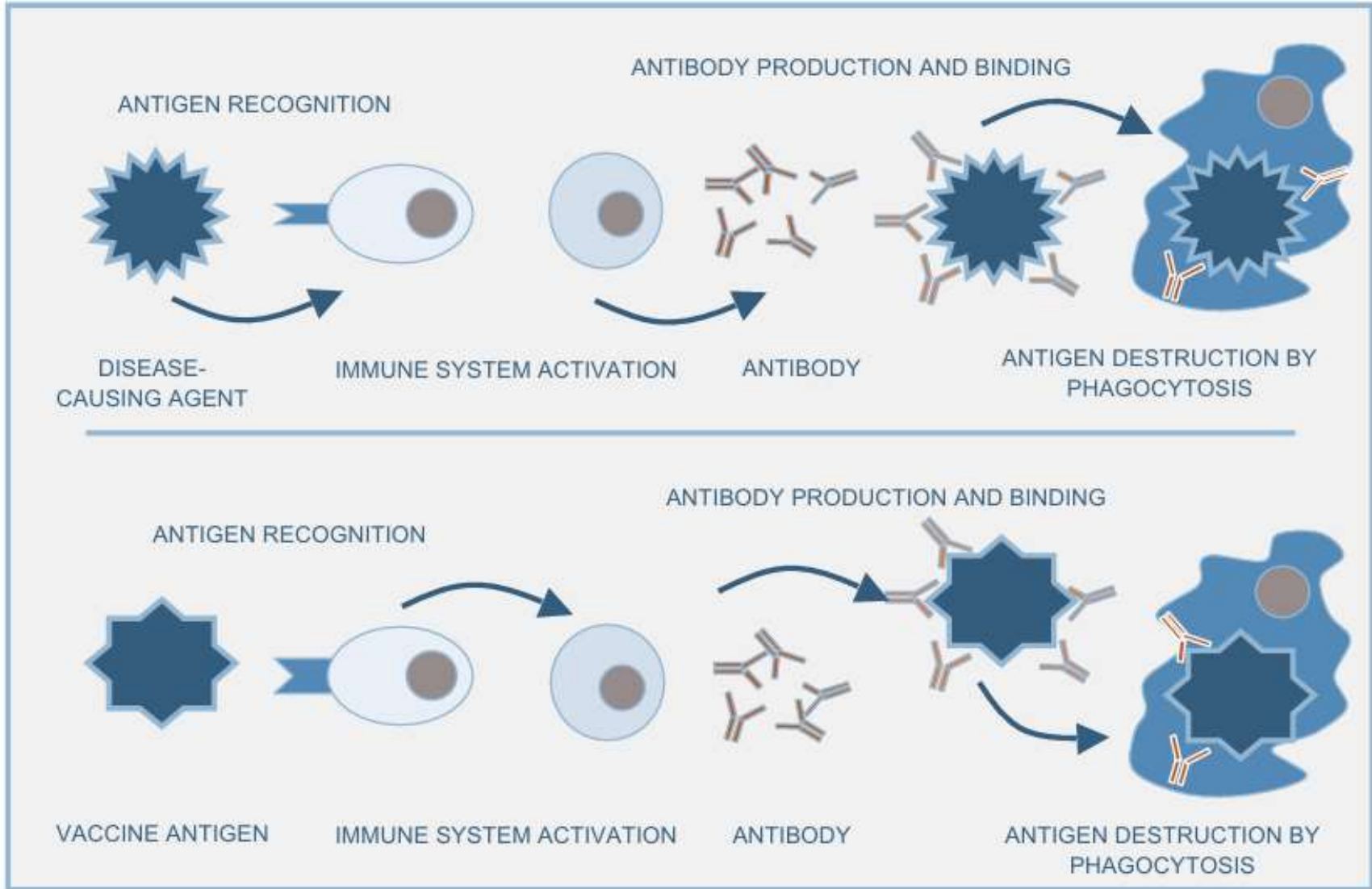


FIGURE 5. ANTIBODY DESTRUCTION OF ANTIGEN

Immunization schedule

BCG	birth-6 years
DT	3, 4, 5, 18 months (high-risk groups)
DTaPHibIPV	3, 4, 5 months
DTwP	18 months
DTwPHib	5 months
DTwPHibHep	3, 4 months
HepB	3, 4, 5 months
Influenza	health workers; pilgrims; high-risk groups
IPV	3, 4 months

Measles	9 months
MenACWY	>2 years; pilgrims; high-risk groups
MMR	12, 18 months
OPV	4, 5, 9, 18 months; 6 years
Pneumo_conj	3, 5, 9 months (subnational)
Td	6, 16 years
TT	1st contact; +1, +6 months; +1 year, +1 year
Typhoid	travellers

Vaccines in Jordan

- Vaccination in Jordan is mandatory for all children under the National Expanded Programme on Immunization (EPI) and has achieved a high 95% coverage rate. The Ministry of Health (MoH), supported by WHO and UNICEF, provides free routine vaccines against 12 diseases—including polio, measles, and hepatitis—at approximately 700 health centers across the country

At One month

Bacille Calmette-Guerin vaccine (BCG)

Live attenuated vaccine, its created using

**A weakened living strain of
Mycobacterium**

Bovis.

(bacterium closely related to the one that
causes tuberculosis (TB)).

At 3 months of age

Hexaxim vaccine (Hexa) - first dose

Inactivated poliovirus vaccine (IPV)

Diphtheria(toxoid), Tetanus, and Pertussis .

Haemophilus influenzae vaccine B, Hepatitis

ROTA vaccine - first dose

At 4 months of age

Hexaxim vaccine (Hexa) - second dose

Inactivated poliovirus vaccine (IPV)

Diphtheria, Tetanus, and Pertussis vaccine
(Dapt)

Haemophilus influenzae vaccine, type B

Hepatitis vaccine, type B

ROTA vaccine - second dose

Oral Polio Vaccine (OPV) - first dose

At 5 months of age

Hexaxim vaccine (Hexa) - third dose

Inactivated poliovirus vaccine (IPV)

Diphtheria, Tetanus, and Pertussis vaccine (DaPt)

Haemophilus influenzae vaccine, type B

Hepatitis vaccine, type B

ROTA vaccine - third dose

Oral Polio Vaccine (OPV) - second dose

At 10 months of age

Measles vaccine

Oral Polio Vaccine (OPV) - third dose

**Vitamin A (100 thousand international
units)**

At 1 year of age

Measles, Mumps, and Rubella (German measles) Vaccine (MMR-1) - first dose

At 18 months of age

Measles, Mumps, and Rubella (German measles) Vaccine (MMR-2) - second dose

Diphtheria, Tetanus, and Pertussis Vaccine

(DaPt) - the supportive dose

Oral Polio Vaccine (OPV)

the supportive dose Vitamin A (200 thousand

international units)

Family Advice:What are common side effects of vaccines?

The Jordanian Ministry of Health confirms that there is no reason to be concerned of vaccines. Whether it's vaccines against communicable diseases or even coronavirus.

Possible side effects of vaccines:

- Low-grade fever up to 38°C.
- Pain, redness, or warmth at the injection site.
- Mild diarrhea.

Treatment: Mild reactions go away within a few days on their own, Use painkillers and warm compresses.