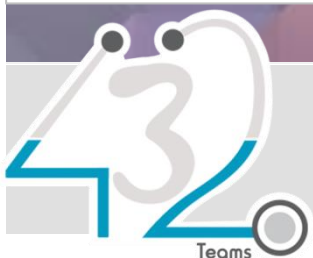


Objectives

- Mention the types of acquired immunity
- List important immunizable diseases
- Describe the compulsory childhood vaccination schedule practiced in KSA
- Define the Cold Chain and its importance.



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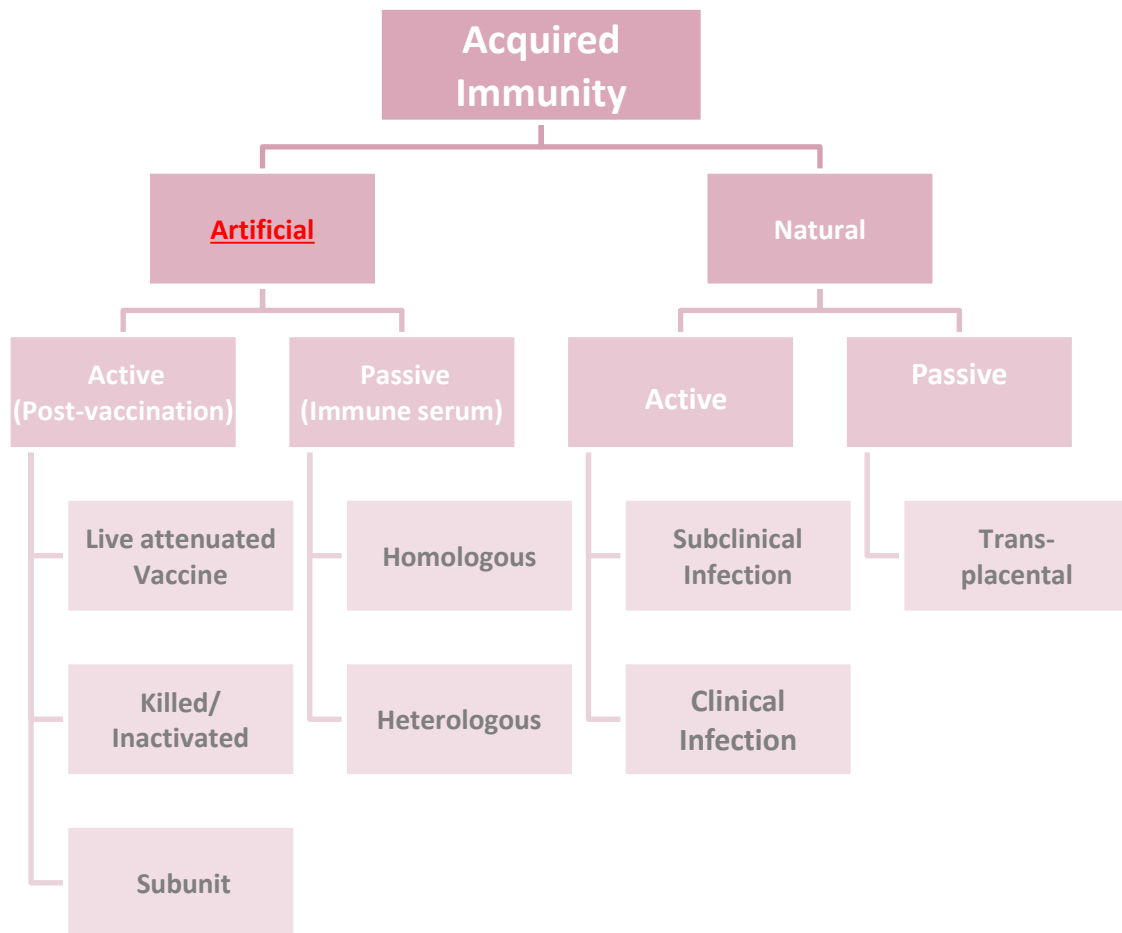


Immunization

Importance:

- Immunization has helped reduce the **impact of communicable disease** on health and wellbeing
- Some diseases have been **well controlled** and other **eliminated** from some parts of the world because of vaccination
- Stopping vaccination may again **lead to epidemic**.

Acquired immunity:



* in the active immunization: body will produce antibodies unlike the passive immunization

Important concepts

-Vaccination

- Vaccination is a method of **giving antigens** to stimulate the immune response through **active immunization**
- A vaccine is an **immuno-biological** substance designed to produce specific protection against a given disease.
- A vaccine is “antigenic” but not “pathogenic”.

-Antigen: A live or inactivated substance (e.g., protein, polysaccharide) capable of producing an immune response

-Antibody: Protein molecules (immunoglobulin) produced by B lymphocytes to help eliminate an antigen

-Immunotherapy/ pre-formed Ab:

1-Immune serum globulin

(gamma-globulin) contains immunoglobulin extracted from the pooled blood of **human donors (Homologous)**

- Treatment of choice for preventing **measles, hepatitis A and replacing Ab in the immune deficient**
- Lasts 2-3 months (**because it is a passive immunization, the body does not produce Abs, and so, they don't stay for a long time**).

2-Specific immune globulin

Prepared from convalescent patients in a hyperimmune state

- Contains high titer of **specific Ab**
- **Pertussis, Tetanus, Chickenpox, Hepatitis B**
- Sera produced **in horses** are available for Diphtheria, Botulism, Spider and Snake bites (**Heterologous**)

- Act immediately and can protect patients for whom no other useful medication exists

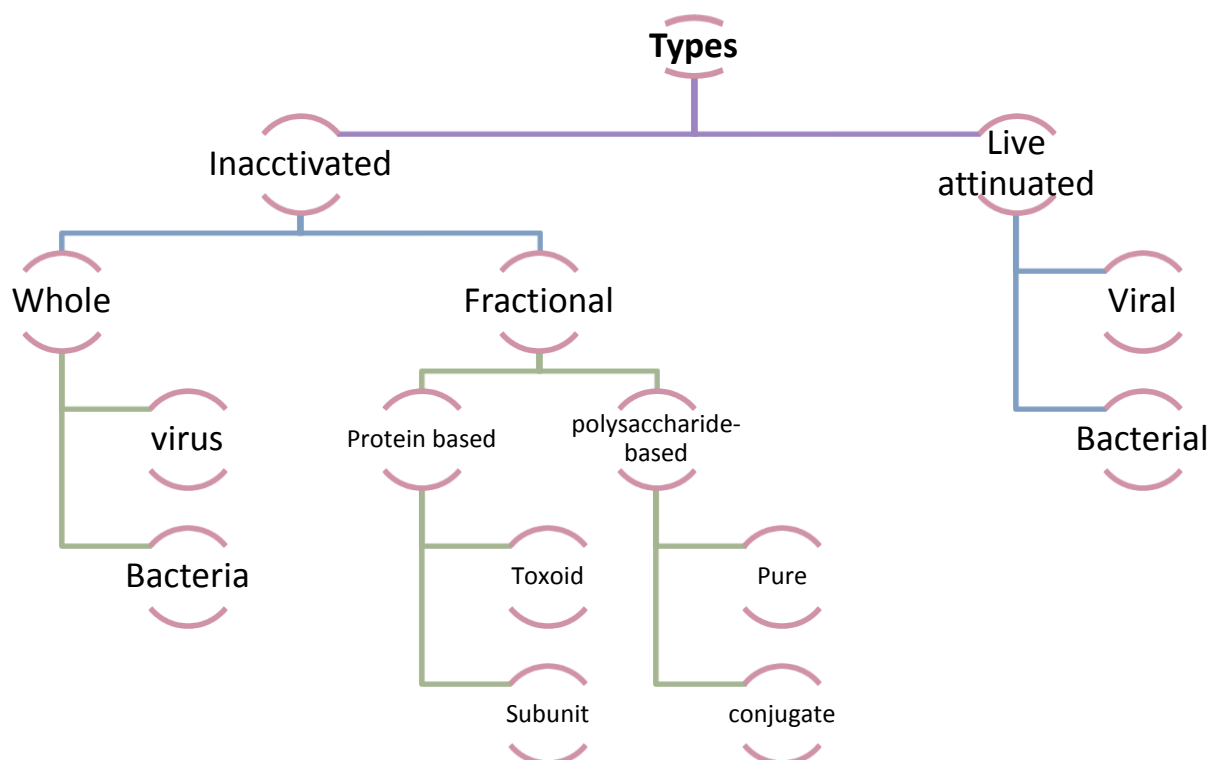
Convalescent patient: A person who is recovering after an illness

Sera produced in horses: because their tissues are similar to the human's. Here, they take a specific antigen and inject it to a horse, after that the horse's body will produce a specific Ab against that antigen. Then, that Ab will be injected to the humans. However, hypersensitivity reaction might occur!

Homologous: when the Abs are taken from a human

Heterologous: When the Abs are taken from another species such as animals.

Types of vaccines



Live attenuated	Inactivated (<u>Killed</u>)
<ul style="list-style-type: none"> • Attenuated (weakened) form of the "wild" virus or bacterium • Must replicate to be effective • Immune response similar to natural infection • Usually effective with one dose (except those administered orally) • Severe reactions are possible • Interference from circulating antibodies are possible • Fragile – must be stored and handled carefully <p>*except those administered orally</p> <p>(In live attenuated we do sub- culturing for the organism to attenuate it and reduce its pathogenicity).</p>	<ul style="list-style-type: none"> • Cannot replicate • Less interference from circulating antibody than live vaccines • Generally require 3-5 doses • Immune response mostly humoral • Antibody titer diminishes with time <p>(We usually say inactivated virus and killed bacteria)</p>
Examples	
<p>1- viral : measles,mumps,rubella (MMR), yellow fever, influenza* oral polio.</p> <p>2- Bacterial: BCG (for TB), oral typhoid</p> <p>*(Not the common influenza vaccine that we take annually),</p>	<p>1- viral: Inactivated polio vaccine (IPV), Hepatitis A, Influenza*, Rabies.</p> <p>2- Bacterial: Pertussis, Typhoid, Cholera, Plague</p> <p>3- Subunit: Hepatitis B</p> <p>4- Toxoid: Tetanus, Diphtheria</p> <p>*(The common one)</p>

-Cellular fraction (Polysaccharide) vaccines:

- They are prepared from **extracted cellular fractions** e.g. N. meningitidis (A,C,Y,W-135); meningococcal vaccine from the polysaccharide antigen of the cell wall
- S. Pneumoniae; pneumococcal vaccine from the polysaccharide contained in the capsule of the organism
- Their **efficacy and safety appear to be high.**

N. meningitidis (A,C,Y,W-135): A combination of several types and it covers many species of N.meningitidis, commonly used during Al-hajj.

-Conjugate vaccine:

Haemophilus influenza B (Hib) vaccine; gives **long-term** protection from Haemophilus influenza type B the leading cause of meningitis in children under 5 years.

-Surface antigen (recombinant) vaccines:

- It is prepared by cloning HBsAg gene in yeast cells where it is expressed. HBsAg produced is then used for vaccine preparations
- Their **efficacy and safety also appear to be high.**

-Toxoid vaccines:

- Prepared by **detoxifying the exotoxins** of some bacteria rendering them antigenic but **not pathogenic.**
- Adjuvant (e.g. alum precipitation) is used to increase the potency of vaccine.
- The antibodies produced in the body neutralize the toxic part produced during infection rather than act upon the organism itself.
- **In general toxoids are highly efficacious and safe immunizing agents.**

Childhood Immunization Schedule in KSA

Age:	Vaccines:
At birth	BCG / Hepatitis B
2 Months	IPV /DTaP / Hepatitis B/ Hib/Pneumococcal Conjugate (PCV)/Rota
4 Months	IPV /DTaP / Hepatitis B/ Hib/Pneumococcal Conjugate (PCV)/Rota
6 Months	OPV/IPV /DTaP/ Hepatitis B/ Hib/Pneumococcal Conjugate (PCV)
9 Months	Measles / Meningococcal Conjugate quadrivalent (MCV4)
12 Months	OPV/ MMR/ Pneumococcal Conjugate (PCV)/Meningococcal Conjugate quadrivalent (MCV4)
18 Months	OPV/DTaP/Hib/ MMR/ Varicella/ Hepatitis A
24 Months	Hepatitis A
First class Primary School age	OPV/ DTaP(Td) / MMR/Varicella

Factors influencing recommendations concerning the age of vaccination:

- Age-specific risks of diseases
- Age-specific risks of complications
- Ability of persons of a given age to respond to the vaccine(s)
- Potential interference with the immune response by passively transferred maternal antibody (e.g., measles vaccine)

Doses & Routes of administration

Vaccine	Dose	Route
BCG	0.05 ml	ID or SC (left arm)
DPT	0.5 ml	IM (right or left side of thigh)
Hepatitis B (HBV)	0.5 ml	IM
Haemophilus Influenza b (Hib)	0.5 ml	M
MMR	0.5 ml	SC
OPV	2 drops	Oral

It is important to know that all of them have the same dose expect for:

-BCG (which is given by insulin syringe)

-And OPV

Active immunization for adult females:

- **MMR vaccine** is given in adolescence before or after marriage, but not during pregnancy and has to be before 3 months of conception
- **Tetanus toxoid** in pregnancy to prevent tetanus neonatorum in the newborn. In the first pregnancy on the third month and after 1 month. The third dose in the second pregnancy, and the fourth on the third pregnancy with a maximum of 5 doses.
- If 10 years elapse, and then pregnancy occurs, the doses are given from the start

Live attenuated vaccines should not be given during pregnancy

Vaccination for special occupations

- **Health care workers:** hepatitis B, influenza, MMR, polio
- **Public safety personnel** (police, fire fighters) and staff of institutions for the developmentally disabled: hepatitis B, influenza
- **Veterinarians (Animals' doctor) and animal handlers:** rabies, plague and anthrax
- **Sewage workers:** DT, hepatitis A, polio, TAB (Typhoid vaccine)
- **Food handlers:** TAB
- **Military troops and camp dwellers:** pneumococcal, meningococcal, influenza, BCG (for non-reactors), tetanus.

Invalid Contraindications to Vaccination (not contraindications)

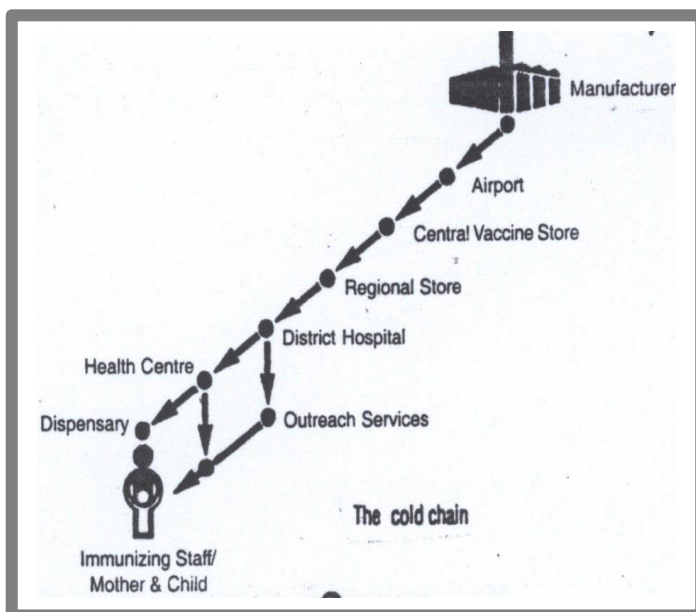
- Mild illness
- Mild/moderate local reaction or fever following prior dose
- Antibiotic therapy
- Disease exposure or convalescence
- Pregnancy in the household

- Premature birth
- Breast feeding
- Allergies to products not in vaccine
- Family history not related to immuno-suppression

Vaccine potency: All vaccines are thermo-sensitive and need to be properly stored and distributed within an efficient cold chain system

The cold chain system

- Refers to the system (personnel, equipment & procedure) used for keeping and distributing vaccines in good condition.
- When implemented properly, can help overcome the challenge of the delivery of quality vaccines.
- Can enhance the on-going quality, safety and efficacy of an immunization program.



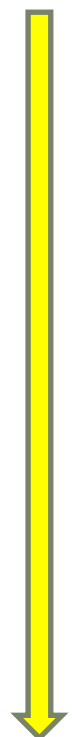
Live attenuated vaccines are always in deep freezing

Sensitivity to heat

- Live oral polio vaccine (OPV)
- BCG (Lyophilized) *
- Measles (Lyophilized) *
- Rubella and Mumps (Lyophilized)
- Adsorbed Diphtheria-Pertussis-Tetanus vaccine (DPT)
- Adsorbed Diphtheria-Tetanus vaccine (DT, Td)
- Tetanus Toxoid (TT)
- Hepatitis A
- Hepatitis B

*Note: These vaccines become much more heat sensitive after they have been reconstituted with diluents.

Most sensitive



Least sensitive

MCQS

Q1: One of the following is true about inactivated vaccines :

A-Usually effective with one dose

B-They cannot replicate

C- Severe reactions are possible

Answer is B

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If you find any Mistakes please contact me:

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