Immunization Lecture 1

Learning objectives

At the end of this lecture, students will be able to

1. Define different terminology related to immunity

2.Classify the immunity in our body and their mechanism

3. Recognize when suspect immunodeficeincy in a child

4. Understand the Vaccine types ,routes of administration

5.Know The principles of vaccine safety including precautions and contraindications

6.Record the guidelines for immunization schedules in Iraq

Definitions

Immune system = cells, tissues, and molecules that mediate resistance to infections

Immunology = study of structure and function of the immune system

Immunity = resistance of a host to pathogens and their toxic effects

Immune response = collective and coordinated response to the introduction of foreign substances in an individual mediated by the cells and molecules of immune system

IMMUNIZATION Is the process of inducing immunity against a specific disease

VACCINATION Is a process of administration of vaccine in order to stimulate the immune system against the microbe, thereby preventing disease

Two types of immunity

1. *Innate(non adaptive) immunity first line immune response , exist before infection*
   Rapid response: within minutes of infection
   Not specific
   Has no memory
   mechanisms •Mechanical barriers / skin, acidic pH in stomach
   •Humoral mechanisms ,lysozymes, basic proteins, complement, interferons
   •Cellular defense mechanisms natural killer cells neutrophils, macrophages,, mast cells, basophils, eosinophils

2. *Acquired (adaptive) , adapt after infection*

- ✓ *second line of response*
- ✓ *Based upon resistance acquired during life*
- ✓ *Responds more slowly, over few days*
- ✓ *Is specific*
- ✓ *Has anamnestic memory*
- ✓ *repeated exposure leads to faster, stronger response*
- ✓ *Is the process of inducing immunity against a specific disease.*
- ✓ *Childhood immunization has markedly reduced the impact of major infectious disease*

Immunity can be induced either

- **Passively** through administration of antibody-containing preparations

or

- **Actively** by administering a vaccine or toxoid to stimulate the immune system to produce a prolonged humoral and/or cellular immune response
- **Mechanism of adaptive immunity**

	• **Active Immunity**	• **Passive Immunity**
• **Natural**	• **Clinical and subclinical infection**	• **Via breast milk, placenta**
• **Artificial**	• **Vaccination :** • **Live ,killed, purified antigen vaccine**	• **Immune serum , Immune cell**

When to suspect immune deficeincy in a child
10 warning signs of immunodeficiency

1.More than or equal 4 new ear with in one year

2.More than or equal 2 sinus infection with in one year

3.More than or equal 2 month of oral antibiotic treatment with little effect(possibly)

4.More than or equal 2 episodes of pneumonia with in one year(depending on organism)

5.Failure of an infant to gain weight or grow normally

7.Recurrent deep skin or organ abscesses

7.Persistent thrush in mouth or fungal infection of skin

8.Need for IV antibiotic to clear infection (possibly)

9.More than or equal 2 deep seated infection including septicemia

10.A family history of primary immune deficeincy

Vaccination :Is a process of administration of vaccine in order to stimulate the immune system against the microbe, thereby preventing disease.

Vaccines

Are defined as whole or parts of microorganisms administered to prevent an infectious disease

Toxoid

A is a modified bacterial toxin that is made nontoxic but is still able to induce an active immune response against the toxin.

Classifications of vaccine

1. live-attenuated vaccine

Is a Live attenuated infectious agents

(e.g. BCG , MMR, Polio ,varicella, influenza)

2. Inactivated or detoxified agents: include

Inactivated whole organisms	whole-cell pertussis
Purified protein antigens	acellular pertussis and hepatitis B vaccines
Detoxified exotoxins	tetanus and diphtheria toxoids
Polysaccharides	capsular meningococcal vaccine
Capsular polysaccharides	Hib and pneumococcal conjugate vaccines

General contraindications

- Serious allergic reaction (anaphylaxis) after a previous vaccine dose.
- Immunocompromised states
- Moderate or severe acute illness with or without fever

Vaccine Delivery

- To ensure potency, vaccines should be stored at recommended temperatures (2-8^{0}C) before and after reconstitution

Injection sites

- For infants and young children: IM injections, the anterolateral thigh muscle is the preferred site.
- For adolescents and adults, the deltoid muscle of the arm is the preferred site for IM administration

Types of combined vaccines

Combination vaccines: take two or more vaccines and put them into single product that given as one shot or injection

Hexaxim (®) (DTaP-IPV-Hep B-Hib)

Is a new hexavalent combination pediatric vaccine containing

1. Diphtheria toxoids
2. Tetanus toxoids
3. A cellular pertussis
4. Inactivated poliovirus
5. Recombinant hepatitis B virus
6. Hib

Quinvaxem™composition(Penta)

1. Diphtheria toxoid
2. Tetanus toxoid
3. inactivated *B. pertussis*
4. Hepatitis B surface antigen (HBsAg)
5. Hib oligosaccharide

Tetra-Act-HIB- DTp Composition

1. Diphtheria toxoid
2. Tetanus toxoid
3. Pertussis vaccine
4. Hib

Vaccination schedule

- Based on age-specific attack rates of disease, disease risks, and age-specific immune responses and child health status
- Based on vaccine product type
- Campiagn
- Immunization card

Expanded Program on Immunization(EPI)
National Immunization Schedule for Infants and Children 2015

- **0-1 Week** HepB1 , BCG + OPV0dose
- **2 Months** HEXA 1, ROTA1 , pneumococcal 13-valent vaccine-1 ,OPV1
- **4 Months** HEXA2, ROTA2 , pneumococcal 13-valent vaccine-2 ,OPV2
- **6 Months** HEXA3, ROTA3 , pneumococcal 13-valent vaccine-3 ,OPV3
- **9 Months** Measles + VIT A
- **15 Months** MMR (Measles , Mumps , Rubella)
- **18 Months** PENTA ,OPV , VIT A
- **4-6 Years** TETRA , OPV , MMR

Be sure to ask these questions before giving the vaccines:

- Is child sick today? (More than a common cold, earache, etc.)
- Does child have any severe (life-threatening) allergies?
- Has child ever had a severe reaction after a vaccination?
- Does child have a weakened immune system (because of diseases such as cancer, or medications such as steroids)?
- Has child gotten a transfusion, or any other blood product, recently?
- Has child ever had convulsions or any kind of nervous system problem?
- Does child not seem to be developing normally