IMMUNIZATION

Is a remarkable successful and very cost effective means of preventing infectious diseases.

**Vaccination** = is administration of any vaccine or toxiod for preventing the diseases

**Immunization** = is processes of induction of vaccine (active) or by Ab(passive)

**Active** = celluler+Ab = long term protection

**Passive** = temporary protection, by exogenous Abs(IgM) or by Tran placental (natural) = give protection in the 1st several months of life. In general vaccine are indicated at younger age group at which significant risk of diseases and its complication exist and at which protective immune response can be expected
**IMMUNIZING AGENTS**

**Vaccine** = preparation of protein, polysaccharide, or nuclear acid of pathogen. Either attenuated (live) or killed M.O to induce specific response that inactivate, destroy, and suppress the pathogen.  
**Live** = MMR, oral polio (Sabin), typhoid, BCG. Is more antigenic, looks like natural infection  
**Killed inactivated** = less antigenic, need booster doses to build good immunity. Either whole M.O (whole cell pertussis, HAV), detoxified (tetanus and diphtheria), purified protein derivative a cellular type, HBV, polysaccharide capsular meningococcal vaccine), capsular polysaccharide conjugated to the protein (Hib and pneumococcal)  
**Toxiod** = modified bacterial toxin that had been not toxic but remain had capacity to produce immunity.  
**Immunoglobulin (Ig)** = Ab-containing solution, derived from human blood  
**Anti-toxin** = Ab-containing solution, derived from serum of human or animal after stimulation of sp. Antigen.
FACTORS AFFECT THE RESPONSE OF VACCINE

1- Chemical and physical state of Ag
2- The mode of administration of Ag (i.m, s.c, i.d) i.e (parenteral polio vaccine not induce mucosal Abs (IgA) where the oral polio vaccine are likely to do so.
3- The catabolic rate of Ag
4- Host factor (age, nutrition, gender, preexisting Abs.
5- Genetic determent of host.
6- The presence of high level of maternal Abs in the 1st few months of life and relative immaturity of immune system early in life will impair the initial response of certain vaccine (measles and MMR).
7- 2 types of Ag
   A- thymus-dependent Ag = need interaction of B and T lymphocyte to produce immune response and is more immunogenic and can be given in the 1st 2 years of life.
   B- thymus-independent Ag= generally no need of effect of thymus (T lymphocyte to produce immune response and is less immunogenic and can not be given in the 1st 2 years of life.
IMMUNOLOGICAL REACTION AFTER VACCINE

Serum Abs can be detected after 7-10 days (IgM) then replaced by IgG, the secondary immune response become strong and heightened in 4-5 days.
## Vaccination program in Iraq 2012

<table>
<thead>
<tr>
<th>Age</th>
<th>Vaccines</th>
<th>Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st 24 hours</td>
<td>B.C.G + POLIO(0) +HB1</td>
<td>ID + ORAL + IM</td>
</tr>
<tr>
<td>2 months</td>
<td>Penta (1) + POLIO(1)+ Rota (1)</td>
<td>IM + ORAL + ORAL</td>
</tr>
<tr>
<td>4 months</td>
<td>Tetra (1) + POLIO(2)+ Rota (2)</td>
<td>IM + ORAL + ORAL</td>
</tr>
<tr>
<td>6 months</td>
<td>Penta (2) + POLIO(3)+ Rota (3)</td>
<td>IM + ORAL + ORAL</td>
</tr>
<tr>
<td>9 months</td>
<td>Measles + Vit A (100000 IU)</td>
<td>SC + ORAL</td>
</tr>
<tr>
<td>15 months</td>
<td>M.M.R</td>
<td>SC</td>
</tr>
<tr>
<td>18-24 months</td>
<td>1st Booster = POLIO + Tetra + 20000 IU Vit A</td>
<td>ORAL + IM + ORAL</td>
</tr>
<tr>
<td>4-6 years</td>
<td>2nd Booster = POLIO + MMR + D.P.T</td>
<td>ORAL + IM + SC</td>
</tr>
</tbody>
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Penta = DPT+HB+HiB
Tetra = DPT + HiB
BCG vaccine is a lyophilized preparation of live, attenuated organisms of the Calmette-Guérin strain of *Mycobacterium bovis* that is used to stimulate active immunity to tuberculosis.

In developing countries where tuberculosis is epidemic and short-term prophylaxis with ant tuberculosis agents (e.g., isoniazid) or tuberculin skin test screening is not possible, BCG vaccine is used routinely to attempt tuberculosis control. The World Health Organization currently recommends that BCG vaccine be administered by intradermal injection in the left deltoid region), and can be given in any time during infancy, and give protection for about 5–7 years.

*(it prevent military TB, and TB meningitis in about 50–80% and pulmory TB in about 50%)*
The lesion is characterized by a small red papule at the site of injection; the papule reaches its maximum diameter of approximately 8 mm within 5 weeks after administration of the vaccine. The top of the papule scales, ulcerates, and dries, and the entire lesion gradually shrinks to a smooth or scaly pink or bluish scar approximately 3 months following immunization; the lesion then becomes a smooth or pitted white scar in approximately 6 months.
SITE EFFECTS

Local ulceration, regional supportive adenitis in 0.1-1%, and this is not indicate underlying host immune defect and dose not effect the level of protection and mostly mild and resolve spontaneously but chemotherapy is needed occasionally, Surgical excitation rarely indicated. Ostiomyelits in 1 in million, Disseminated BCG infection, which can be fatal, occurs only rarely (1–10 cases per 10 million vaccines. Fever, , and irritability are uncommon.
CONTRAINDICATION

1- immune compromised patient
2- burn
3 hypsensivity reaction to vaccine

Revaccination of BCG, indicated in some country either depend on the absence of scar, or negative Tuberculin test (indurations less than 8 mm), in our country we revaccinate if no scar more than 2 months.
DPT (DIPHTHERIA, PERTUSIS, TETANUS)

- Killed vaccine, given I.M in the anterolateral aspect of the thigh, given as Penta (with HBV and HIB) or Tetra (without HBV)

- **Contraindication**
  - 1-sever allergic reaction to previous vaccine or to its preservative
  - 2-encephalopathy (coma, decrease level of consciousness, prolonged fitting within 7 days)
  - 3-progressive neurological distress, infantile spasm, uncontrollable epilepsy, and progressive encephalopathy.

- In all of these above, we give only DT
PRECAUTION

- 1- fever more than 40.5' of less than 2 days
- 2- collapse or shocked like state (hypo responsiveness syndrome) of less than 2 days
- 3- fit less than 3 days
- 4- persistent cry more than 3 hours oh less than 2 days
- 5- moderate to severe illness with or without fever.

Most of these above complications are due to pertussis vaccine whole cell pertussis vaccine) but now a days acellular vaccine is available, so that these complications were reduced dramatically.
SITE EFFECT

Fever (up to about 1 child in 4)
Redness or swelling where the shot was given (up to about 1 child in 4)
Soreness or tenderness where the shot was given (up to about 1 child in 4)
These problems occur more often after the 4th and 5th doses of the DTaP series than after earlier doses.
Sometimes the 4th or 5th dose of DTaP vaccine is followed by swelling of the entire arm or leg in which the shot was given, for 1 to 7 days (up to about 1 child in 30).
HEPATITIS B VACCINE

- Killed vaccine, I.M, in the anterolateral aspect of thigh, according to the HBsAg status if it is +ve, given 0.5ml IG, and zero dose of vaccine immediately after birth then 1st dose at age of one month, 2nd at 2 month, 3rd dose at 4th month, 4th dose at 6th month, at the age of 9-18 month do serological test of HBsAbs +ve ,or HBsAg +ve(repeat the above schedule , if still +ve refer to hepatologist.

- If HBsAg is unknown or –ve , give the 1st dose at age of 1-2month, 2nd dose at age of 4-6month, 3rd dose at age of 9-18month.
SITE EFFECT

Fever
Soreness at the site of injection
Allergy

Contraindication
premature baby and the BW, less than 2 KG
allergic reaction of previous vaccine
Haemophilus influenzae type b vaccine prevents meningitis (an infection of the covering of the brain and spinal cord), pneumonia (lung infection), epiglottitis (a severe throat infection), and other serious infections caused by a type of bacteria called *Haemophilus influenzae* type b.

It is killed vaccine can be given alone or combined with other vaccine (Tetra and Penta)

It is given in 2, 4, 6 months

Non sp site effect, no sp contraindication.
ORAL POLIO VACCINE OPV SABIN TYPE

A single dose of oral polio vaccine (usually two drops) contains 1,000,000 infectious units of Sabin 1 (effective against PV1), 100,000 infectious units of the Sabin 2 strain, and 600,000. One dose of OPV produces immunity to all three poliovirus serotypes in approximately 50% of recipients. Three doses of live-attenuated OPV produce protective antibody to all three poliovirus types in more than 95% of recipients. The live virus used in the vaccine is shed in the stool and can be spread to others within a community, resulting in protection against poliomyelitis even in individuals who have not been directly vaccinated.
**PREVENT**

Sabin  
Oral  
More antigenic  
circulatory (blood)  
By trained personnel  
Developing country  
VAPP  26 million

Salk  
parental  
less antigenic  
(Mucosal immunity (intestine)  
By no trained personnel  
developed country  
non
Two rotavirus vaccines are available, **RotaTeq** (RV5) and **Rotarix** (RV1). With both vaccines, the first dose can be administered as early as 6 wk of age and must be administered by 14 wk 6 days. The final dose in the series must be administered no later than 8 mo of age. The RV5 vaccine is administered in 3 doses at least 4 wk apart. The RV1 vaccine is administered in 2 doses at least 4 wk apart. The RotaTeq vaccine does not appear to increase this risk and is considered safe.
Rotavirus Vaccine - Past

- Early 1980s: 1st efforts to develop vaccine
- 1998: Rhesus tetravalent, RotaShield™
  - Licensed by FDA
  - Recommended by AAP and ACIP
  - More than 600,000 US children received this
- 1999: 15 cases of intussusception identified and vaccine withdrawn
CONTRAINDICATIONS

Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component
Severe combined immunodeficiency (SCID)
History of intussusception
MEASLES VACCINE AND MMR (MEASLES, MUMPS, RUBELLA)

Live attenuated vaccine, given S.C, not given in earlier age (vaccine failure)

*Site effect*
- fever (one out of six)
- mild rash (one out of 20)
- swollen glands (rare)
- seizure (one out of 3,000)
- pain and joint stiffness (one out of 20)
- low platelet (one out of 30,000)
- serious allergic reaction (less than one out of 1,000,000)
CONTRAINDICATIONS

1- Immune compromised child
2- pregnancy
3- Allergy to egg
INFLUENZA VACCINE

Annually was given, i.m, indicated in the (more than 6 month)
1- CHD
2- CPD
3- renal failure
4- diabetes mellitus
5- long term aspirin therapy
MENINGOCOCCAL POLY SACCHARIDE VACCINE (MPSV)

killed vaccine, I.M, indicated in the following:
1- functional and anatomical asplenia
2- terminal complement defect
3- outbreak
4- traveling to the endemic area.
PNEUMOCOCCAL POLYSACCHARIDE VACCINE (PPSV23)

2 years and older and at high risk for disease (e.g., sickle cell disease, HIV infection, or other immunocompromising conditions)
Nephrotic syndrome
functional and anatomical asplenia
NOTE

Premature baby was dialed like full term baby (regarding doses and timing) except HBv
SCREENING CHECKLIST FOR CONTRAINDICATIONS TO VACCINES FOR CHILDREN AND TEENS

Is the child sick today? □ □ □

2. Does the child have allergies to medications, food, a vaccine component, or latex? □ □ □

3. Has the child had a serious reaction to a vaccine in the past? □ □ □

4. Has the child had a health problem with lung, heart, kidney or metabolic disease (e.g., diabetes), asthma, or a blood disorder? Is he/she on long-term aspirin therapy? □ □ □

5. If the child to be vaccinated is between the ages of 2 and 4 years, has a healthcare provider told you that the child had wheezing or asthma in the past 12 months? □ □ □

6. If your child is a baby, have you ever been told he or she has had intussusception? □ □ □

7. Has the child, a sibling, or a parent had a seizure; has the child had brain or other nervous system problems? □ □ □
8. Does the child have cancer, leukemia, HIV/AIDS, or any other immune system problem? □ □ □
9. In the past 3 months, has the child taken medications that weaken their immune system, such as cortisone, prednisone, other steroids, or anticancer drugs, or had □ □ □ radiation treatments?
10. In the past year, has the child received a transfusion of blood or blood products, or been given immune (gamma) globulin or an antiviral drug? □ □ □
11. Is the child/teen pregnant or is there a chance she could become pregnant during the next month? □ □ □
12. Has the child received vaccinations in the past 4 weeks? □ □ □