



IMMUNIZATION



IMMUNIZATION

Process Of inducing immunity by stimulating immune system through antigens.

OR

The fact or process of becoming, as against a disease.

OR

Providing immunity by using an immunizing agent
(Biologic or Immunobiologic)



Beginning of Vaccination

Vaccination (Latin ;
Vacca- Cow)

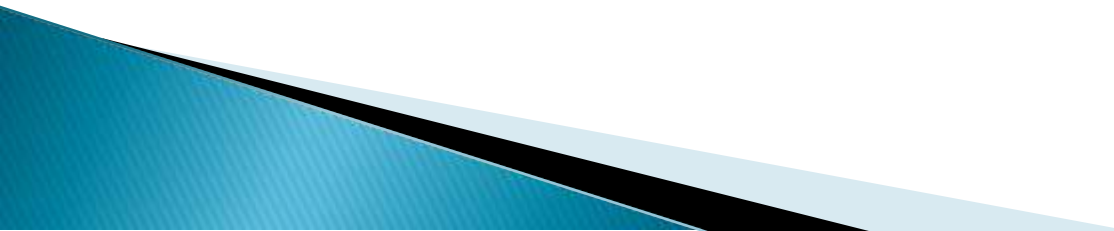
Edward Jenner used
the
term Vaccination

Cow pox virus provided
immunity in prevention
of Small pox



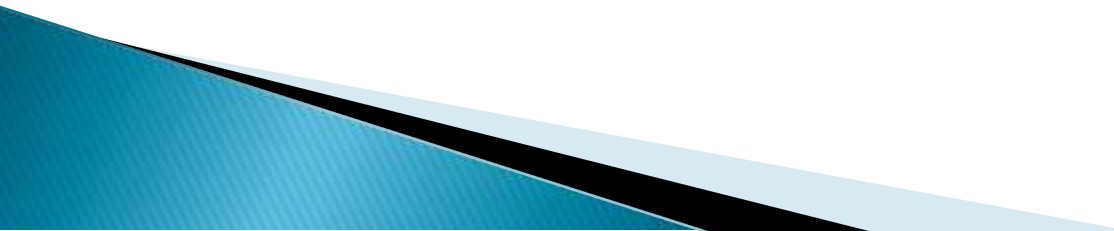
Edward Jenner Vaccinating



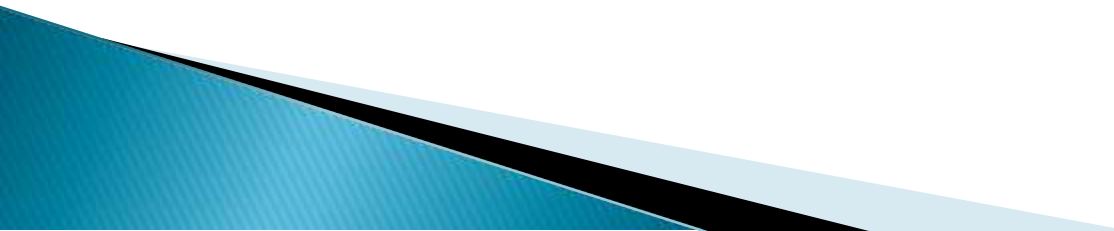
- 1974: Expanded program of Immunization (EPI) organized by WHO
 - In 1985, The Universal Immunization Program (UIP) was introduced to improve coverage of immunization
 - Immunization strengthening project introduced by Govt. of India
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TERMINOLOGY

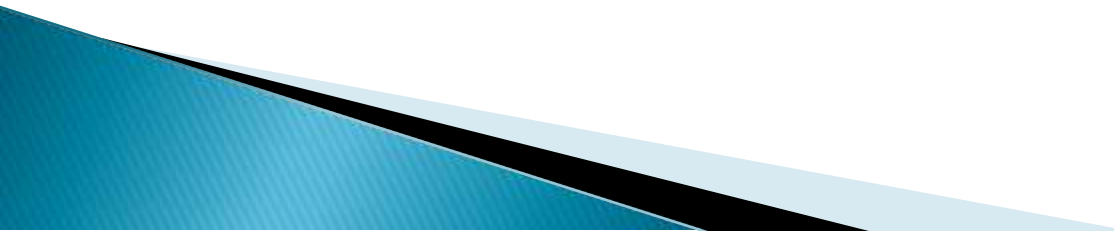
- **VACCINATION**: administration or inoculation of vaccine
- **IMMUNIZATION**: induction of an immune response
- **SEROCONVERSION**: change from Ab-negative to Ab-positive state
- **SEROPROTECTION**: state of remaining protected from the disease
- **VACCINE FAILURE**: if disease occurs despite immunization
- **HERD EFFECT**: immunization of large number of susceptible individuals, thereby preventing further

- ▶ Classification of immunizing agents
 - 1. Biologicals for active immunization
Eg. Vaccines and toxoids
 - 2. Biologicals for passive immunization
 - ▶ Eg. Anti-sera and immunoglobulins
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IMMUNIZING AGENTS

- VACCINES
 - IMMUNOGLOBULINS
 - ANTISERA OR ANTITOXINS
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Types of Vaccines

- Live vaccines
 - Killed vaccines
 - Toxoids
 - Subunit vaccines
 - Combined vaccines
 - Polyvalent vaccines
 - Cellular fractions
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Live Vaccines

- Contains attenuated form of wild virus or bacteria. Must replicate to provide immunity
- Produce local immunity.
- More convenient for mass immunization
- Single dose is sufficient usually
- Unstable & severe reactions are possible
- May get interfered by circulating antibodies eg maternal antibodies

Eg: **Bacterial-BCG**, **Oral typhoid**

Viral-OPV, **MMR**, **Varicella**

Killed Vaccines

- Organisms are killed or inactivated by heat or chemicals but remain antigenic.
- Vaccines are stable
- Immunity induced is not permanent
- Multiple doses are required

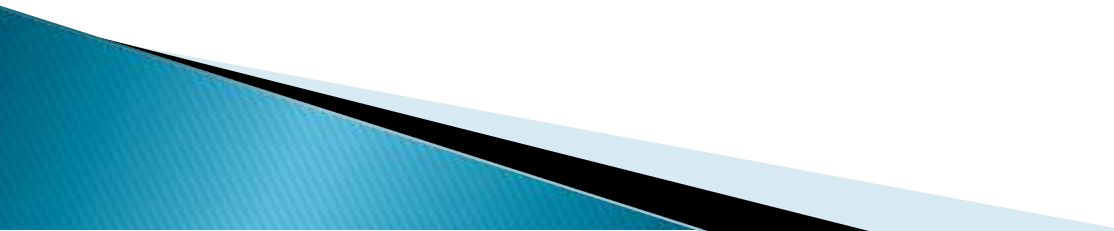
Eg: Bacterial-DTPw, whole cell killed typhoid

Viral- IPV, Rabies, Hep A vaccine

Toxoids

- Toxoids are modified toxins.
- Primary immunization is in the form of multiple divided doses in order to decrease the adverse effects.
- Booster doses are required to sustain the protection.
- Eg: TT, diphtheria

Subunit Vaccines

- Contains bacterial capsular polysaccharide
 - Eg: Hib, meningococcal, pneumococcal, S.typhi(Vi)
 - Or contains viral surface antigens Eg: Hep B
 - Produce only IgM antibodies.
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Combined Vaccines

More than one kind of immunizing agent is included.

Aim:

- To simplify administration
- Reduce costs
- Minimize the number of contacts of the patient with health system

Eg: DTP, MMR, DT, DP

▶ Polyvalent vaccines

- ▶ The vaccines prepared from two or more strains of the same species are known as polyvalent vaccines
- ▶ Eg. Poliovirus vaccine
- ▶ Pneumococcal polyvalent vaccine

▶ CELLULAR FRACTIONS

Certain vaccines are prepared from the extracted cellular fractions .

- ▶ Eg. Pneumococcal vaccines from the polysachharides contained in the capsule of bacteria.

Immunoglobulins

- Specialized group of proteins mostly associated with γ globulin fraction.
- Immunoglobulins is a functional term while γ globulin is a physical term.
- Abbreviated as Ig
- Ig are produced by plasma cells in response to an antigen and which function as antibodies.

Immunoglobulin

Major Functions

IgG

- Main antibody in the **secondary response**.
- **Opsonizes bacteria**, making them easier to phagocytose.
- **Fixes complement**, which enhances bacterial killing. Neutralizes bacterial toxins and viruses.
- **Crosses the placenta**.

IgA

- **Secretory IgA** prevents attachment of bacteria and viruses to mucous membranes.
- Does not fix complement.

IgM

- Produced in the **primary response** to an antigen.
- **Fixes complement.**
- Does not cross the placenta.

IgD

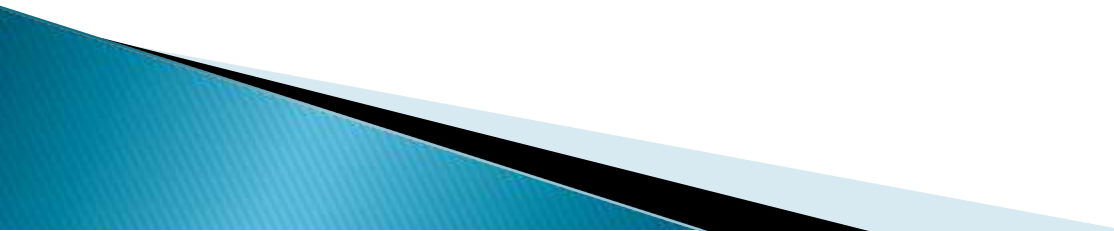
- Found on the **surfaces of B cells** where it acts as a receptor for antigen.

IgE

- Mediates **immediate hypersensitivity (allergy)** by causing release of mediators from mast cells and basophils upon exposure to antigen (allergen).
- Does not fix complement.
- Main host defense against **helminthic infections.**

ANTISERA/ ANTI-TOXINS

Antiserum is human or nonhuman blood serum containing monoclonal or polyclonal antibodies that is used to spread passive immunity to many diseases via blood donation (plasmaphoresis). For example, convalescent serum, passive antibody transfusion from a previous human survivor, used to be the only known effective treatment for Ebola infection with a high success rate of 7 out of 8 patients surviving. Antisera are widely used in diagnostic virology laboratories.

- ▶ HOW IT WORKS ????
 - ▶ Antibodies in the antiserum bind the infectious agent or antigen.
 - ▶ The immune system then recognizes foreign agents bound to antibodies and triggers a more robust immune response.
 - ▶ The use of antiserum is particularly effective against pathogens which are capable of evading the immune system in their unstimulated.
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Route of Immunization

- ❖ **Intradermal** - BCG
- ❖ **Subcutaneous** - Measles, MMR, Meningococcal, Varicella
- ❖ **Intramuscular** -DTP, Hep A, HepB, Hib

SITE OF ADMINISTRATION

- *Deltoid*- BCG
- *Triceps(Posterior skin fold)*-Measles, MMR, Meningococcal, Varicella
- *Vastus lateralis(Anterolateral aspect of thigh in*

Principles of Immunization

- A minimum interval of 4wks is essential between administration of 2 live vaccines.
- 2 or more killed antigens can be administered simultaneously or at any interval
- If any relapse in administration occurs, the missed can be given to resume the course
- If immunization status of child is unknown he may be given age appropriate vaccines
- Do not mix vaccines in the same syringe

Contraindications

- Congenital immunodeficiency, therapy with high dose steroids, illness with immunosuppression, severe allergic reaction to vaccines
- The following are **not contraindications** :
Minor illness like URT infections & diarrhea, mild fever, prematurity, allergy to penicillin, h/o allergies, malnutrition, recent exposure to infections, current antibiotic therapy

NATIONAL IMMUNIZATION SCHEDULE

1. Immunization Schedule for Pregnant women:

Vaccine	Due age	Max age	Dose	Diluent	Route	Site
For Pregnant Women						
TT-1	Early in pregnancy	Give as early as possible in pregnancy	0.5 ml	NO	Intra-muscular	Upper Arm
TT-2*	4 weeks after TT-1*		0.5 ml	NO	Intra-muscular	Upper Arm
TT- Booster	If received 2 TT doses in a pregnancy within the last 3 years*		0.5 ml	NO	Intra-muscular	Upper Arm

Vaccine	Due age	Max age	Dose	Diluent	Route	Site
For Infants						
BCG	At birth	till one year of age	(0.05 ml until 1 month) 0.1ml Beyond age 1 month	YES Manufacturer supplied diluent (Sodium chloride)	Intra-dermal	Upper Arm - LEFT
Hepatitis B - Birth dose	At birth	within 24 hours	0.5 ml	NO	Intra-muscular	Antero-lateral side of mid-thigh - LEFT
OPV-0	At birth	within the first 15 days	2 drops	-	Oral	Oral
OPV 1, 2 & 3	At 6 weeks, 10 weeks & 14 weeks	till 5 years of age	2 drops	-	Oral	Oral
Pentavalent 1, 2 & 3** (Diphtheria+ Pertussis + Tetanus + Hepatitis B + Hib)	At 6 weeks, 10 weeks & 14 weeks**	1 year of age	0.5 ml	NO	Intra-muscular	Antero-lateral side of mid-thigh - LEFT
Fractional IPV (Inactivated Polio Vaccine)	At 6 & 14 weeks	1 year of age	0.1 ml	NO	Intra-dermal	Upper Arm - RIGHT
Rotavirus‡ (Where applicable)	At 6 weeks, 10 weeks & 14 weeks	1 year of age	5 drops	NO	Oral	Oral
Pneumococcal Conjugate Vaccine (PCV) (Where applicable)	At 6 weeks & 14 weeks At 9 completed months - booster	1 year of age	0.5 ml	NO	Intra-muscular	Antero-lateral side of mid-thigh - RIGHT
Measles / Rubella 1st dose ##	At 9 completed months-12 months.	5 years of age	0.5 ml	YES Manufacturer supplied diluent (Sterile water)	Sub-cutaneous	Upper Arm - RIGHT
Japanese Encephalitis – 1 @ (Where applicable)	At 9 months-12 months@	15 years of age	0.5 ml	YES - Manufacturer supplied diluent (Phosphate Buffer Solution)	Sub-cutaneous	Upper Arm - LEFT
Vitamin A (1st dose)	At 9 months	5 years of age (1 lakh IU)	1 ml	-	Oral	Oral

Vaccine	When to give	Max age	Dose	Diluent	Route	Site
For Children						
DPT Booster-1	16-24 months	7 years of age	0.5 ml	NO	Intra-muscular	Antero-lateral side of mid-thigh – LEFT
Measles / Rubella 2nd dose ##	16-24 months	5 years of age	0.5 ml	YES Manufacturer supplied diluent (Sterile water)	Sub-cutaneous	Upper Arm - RIGHT
OPV Booster	16-24 months	5 Years	2 drops	NO	Oral	Oral
Japanese Encephalitis – 2 @ (Where applicable)	16-24 months @	till 15 years of age	0.5 ml	YES Manufacturer supplied diluent (Phosphate Buffer Solution)	Sub-cutaneous	Upper Arm - LEFT
Vitamin A \$ (2nd to 9th dose)	At 16 months. Then, one dose every 6 months.	up to the age of 5 years	2 ml (2 lakh IU)	-	Oral	Oral
DPT Booster-2	5-6 years	7 Years of age	0.5 ml	NO	Intra-muscular	Upper Arm
TT	10 years & 16 years	16 Years	0.5 ml	NO	Intra-muscular	Upper Arm

▶ **THANK Q**