

[Lymphoid Tissue and Lymph]

Lymphoid Tissue

It is fundamental for all type of immune response in body.

It present in

Bone marrow, Spleen, Lymphnodes, Tonsils, Peyer's patches, appendix, thymus.

Lymphoid contain 3-types of Cells

- Tissue Macrophages
- Lymphocytes (90% - small
10% - large)
- Plasma Cells

Tissue Macrophages

Special phagocytic cells found in different parts of body.

1. **Littoral cells** - present in lining of blood sinuses in Bone marrow.
2. **Kupffer's cells** - present in liver.
3. **Reticulum cells** - In spleen.
4. **Lymph nodes** - In lymphatic path.
5. **Pulmonary alveolar macrophages** - In alveoli.
6. **Osteoclast** - In Bones.
7. **Microglia** - In Brain.

- Function
- Ingest and destroy RBC, form and release bilirubin. Also destroy WBC and platelets.
 - Ingest bacteria. They rapidly inc. in no. during any infection.
 - They help in antibody production.

Lymphocytes

- They circulate in blood and lymph.
- Non-phagocytic.
- Do not respond to stimuli.

NOTE: During embryological development Thymus is 1st organ to contain lymphoid tissue.

- Two population of lymphocyte in blood:
 - B-lymphocytes (20-30)% - It survive for few days & weeks.
 - T-lymphocytes (60-80)% - It survive for 2-4 yrs.

• Locatⁿ of B and T-lymphocytes

1. Peripheral Blood and Thoracic duct (60-80)% T-lymph.
(20-30)% B-lymph
2. Lymph nodes T-lymph in Paracortical Region of nodes.
B-lymph in Subcapsular Region of nodes.
3. Spleen T-lymph in periarterolar sheath of spleen
B-lymph in Germinal centres of spleen

Plasma Cells

It found in medullary region of lymphoid follicles.

Small lymphocytes \longrightarrow plasma blast $\xrightarrow[\text{differentiat}^n]{\text{Replicat}^n}$ Plasma Cells

Functⁿ: • Formatⁿ of RBCs

- Participate in defence
- Reservoir of RBC
- It destroy aged RBC, platelets, WBC.
- form lymphocytes & plasma cells.

Lymph

- Lymph is modified "tissue fluid", transparent, yellowish in color, faintly alkaline.
- Contain Protein, Lipids, Carb., Coagulatⁿ factors, Cellular Component and others.

Function of lymph

1. Transport protein
2. Transport absorbed long chain fatty acids and cholesterol from intestine via lymphatics.
3. Transport RBCs, WBCs and bacterial to regional lymph nodes.
4. Transport antibiotics.
5. Supplies O_2 and nutrition to body.
6. Enhance immune system.

Immunity (The Immune System)

- 1st line Defence: Body is protected against invading organisms by physical barriers like skin & epithelial linings → constitute 1st line of defence.
- 2nd line Defence: When 1st line defence fail then 2nd line defence get activate.

Define Immunity

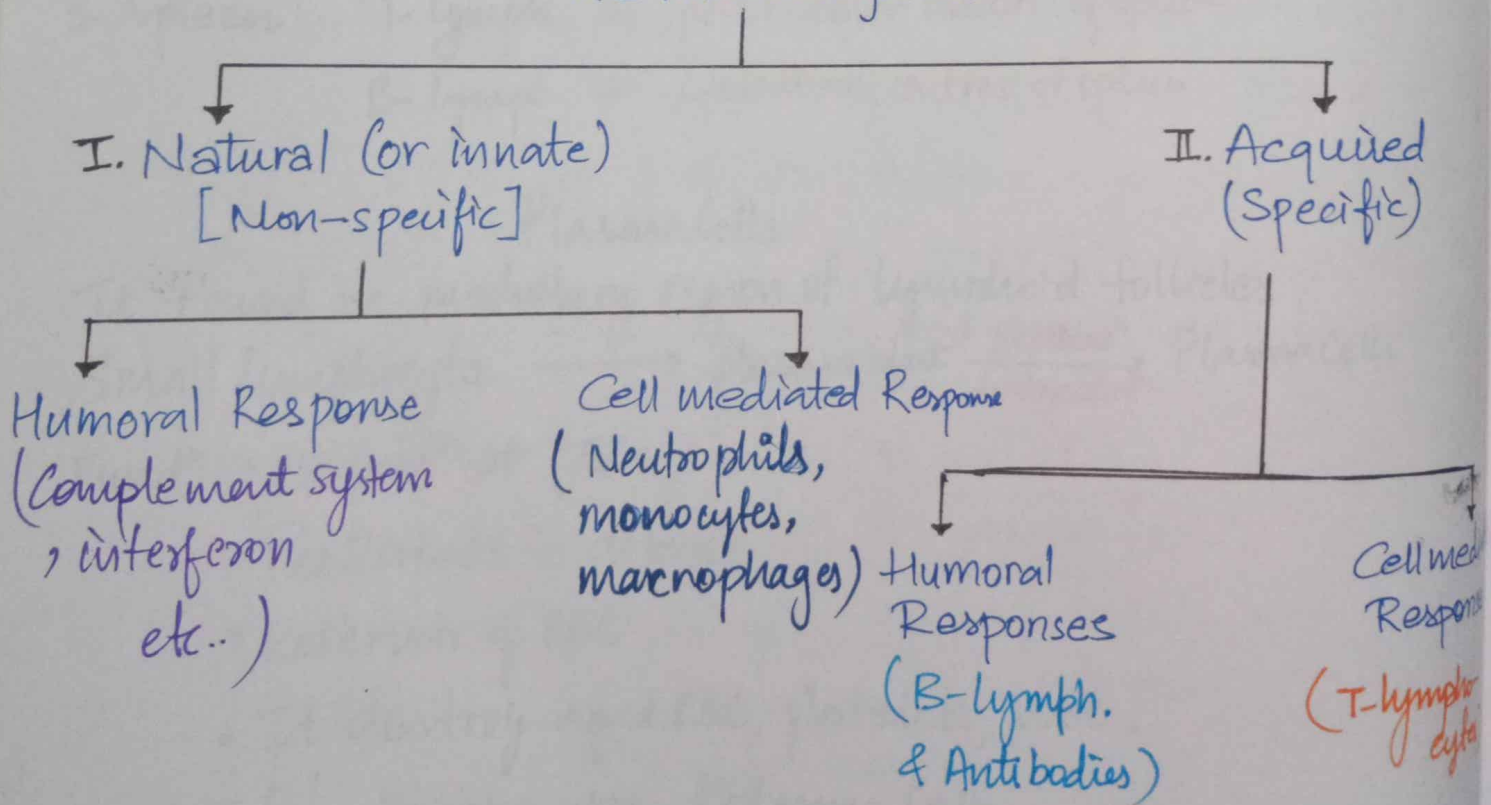
It is a condition of being able to resist a particular disease especially through preventing the development of microorganism.

or

It is the capability of blood to resist harmful micro-organism or virus from entering it.

- Write in detail on classification on immunity.

The immune system



Natural Immunity

- Available since Birth
- "Not specific" to a particular micro-organism.
- It is able to recognise & respond immediately to any foreign cell or particle.

Acquired Immunity after

- Acquired [^]birth after - exposure to micro-org.
- Specific for each species of micro-organisms and shows 'immunological-memory'.
- It is more complex & requires time to be fully developed.

Mechanism of Innate Immunity

1. Epithelial Surface: Skin and Mucus membrane covering body protect body against invasion by micro-organisms.

Skin • Mechanical barrier

- Normal flora on skin prevent colonisation by pathogen.

Respiratory tract • Inhaled particle arrested in nasal passages on moist mucus membrane.

- Cough reflex as defence mechanism.

- If particles reach alveoli then it get phagocytosis

Digestive tract • Mouth saliva contain bacterial lysis enzyme i.e. lysozyme.
anti-bacterial

- Swallowed pathogen destroy by acidic pH of stomach.

- Normal flora of ileum inhibits growth of pathogen.

Conjunctiva • Tear secretion flush away bacteria & other foreign particles.

- Tear contain antibacterial enzyme i.e. lysozyme.

- Genitourinary tract
- flushing action of urine eliminate bacteria from urethra.
 - Acidic pH of vagina in females, due to fermentatⁿ by lactobacilli, inhibit the pathogens.

2. Antibacterial substances in blood and tissues:

- Complement system: Destructⁿ of pathogenic bacteria.
- Antibacterial subs.: Lysozyme, lactic acid etc.
- Interferons produces by infected cells: antiviral activity

3. Cellular factors:

- Pathogen invading blood and tissue: destroyed by the phagocyte cells.
- Phagocytes: microphages and macrophages.
- Microphages are polymorphonuclear leucocytes.

4. Inflammatⁿ

- It lead to vasodilation, inc. vascular permeability & cellular infiltration.
- Entry of pathogen → Tissue injury → lead to inflammatⁿ.

5. Fever:

- Rise in temp. after infection helps to accelerate physiological processes.

6. Acute phase protein

- Infection or injury leads to sudden inc. in concentration of certain proteins called acute phase protein.

Acquired Immunity

Active Immunity

- Resistance developed by individual as a result of antigen stimulus.
- Involve active functioning of host's immune apparatus to produce antibodies & immunologically active cells.
- Active immunity take long period to show effect.
- It last long.
- There is a negative phase in active immunity.
- There is a 2nd response in active immunity.
- Not applicable in immunodeficient.

Both active and passive immunities are further classified as : Artificial and Natural.

Natural Active Immunity:

- Result from infection by a microbe.
- e.g person recovered from attack of measles develops ^{natural} active immunity.
- Such immunity long-lasting (but duratⁿ vary with diff. types of pathogen)
- Immunity is life-long.
- Immunity following bacterial infection is generally less-permanent.

Passive Immunity

- Resistance transmitted to patient/Recipient in a ready-made form.
- Recipient's immune system plays no active role.
- It is fast.
- It lasting for days or weeks
- No negative Phase
- NO 2nd response.
- Applicable in immunodeficient

Artificial Active Immunity

- Resistance induced by vaccine.
- e.g of vaccines:

- Bacterial Vaccines:

Live (BCG for Tuberculosis)

killed (Cholera vaccine)

Subunit (Typhoid Vi antigen)

Bacterial products (Tetanus toxoid)

- Viral Vaccines:

Live (Oral polio vaccine - Sabin)

killed (Injectable polio vaccine - Salk)

Subunit (Hepatitis B vaccine)

Live Vaccine

- # Initiate infectⁿ without causing any injury or disease
- # Last for several yrs but booster doses may require
- # It can administered orally or parenterally

Killed Vaccine

- # Less immunogenic than live vaccine
- # Last for short period
- # Administered repeatedly

Natural Passive Immunity

- Resistance passively transferred from one body to another body.

eg In human infants maternal antibodies are transmitted through placenta.

In animals, it transmitted through colostrum.

Artificial passive Immunity

- Prepared antibodies i.e artificially prepared transmitted to the recipient.

- Agent used - Hyperimmune sera of animal or human origin.
 - Convalescent sera
 - Pooled human gamma globulin.