



IMMUNITY



- Immunity means defense mechanisms of the body against foreign entities (antigens).
- Immunity is the body's ability to fight off harmful invaders (PATHOGENS :bacteria,viruses,paracites).
- The immune system produces antibodies or cells that can deactivate invaders.
- Immune response against self antigens lead to hypersensitivity and allergy or autoimmune disease .

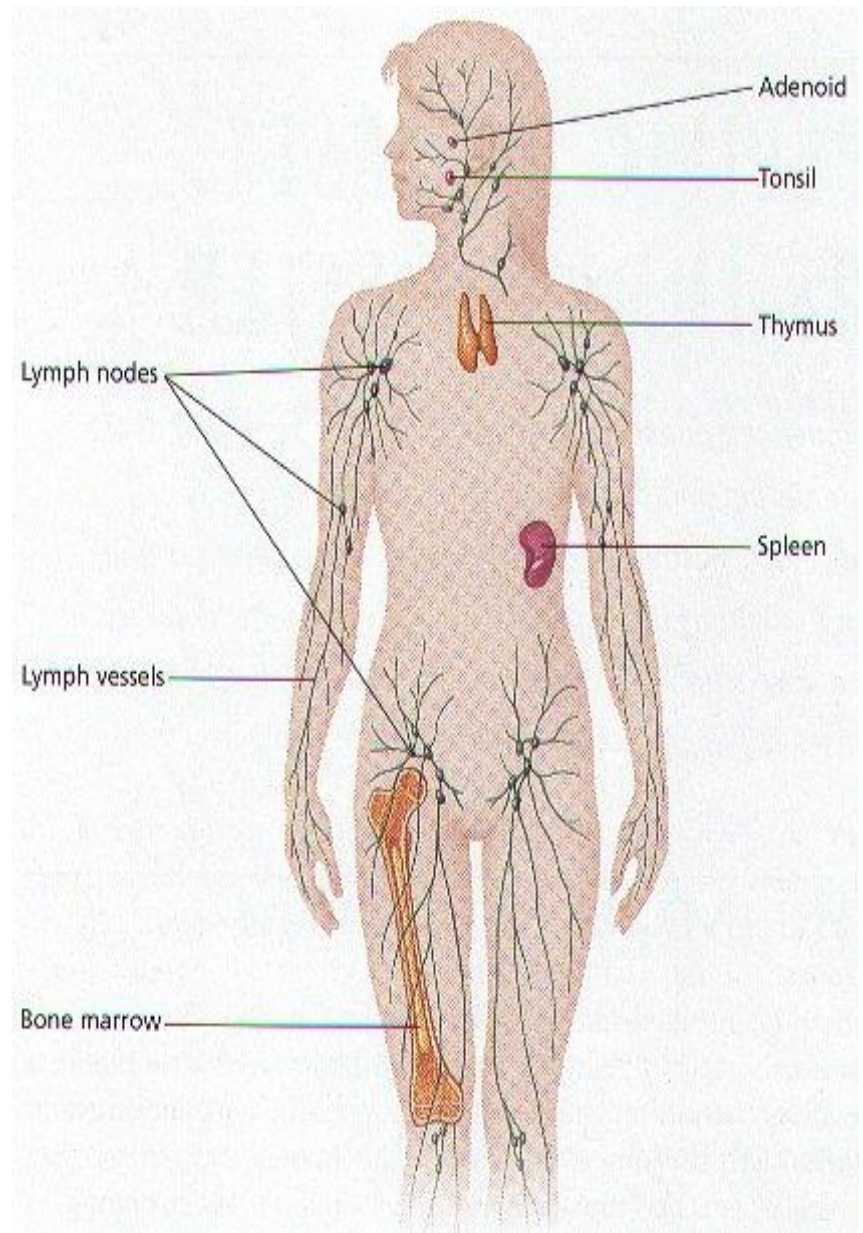
The Immune System - includes all parts of the body that help in the recognition and destruction of foreign materials

White blood cells

phagocytes and lymphocytes

bone marrow

lymph nodes, tonsils, thymus, and spleen are all part of the immune system.



Defense mechanisms include :

1) Innate immunity (Natural or Non specific)

2) Acquired immunity (Adaptive or Specific)

a-Cell-mediated immunity

b- Humoral immunity

Component of Innate Immunity

Innate Immune system

First line

- 1) Mechanical barriers
- 2) Chemical & biochemical inhibitors
- 3) Normal flora

Second line

- A- cells
 - 1- Natural killer
 - 2- Phagocytes
- B- Soluble factors
- C- Inflammatory barriers

First line

1) Mechanical barriers

- Intact skin
- Mucous coat
- Mucous secretion
- Blinking reflex and tears
- The hair at the nares
- Coughing and sneezing reflex

First line

2) Chemical & biochemical inhibitors

- Sweet and sebaceous secretion
- Hydrolytic enzymes in saliva
- HCl of the stomach
- Proteolytic enzyme in small intestine
- Lysozyme in tears
- Acidic pH in the adult vagina

3) Normal bacterial flora

- Competition for essential nutrients
- Production of inhibitory substances

Second line

A) cells

1- Natural killer (NK)

Definition: Large granular lymphocytes
Innate cytotoxic lymphocytes

Source : Bone marrow precursors

Location : 10% or 15% of lymphocytes in peripheral blood
1% or 2% of lymphocytes in spleen

Function : Cytotoxic for

1. Tumor cells
2. Viral infected cells
3. Bacterial, fungal, parasitic infection

Responsible for antibody-dependent cell mediated cytotoxicity (ADCC)

Second line

2- Phagocytes

Specialized cells for capture, Ingestion and destruction of invading microorganisms

- * Polymorphonuclear leucocytes, mainly neutrophils:
granulocytes circulate in blood

- * Mononuclear cells (macrophages)
 - Monocytes in blood

 - **Histocytes** in connective tissues

 - **Fixed reticuloendothelial cells** in liver spleen, lymph
nodes, bone marrow

Second line

B- Soluble factors

- 1- Acute phase protein (Plasma protein, CRP=C reactive protein, Fibrin)
- 2- Complement (proteins in serum, body fluids)
- 2- Interferons (Proteins against viral infections)
- 3- Properdin (Complement activation)
- 4- Beta lysine (Antibacterial protein from Platelets)
- 5- Lactoperoxidase (Saliva & Milk)
- 6- Lysozyme (Hydrolyze cell wall)

Interferons

Proteins usually produced by virally infected cells

Types of interferon:

1- Alpha interferon

Secreted by
Induced by

Macrophages
Viruses or Polynucleotide

2- Beta interferon

Secreted by

Fibroblasts, Viruses

3- Gamma interferon

T- lymphocytes, Specific antigens

Interferons



Protective action of interferon's:

- 1) Activate T-cells
- 2) Activate macrophages
- 3) Activate NK

Phagocytosis

The engulfment, digestion, and subsequent processing of microorganisms by macrophages and neutrophils

1) Chemotaxis & attachment:

- a- Attraction by chemotactic substances (microbes, damaged tissues)
- b- Attachment by receptors on surfaces of phagocytes

Phagocytosis

2) Ingestion:

- * Phagocyte pseudopodia surround organism forming phagosome
- * Opsonins and co-factors enhance phagocytosis
- * Fusion with phagocyte granules and release digestive, toxic contents

Phagocytosis

3- Killing (two microbicidal routes)

a- Oxygen depended system (powerful microbicidal agents)

Oxygen converted to superoxide, anion, hydrogen peroxide, activated oxygen and hydroxyl radicals.

b- Oxygen-independent system (anaerobic conditions)

Digestion and killing by lysozyme.

low pH, cationic proteins and hydrolytic and proteolytic enzymes

C) Inflammatory Barriers

Tissue damage by a wound or by invading pathogen

Inflammatory response:

