UNIT 13

LYMPHATIC SYSTEM

The system which includes all the structures involved in the transport of lymph from the tissues to the blood stream (circulating blood).

Components of Lymphatic System

The lymphatic system consists of:

1. Lymph
2. Lymph vessels
3. Lymph nodes
4. Spleen
5. Thymus gland
6. Tonsils

Functions of Lymphatic System

1. It drains excess tissue fluid from tissues back to circulation.
2. It helps in absorption of digested fat and fat soluble substances.
3. It protects body against infection by filtering and destroying bacteria.

LYMPH

Lymph is a colourless, transparent, clear, alkaline, fluid which circulates through the lymphatic vessels.

Composition of Lymph

The lymph is made up of:

- Water : 96%
- Solids : 4%

The solids substances of lymph are made up of proteins, lipids, carbohydrates, amino acids, electrolytes etc.

Functions of Lymph

1. It returns protein from tissue spaces into blood.
2. It plays an important role in redistribution of fluid in the body.
3. It acts as immunity by transporting lymphocytes.
4. It removes bacteria, toxins and other foreign bodies from tissue.
5. It helps in clotting.
6. It carries of hormones.

LYMPH VESSELS

The vessels which transport lymph throughout the lymphatic system are known as lymph vessels. It is also known as lymphatic vessels.

Types of Lymph Vessels

The lymph vessels are of two types:

1. **Lymph capillaries:** It is blind end tubes originated from interstitial spaces. It is composed of endothelial cells. The capillaries unite to form large lymphatic vessels.
2. **Large lymph vessels:** The large lymph vessels are of two types:
   a. Right lymphatic duct: It is dilated lymph vessels about 1cm long. It drains lymph from the right half of the thorax, head, neck and the right arm.
   b. Thoracic duct: It is large lymphatic duct about 40 cm long. It drains lymph from both legs, pelvic, abdominal cavities, the left half of thorax, head & neck and left arm.

LYMPH NODES

Lymph nodes are oval or bean shaped small glandular organs located in the course of lymph vessels. It is also known as lymph glands or lymphatic nodes.

Group of Lymph Nodes

1. Cervical lymph nodes: It lies behind and below the ear.
2. Axillary lymph nodes: It lies from the arm, through the armpit.
3. Thoracic lymph nodes: It lies along the abdominal aorta and mesenteric arteries.
4. Pelvic lymph nodes: It lies along the iliac arteries and veins.
5. Inguinal lymph nodes: It lies in the groin region.

Structure of Lymph Nodes

- Each lymph node is composed of masses of lymphatic tissue and covered by a dense connective tissue.
- The main substance of node consists of reticular and lymphatic tissue containing many lymphocytes and macrophages.

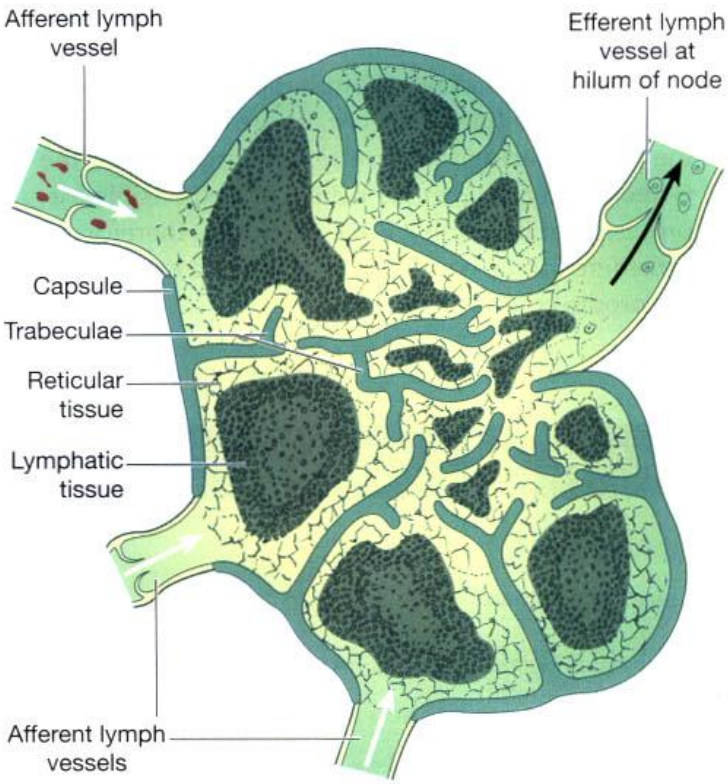

Fig. Structure of Lymph Nodes

Functions of Lymph Nodes

1. It filters lymph.
2. It destroys the bacteria and other toxic substances.
3. It develops lymphocyte.

SPLEEN

Spleen is the largest organ of lymphatic system. It is situated in left hypochondriac region of the abdominal cavity between the diaphragm and stomach. It is purple in colour about 12cm long, 7cm wide and 2.5 cm thick. It is weighed about 200gm.

Structure of Spleen

The spleen is covered by outer surface known as serous membrane (peritoneum) and inner surface known as fibro muscular tissue. The spleen contains collagen fibers, elastic tissue, smooth muscle and reticular cells.

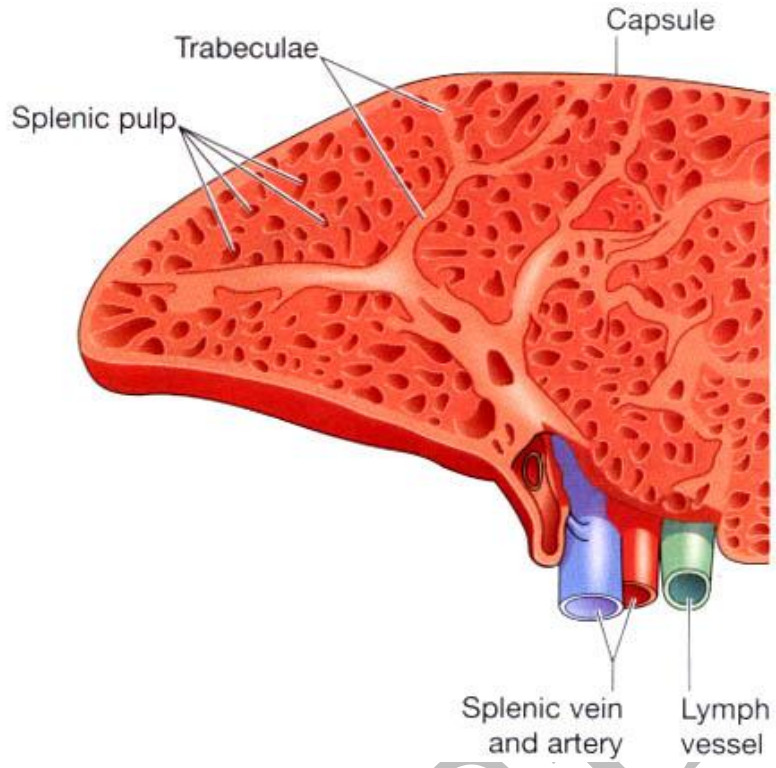

Fig. Structure of spleen

Functions of Spleen

1. Fromation of red blood cells in fetus.
2. Destruction of blood cells.
3. Storage of red blood cells.
4. It helps in immunity.

THYMUS GLAND

Thymus gland is an organ of lymphatic system and also endocrine gland of the body. It is situated in the upper part of the mediastinum behind the sternum and extends upwards into the root of the neck. It weight is about 10-15 gm at birth and grows until puberty weight about 30-40 gm.

Functions of Thymus Gland

1. It secretes **thymosin and thymin hormones.**
2. It accelerates lymphopoiesis.
3. It activates T-lymphocytes.

TONSIL

The mass of lymphoid tissue located in the mouth and throat (pharynx) is known as tonsil.

Types of Tonsil

1. Nasopharyngeal tonsil (adenoids): It is near at the opening of nasal cavity into the pharynx.
2. Palatine tonsil: It is located near the opening of the oral cavity in the pharynx.
3. Lingual tonsil: It is located on the posterior surface of the tongue.
4. Tubal tonsil: It is located near the nasopharyngeal tonsil.
5. Lateral pharyngeal tonsil: It is located at lateral side of oral cavity.
6. Nodules: It is located on the posterior pharyngeal wall.

Functions of Tonsil

1. It protects body against infection.
2. It destroys swallowed and inhaled antigens.

IMMUNITY

Immunity is defined as the state of resistance exhibited by the host towards injury, toxic molecules caused by microorganism, foreign cell and their product.

CLASSIFICATION OF IMMUNITY

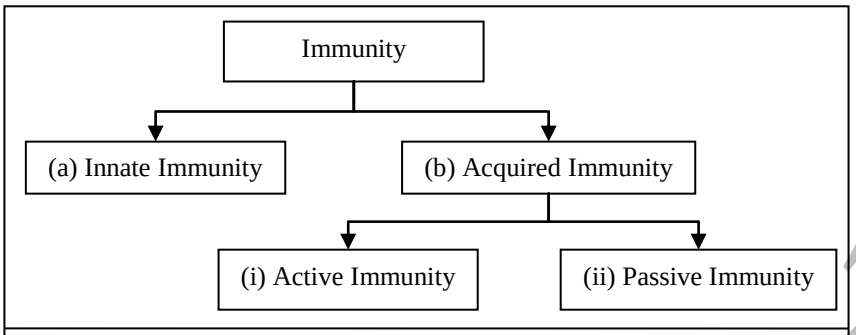

Chart. Classification of immunity

1. **Natural immunity**
   This type of immunity is present in the body since birth during the development of embryo, some antibodies from mother pass through the placenta to the fetus. These antibodies can protect the young from number of diseases like measles, polio etc. It is also known as innate immunity.
2. **Acquired immunity**
   The immunity acquired after birth or during the lifetime of an individual is known as acquired immunity.
   Types of acquired immunity
   a. **Active immunity**: The acquired immunity developed by the entrance of any foreign body or a vaccine is known as active immunity.
   b. **Passive immunity**: The acquired immunity developed by transferring antibodies, serum of lymphocyte from an immune individual is known as passive immunity.

DIFFERENCE BETWEEN ACTIVE & PASSIVE IMMUNITY

No.	Active immunity	Passive immunity
1.	It is developed by an individual's own cells in response to an infection or a vaccine.	It is developed when ready-made antibodies are inoculated from outside.
2.	It has no side effects.	It may cause reaction.
3.	It provides relief only after long period.	It provides immediate relief.
4.	It is long lasting.	It is short lived.

ANTIGENS

Antigens are the substances, which induce specific immune reaction in the body. The antigen stimulates lymphocytes to produce antibodies or to attack the antigen directly (antibody immunity).

IMMUNOGLOBULINE (ANTIBODIES)

The protein substance present in the blood serum, produced in response to a reaction with a specific antigen is known as antibody.