### Chapter 28 - The Lymphatic System

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- The lymphatic system is a secondary circulatory system.
- It is a one way system of dead-ending vessels. These lymph vessels collect fluid that surrounds each cell in the body and returns it to the blood.

#### Formation of lymph:

- The blood in the arteries is under high pressure. This causes fluid to be forced out of blood plasma in capillaries.
- This fluid is called tissue fluid/extracellular fluid/interstitial fluid. This fluid allows molecules to pass in and out of cells.
- Tissue fluid must be removed & returned to the blood.
- Most tissue fluid is drawn back into plasma in capillaries near veins (by osmosis).
- A small amount of tissue fluid passes into lymph vessels.

**Tissue fluid** has white blood cells and proteins,

**Lymph** has white blood cells, proteins & fats.
• Both lymph & tissue fluid act as exchange mediums allowing materials to enter and leave cells.

• If lymph is not properly collected it causes swelling (Oedema).

• 1 litre of lymph is formed per hour.

**Lymph vessels:**

• Lymph is moved through lymph vessels by
  o The muscular walls of the vessels
  o General body movements pressing on the vessels (valves ensure flow in one direction)

• Lymph re-joins the blood stream at the **subclavian veins** near the collar bones.

• Lymph flow is always toward the shoulder regions: the **thoracic duct** on the left and the **right lymphatic duct**.

![Plasma ➔ ECF ➔ Lymph ➔ Plasma](image)

**Lymph nodes:**

• These are swellings found along lymph vessels. They contain large numbers of white blood cells (Lymphocytes).

• They are found in clusters - adenoids, tonsils, neck, armpits, groin, etc

• Lymph nodes fight infection by:
  o Filtering bacteria
  o Store and mature lymphocytes (kill micro-organisms & some make antibodies)

**Functions of the Lymphatic System:**

• To collect tissue fluid and return it to the blood.

• To fight infection by:
  o Filtering micro-organisms in lymph nodes.
  o Maturing and storing lymphocytes
  o Destroying micro-organisms by engulfing/digesting them or by forming antibodies.

• To absorb and transport fats in the digestive system.

• To help with **hearing and balance** (lymph fluid is found in the inner ear).