LYMPH (TISSUE FLUID)

As blood courses through the capillaries in tissues, a portion of water, along with various small water-soluble substances, exits into the intercellular spaces within the tissue. Larger proteins and the majority of formed elements, such as erythrocytes and platelets, remain within the blood vessels. This released fluid is termed interstitial fluid or tissue fluid. Both plasma and tissue fluid exhibit similar mineral distributions. The exchange of nutrients, gases, and other substances between the blood and cells primarily occurs through tissue fluid, acting as an intermediary.

- The collected fluid is then drained back into major veins through an intricate network of vessels known as the lymphatic system. The fluid within the lymphatic system is referred to as lymph.
- Lymph is a colorless fluid devoid of hemoglobin and contains specialized lymphocytes responsible for the body's immune responses. It consists of plasma and leucocytes.
- The lymphatic system comprises lymphatic capillaries, lymphatic vessels, lymphatic nodes, and lymphatic ducts.
- Lymphatic capillaries, the smallest vessels of the lymphatic system, are microscopic, closed-ended tubes forming extensive networks in intercellular spaces within most organs. Interstitial fluid, proteins, microorganisms, and absorbed fats (in the intestine) easily enter lymphatic capillaries, facilitated by endothelial cells with porous junctions.
- Once tissue fluid enters lymphatic capillaries, it transforms into lymph. These capillaries merge to form larger lymphatic vessels, resembling veins in their wall structure. Valves are present to prevent backflow. Larger lymphatic vessels ultimately drain into either the thoracic duct (on the left) or the right lymphatic duct (on the right). These ducts then direct lymph into the left and right subclavian veins, respectively, which connect to the superior vena cava, a major vein leading to the heart. Consequently, tissue fluid, originating from the filtration of plasma out of blood capillaries, returns to the major veins or the cardiovascular system.

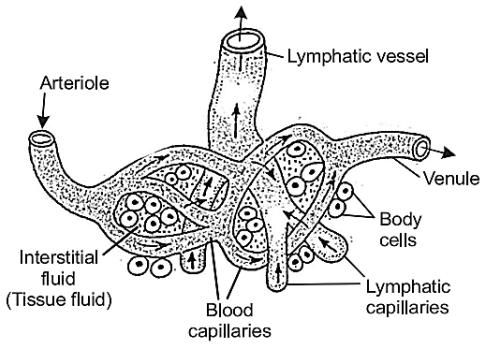

Fig. : Diagram showing the relationship between the lymphatic capillaries and blood capillaries

- Lymph nodes are situated at regular intervals along lymphatic vessels, filtering the lymph. Abundant in the neck, groin, and armpits, lymph nodes contain phagocytic cells aiding in pathogen removal and serve as sites for lymphocyte proliferation. The tonsils, thymus, and spleen are also lymph nodes, collectively referred to as lymphoid organs.

Functions:

- Lymph transports oxygen, nutrients, hormones, etc., to body cells and carries away carbon dioxide and other metabolic wastes from cells, eventually pouring them into the venous system.
- Lymphocytes colonize in lymph nodes, transporting lymphocytes and antibodies from nodes to the blood.
- Lymphocytes within lymph nodes destroy invading microorganisms and foreign particles.

- Lymph absorbs fats from the intestine, with lacteals (lymphatic capillaries) in intestinal villi releasing absorbed fats into the bloodstream.

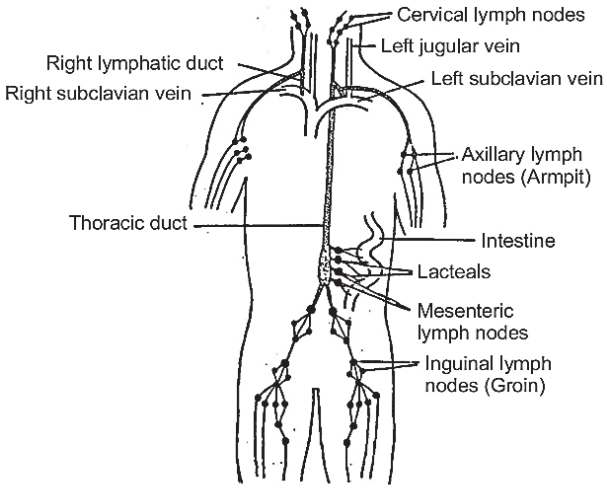

Fig. : Human Lymphatic System