

Theoretical Physiology

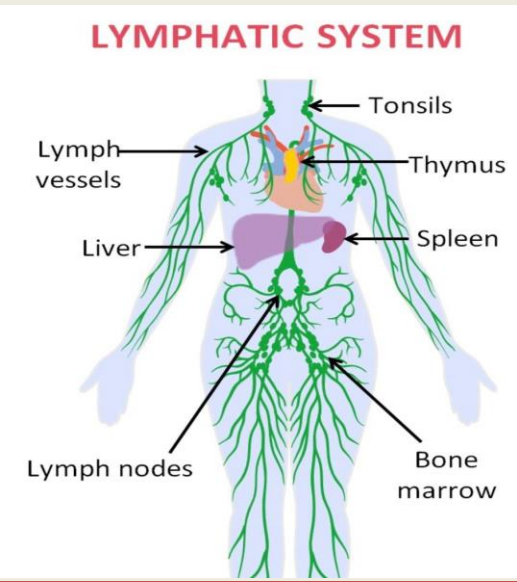
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Lecture 8 M.Sc. Awham Kareem

First Stage

*Lymphatic System



Lec 8

Introduction

The Lymphatic System

Consists of two semi independent parts

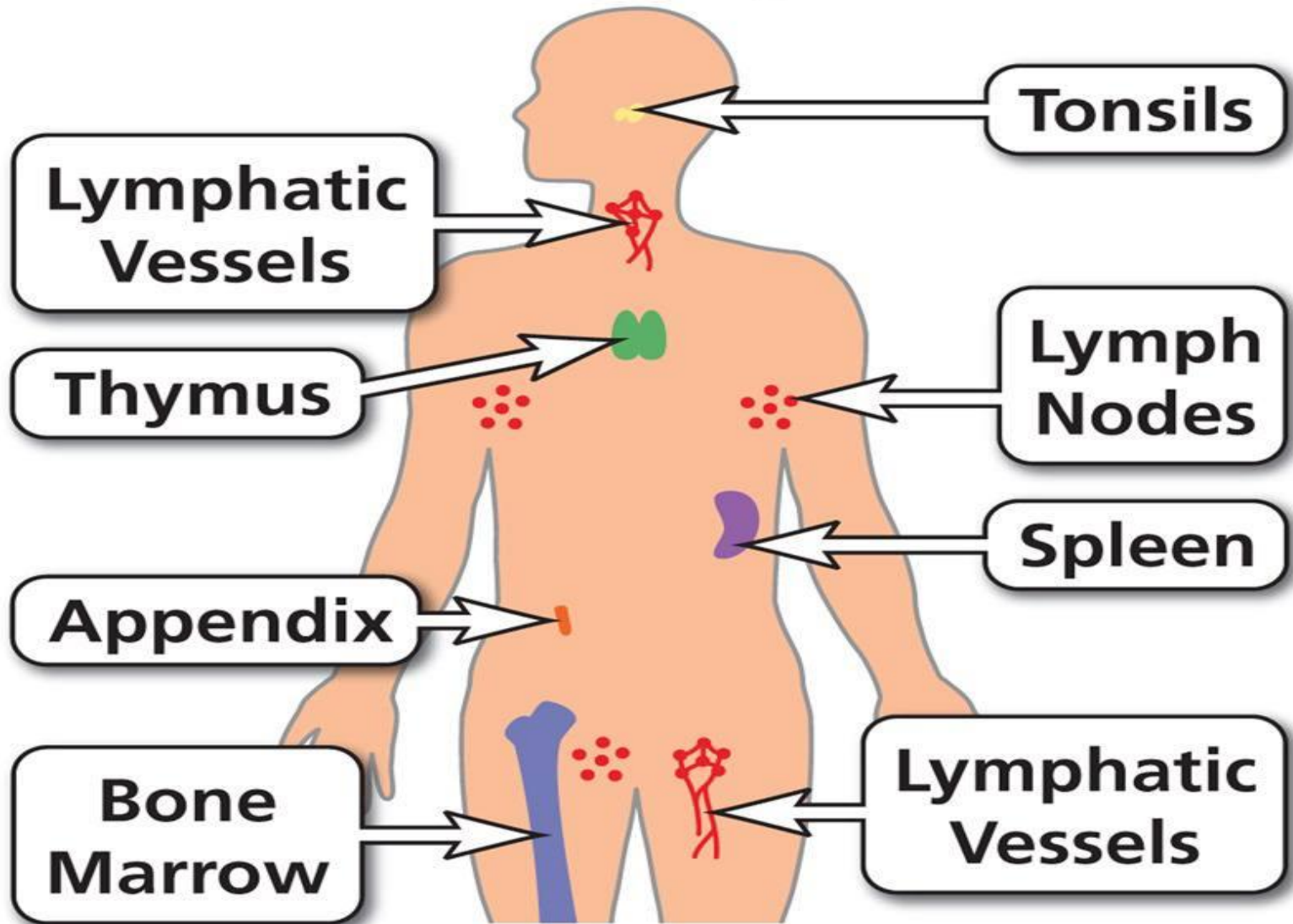
Lymphatic Vessels

Lymphoid Tissues and Organs

Lymphatic System Functions

1. Provides a route for excess interstitial fluid (lymph) to return to the blood.
2. Play essential roles in body defense and resistance to disease.

Immune System



The components of Lymphatic System

1.Primary lymphoid organs (the thymus and bone marrow), where lymphocytes are formed initially

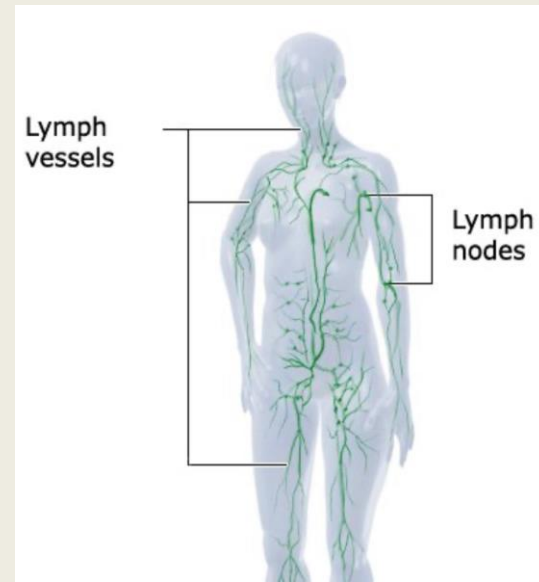
2.Secondary lymphoid organs (the lymph nodes, the spleen, and diffuse lymphoid tissue found in the mucosa of the digestive system, including the tonsils, Peyer patches, and appendix).

Lymphatic System Function

Lymphatic System which consists of vessels and organs plays two vital roles in our lives:

1) The vessels: maintain interstitial fluid levels by carrying excess fluids and any plasma proteins, back into the blood circulation.

2) The organs: house for critical immune cells such as lymphocytes which carry out our body defense against infection and disease as well as offer adaptive immunity .



Lymphatic Characteristics

* Lymph – excess tissue fluid carried by lymphatic vessels (general definition)

Properties of lymphatic vessels

1. One way system toward the heart
2. No pump

Composition of Lymph

* **Lymph** is usually a clear, colorless fluid, similar to blood plasma but low in protein

* Its composition varies from place to place; after a meal, for example, lymph drained from the small intestine, takes on a **milky appearance**, due to **lipid content**.

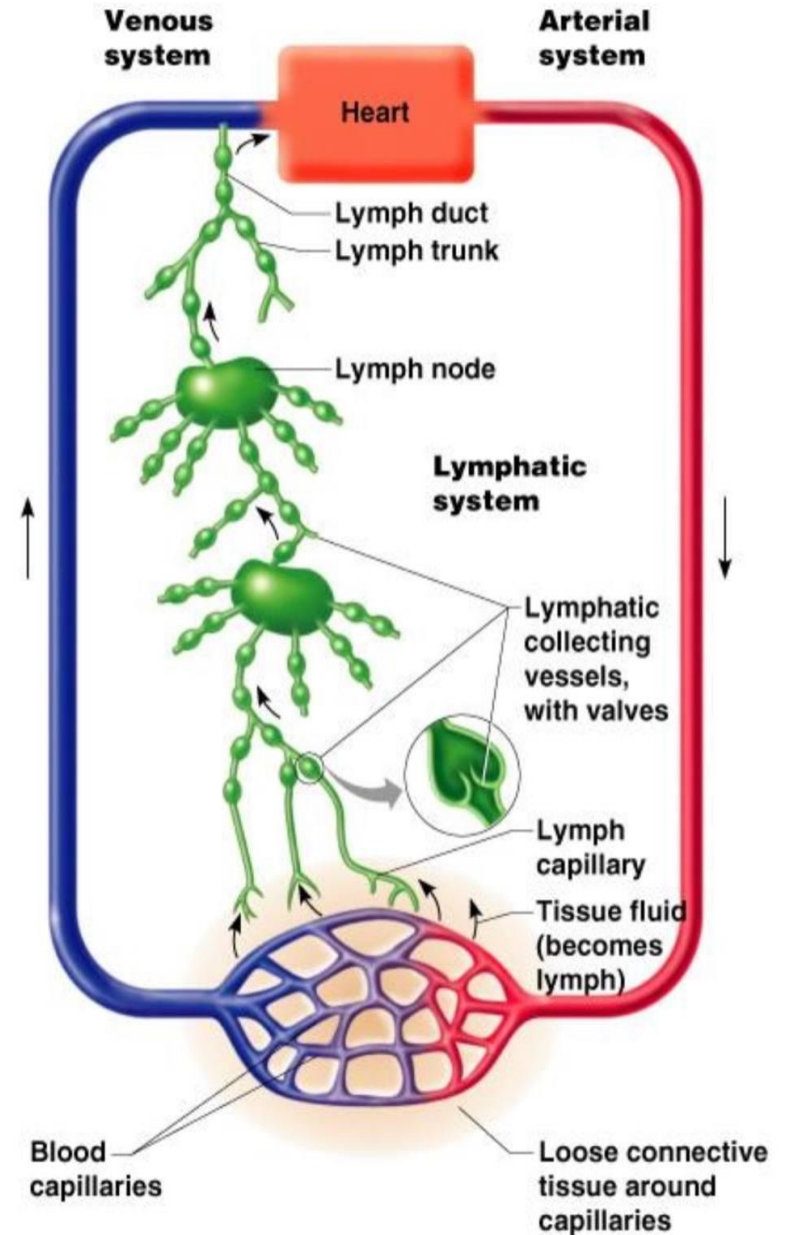
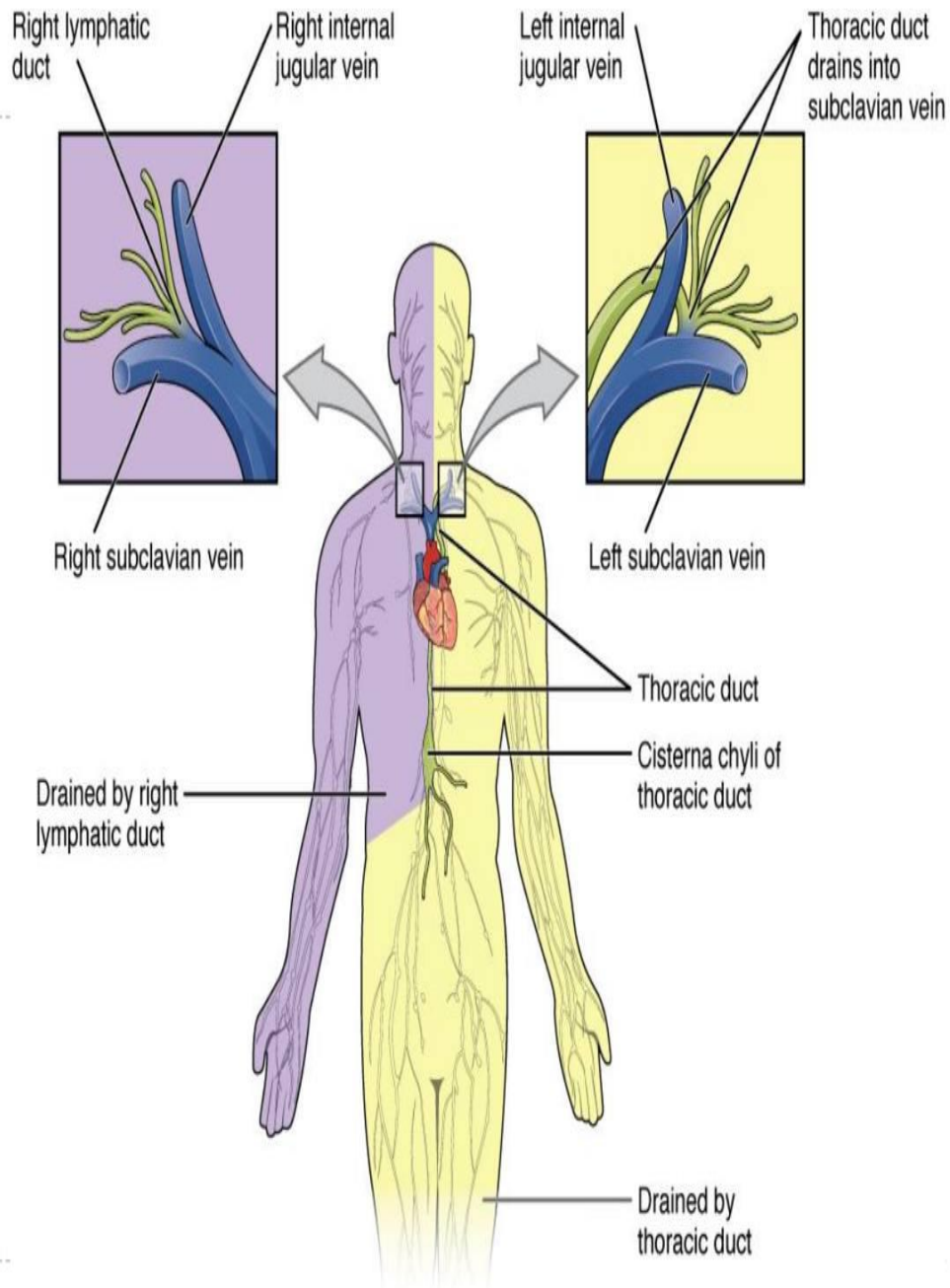
* Lymph may contain macrophages, **viruses, bacteria, cellular debris** and **even traveling cancer cells**

Edema

*Edema is the excess accumulation of fluids in tissue spaces.

*Anything that causes increased capillary pressure, such as decreased plasma protein, increased capillary permeability or lymphatic blockage, can result in Swelling.





Lymphatic Vessels

- * The vessels are called **lymphatics**.
- * They are **thin-walled** and are comparable to veins.
- * Small lymphatics are similar to capillaries only more **porous**; Larger vessels are called **collecting vessels**: both have **valves**.

2 large Ducts: Right Lymphatic duct and Thoracic duct

- * Lymph flows only to the heart (**one way**).
 - * This is a **low-pressure, pump-less** system.
- .

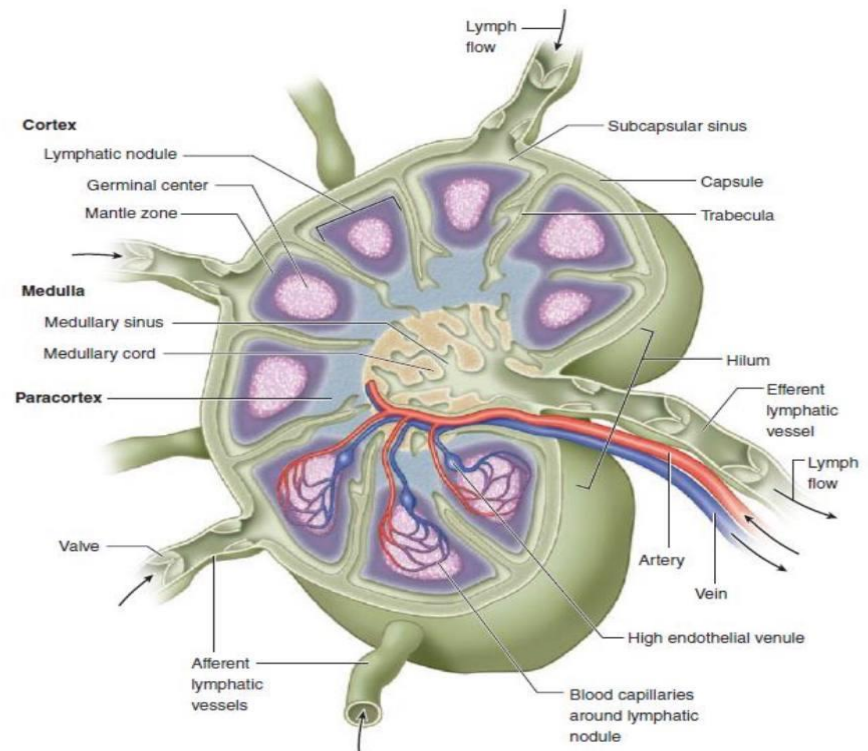
Lymphatic Organs

- 1. Lymph Node-** Important lymphocytes of the immune response are matured here.
- 2. Spleen:** destroys RBCs and Reservoir of Blood; It is the largest Lymph organ and it filter blood of bacteria and antigen-filled cells.
- 3. Thymus Gland:** produces hormone, thymosin , functions in programing lymphocytes T and B cells; T cells matured here (become immunocompetent)
- 4. Tonsils:** Traps bacteria and other microbes in throat.
- 5. Peyer's Patch:** capture and destroy bacteria in intestine. preventing them from penetrating the intestinal wall.
- 6. Bone Marrow(blood cells production)**
- 7. Appendix]**

The appendix is a thin, roughly four-inch-long tube that's part of gastrointestinal (GI) tract located in the lower right part of abdomen

Lymph Nodes

- * Lymph Nodes take the germ-filled lymph and filter it before it is returned to the blood
- * Defense cells within lymph nodes
- * Macrophages – engulf and destroy foreign substances
- * Lymphocytes – provide immune response to antigens



Lymph Node Structure

- * Most are kidney-shaped, less than 1 inch long
- * Cortex
 - * Outer part
 - * Contains lymphoid nodules (follicles) collections of lymphocytes
- * Medulla
 - * Inner part
 - * Contains phagocytic macrophages

Thank you