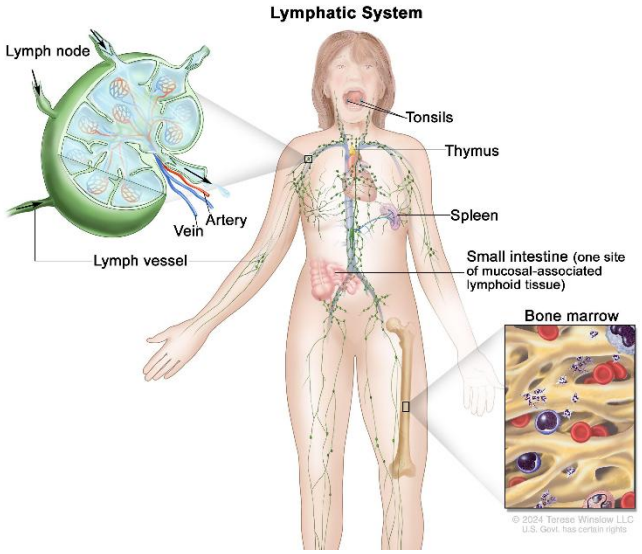
Topic 18: Lymphatics

What is the lymphatic system?

A network of vessels, nodes, and organs that:

- Returns excess interstitial fluid → _____
- Filters pathogens
- Supports immune function

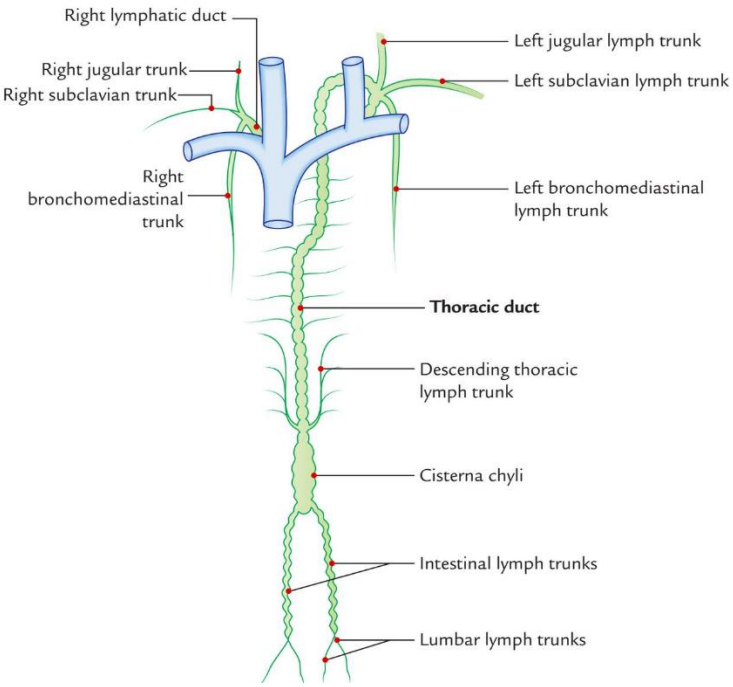


Lymph

- Clear fluid derived from interstitial fluid
- Contains:
  - Lymphocytes (_____)
  - Proteins
  - Lipids
  - Waste products
- Called "lymph" once inside lymphatic vessels

Lymphatic Vessels

- Flow pathway: Interstitial fluid → Lymph capillaries → Collecting vessels → Lymph nodes → Trunks → Ducts → Subclavian veins→SVC

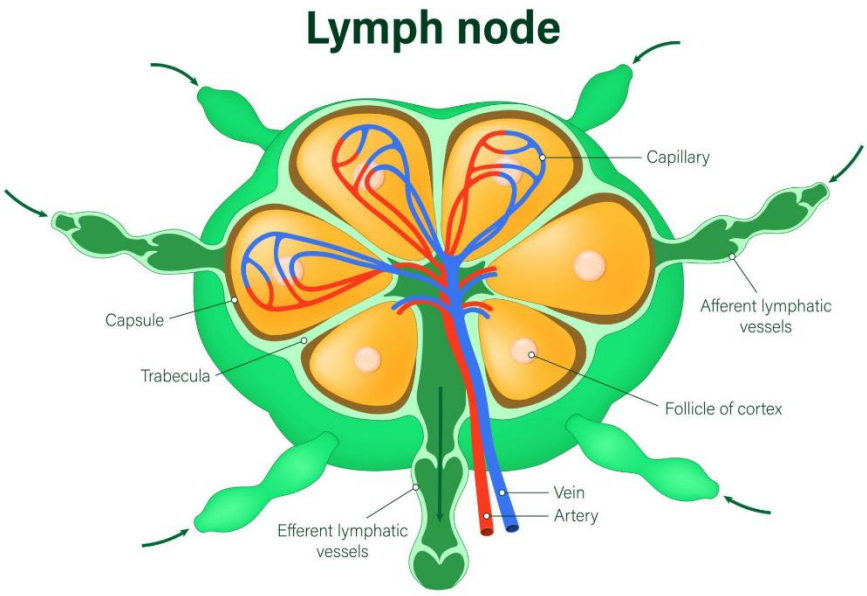


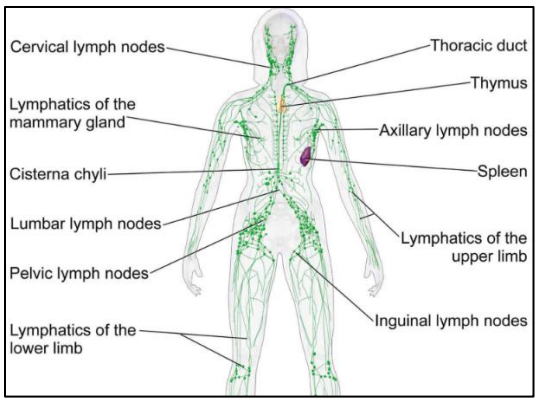
Types:

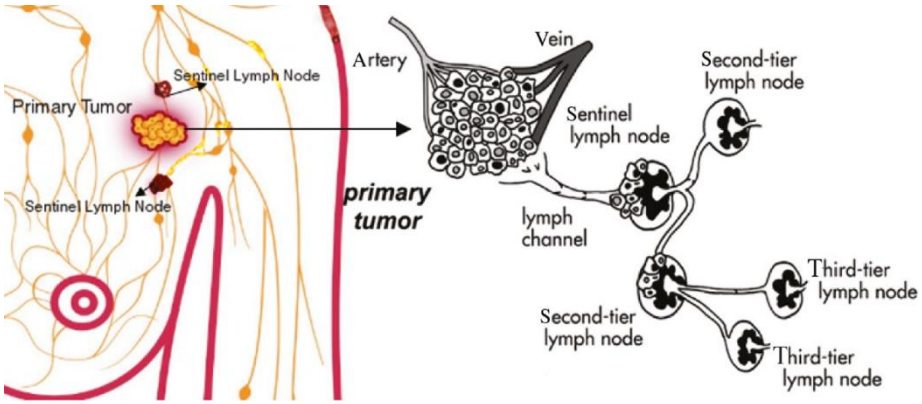
- Capillaries
  - _____-ended
  - Highly permeable (fluid entry)
- Collecting vessels
  - Contain valves → one-way flow
- Trunks
  - Jugular
  - Subclavian
  - Bronchomediastinal
  - Lumbar
- Ducts (final return)
  - Thoracic duct → drains most of _____

Lymph Nodes

- Small, bean-shaped structures
- Function:
  - Filter lymph
  - Trap pathogens
  - Activate immune response

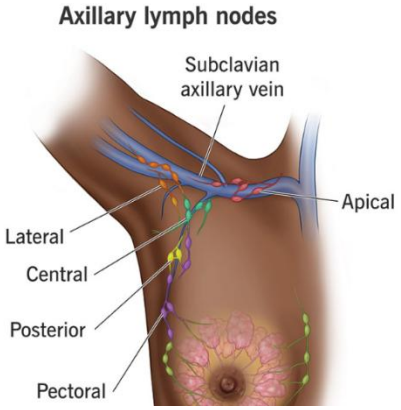






Major clusters:

- Cervical (neck)
- Axillary (armpit): primary site for _____ cancer
- Inguinal (groin)
- Sentinel lymph node→first node that receive drainage
- Clinical: Many cancers (especially carcinomas) commonly spread (metastasis) via the <u>lymphatic system</u>. *(side note: sarcomas or connective tissue cancers prefer blood spread)*.



Lymphoid Organs

<u>Primary</u>

- Bone marrow → produces _____ cells
- Thymus → T cell maturation

<u>Secondary</u>

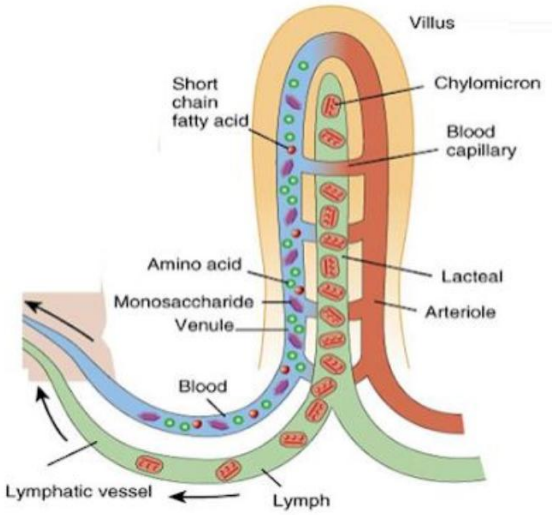
- Lymph nodes
- Spleen
- Tonsils
- MALT (mucosa-associated lymphoid tissue)

Core Functions

1. Fluid Balance
- Returns excess interstitial fluid (~_____ L/day)

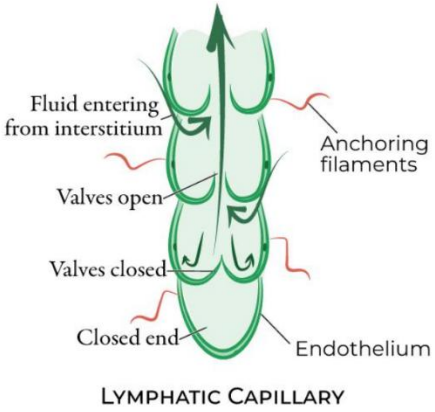
2. Immunity
- Filters pathogens
- Produces and activates lymphocytes

3. Fat Absorption
- _____ in small intestine absorb:
    - Dietary fats
    - Fat-soluble vitamins (A, D, E, K)



Flow Mechanics

- No central pump
- Flow depends on:
    - Skeletal muscle contraction
    - Breathing (thoracic pressure changes)
    - One-way valves
- low-pressure return system (similar to veins)



Large lymphatics vessels:

- Have tunica interna, tunica media, tunica externa (Trunks and Ducts only)

Topic 18: Study Guide Questions

1. Lymph is best described as: A. Plasma inside arteries B. Interstitial fluid within lymphatic vessels C. Blood without RBCs D. Intracellular fluid
2. Lymphatic capillaries are characterized by: A. Thick muscular walls B. Continuous tight junctions C. Blind-ended structure and high permeability D. Absence of valves
3. What ensures one-way flow in lymphatic vessels? A. Heart contractions B. Smooth muscle only C. Valves D. Pressure from arteries
4. The thoracic duct drains lymph from: A. Right upper quadrant only B. Entire body C. Most of the body D. Lower limbs only
5. The sentinel lymph node is defined as: A. The largest lymph node B. The first node receiving lymph drainage from a tumor C. The node closest to the heart D. A node in the spleen
6. Which lymph node group is most associated with breast cancer spread? A. Cervical B. Inguinal C. Axillary D. Popliteal
7. Lacteals are specialized lymphatic vessels involved in: A. Gas exchange B. Hormone transport C. Fat absorption D. Protein synthesis
8. Approximately how much fluid is returned daily by the lymphatic system? A. 0.5 L B. 1 L C. 3 L D. 10 L
9. The correct flow of lymph is: A. Nodes → capillaries → ducts → veins B. Capillaries → nodes → vessels → arteries C. Capillaries → collecting vessels → nodes → trunks → ducts → veins D. Veins → ducts → nodes → capillaries
10. Lymph ultimately returns to the bloodstream at the: A. Inferior vena cava B. Aorta C. Superior vena cava via subclavian veins D. Pulmonary artery
11. The thoracic duct empties lymph into the: A. Right subclavian vein B. Left subclavian vein C. Superior vena cava directly D. Inferior vena cava

Identify: