Blood Vessels, Lymphatic System

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Blood Vessels

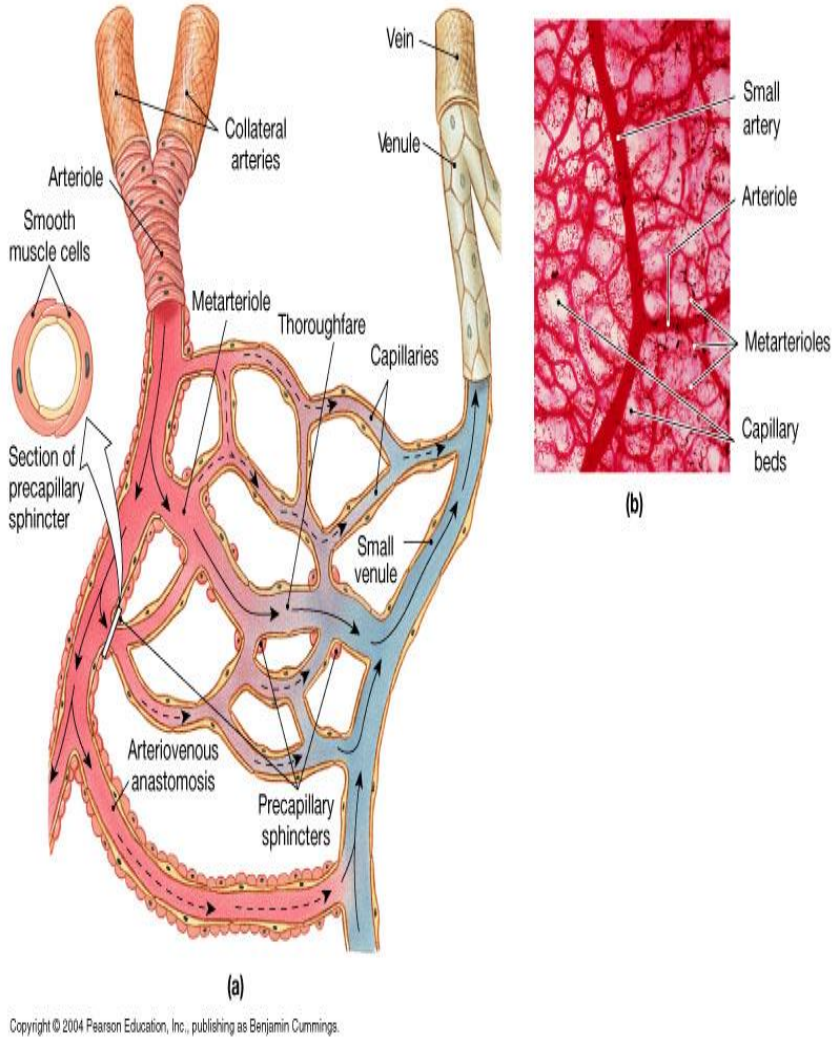
The cardiovascular system consists of;

Heart, which pumps blood throughout the body

Blood vessels which are a closed network of tubes that transport the blood.

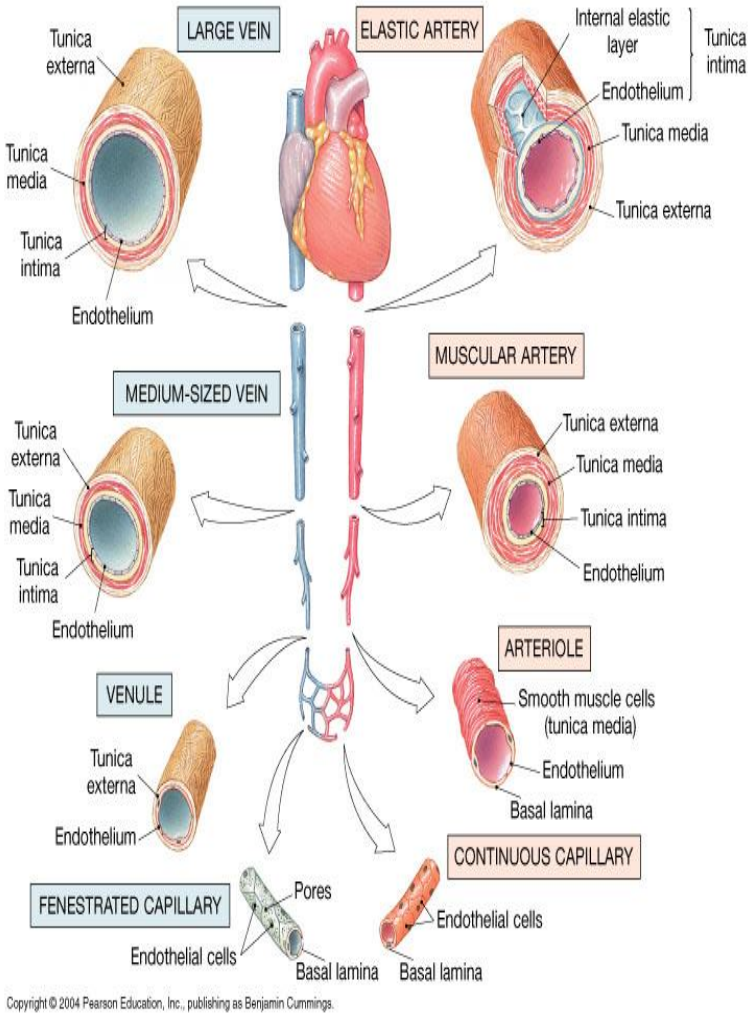
There are three types of blood vessels:

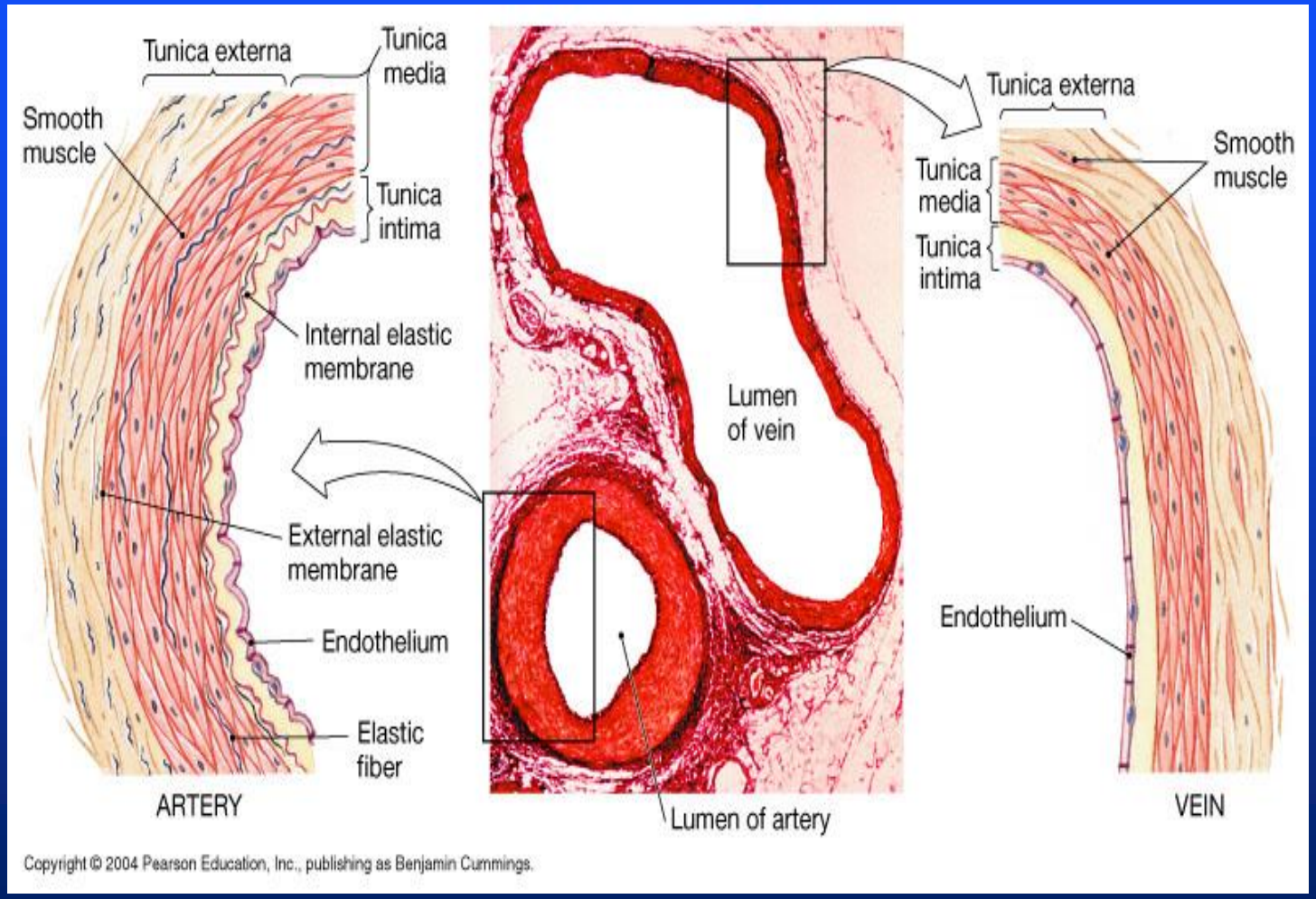
- Arteries, which transport blood away from the heart.
- Veins, which transport blood toward the heart.
- Capillaries, which connect the arteries and veins, are the smallest of the blood vessels and are where oxygen, nutrients, and wastes are exchanged within the tissues.



The walls of the blood vessels of the cardiovascular system usually consist of three layers or tunics:

- tunica externa (adventitia)—the outer connective tissue layer.
- tunica media—the middle smooth muscle layer (may also contain varying amounts of elastic fibers in medium and large arteries).
- tunica intima—the inner endothelial lining of the blood vessels.





Arteries

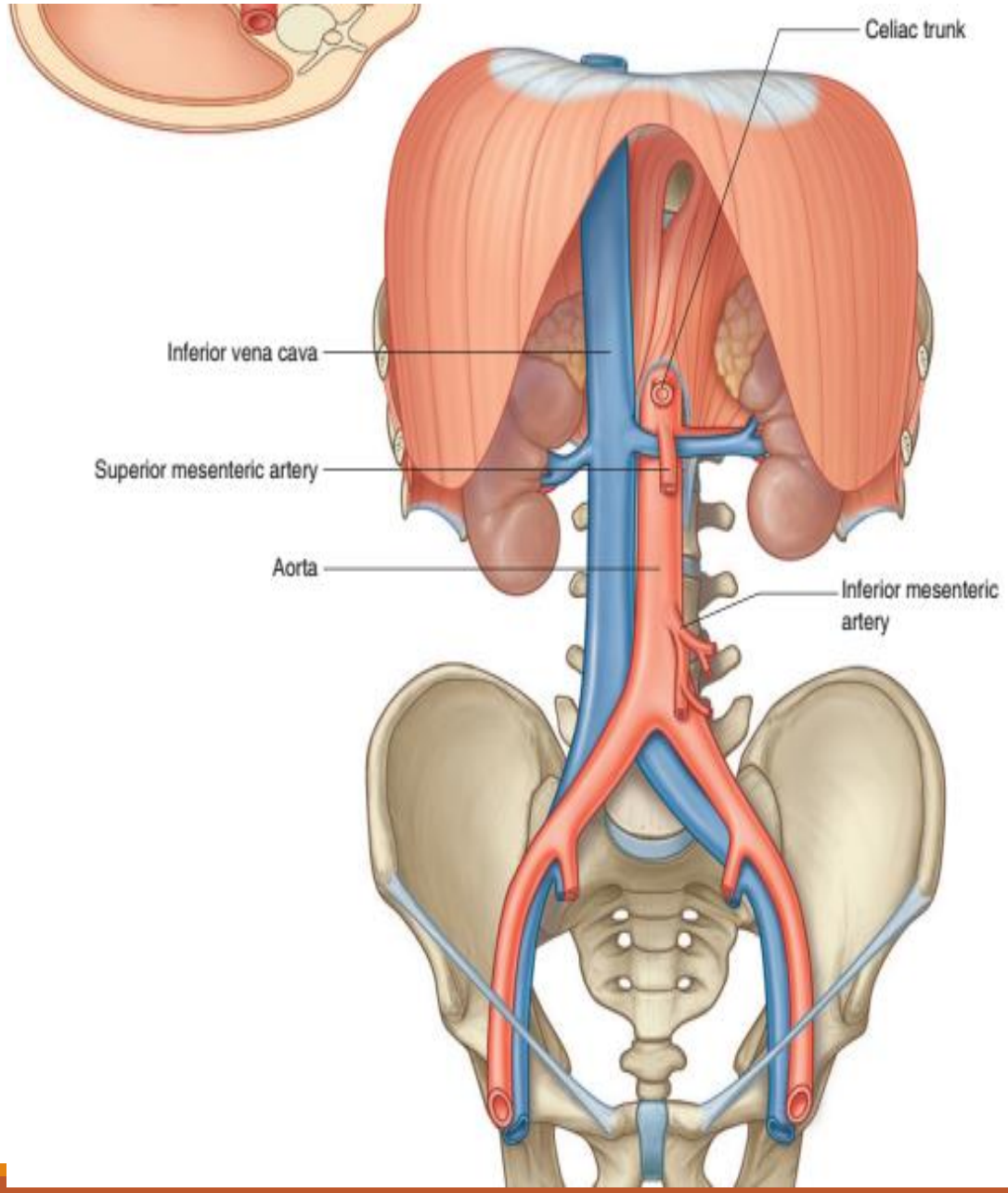
Subdivided into three classes, according to the variable amounts of smooth muscle and elastic fibers contributing to the thickness of the tunica media, the overall size of the vessel, and its function.

- Large elastic arteries ;

Contain substantial amounts of elastic fibers in the tunica media, allowing expansion and recoil during the normal cardiac cycle. This helps maintain a constant flow of blood during diastole.

Examples of large elastic arteries are ;

Aorta, the brachiocephalic trunk, the left common carotid artery, the left subclavian artery, and the pulmonary trunk


Celiac trunk
Inferior vena cava
Superior mesenteric artery
Aorta
Inferior mesenteric artery

- Medium muscular arteries;

Composed of a tunica media that contains mostly smooth muscle fibers. This characteristic allows these vessels to regulate their diameter and control the flow of blood to different parts of the body.

Examples of medium muscular arteries are most of the named arteries, including the femoral, axillary, and radial arteries.

- Small arteries and arterioles ;

control the filling of the capillaries and directly contribute to the arterial pressure in the vascular system

Veins

Subdivided into three classes;

- Large veins contain some smooth muscle in the tunica media, but the thickest layer is the tunica externa .

  Examples of large veins are the superior vena cava, the inferior vena cava, and the portal vein.

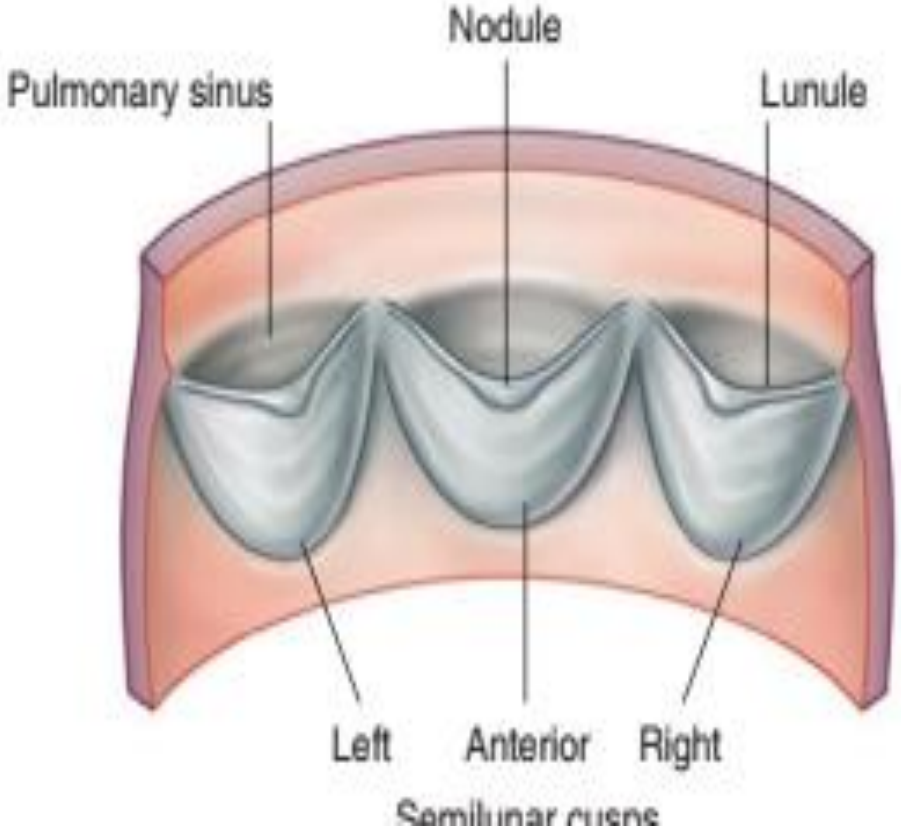
- Small and medium veins contain small amounts of smooth muscle, and the thickest layer is the tunica externa.

Examples of small and medium veins are superficial veins in the upper and lower limbs and deeper veins of the leg and forearm.

- Venules are the smallest veins and drain the capillaries

Although veins are similar in general structure to arteries, they have a number of distinguishing features.

- The walls of veins, specifically the tunica media, are thin.
- The luminal diameters of veins are large.
- There often are multiple veins (venae comitantes) closely associated with arteries in peripheral regions.
- Valves often are present in veins, particularly in peripheral vessels inferior to the level of the heart. These are usually paired cusps that facilitate blood flow toward the heart


Nodule
Pulmonary sinus
Lunule
Left
Anterior
Right
Semilunar cusps

Capillary

- Capillaries connect arteries to veins.
- Capillaries are the smallest type of blood vessel.
- A capillary wall is only one cell in thickness. The capillary wall is made of endothelial cells and allows oxygen, nutrients, and waste to pass to and from tissue cells.

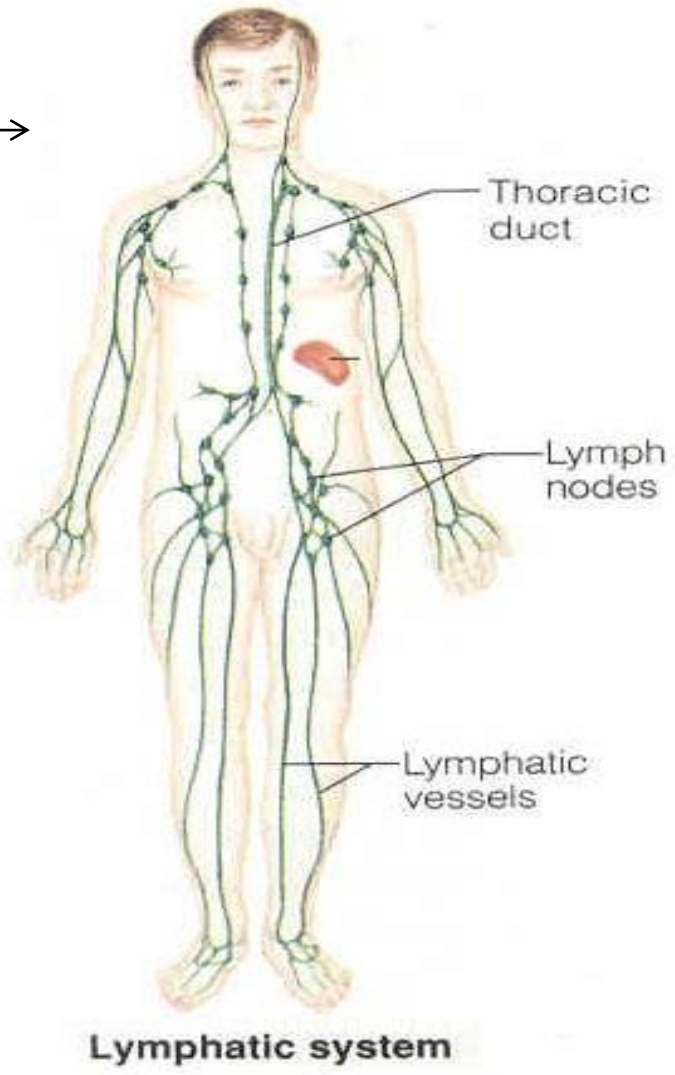
Lymphoid Tissue

Function:

1. lymphatic vessels drainage of interstitial tissue fluid (fluid lost from vascular capillary beds during nutrient exchange processes and deliver it back to the venous side of the vascular system).
2. Lymphatic tissue (lymphocytes) responsible for local and systemic body resistance against infection , tumours and any foreign substance enters the body.
3. The lymphatic system also a major route of transport for fat absorbed by the intestine .

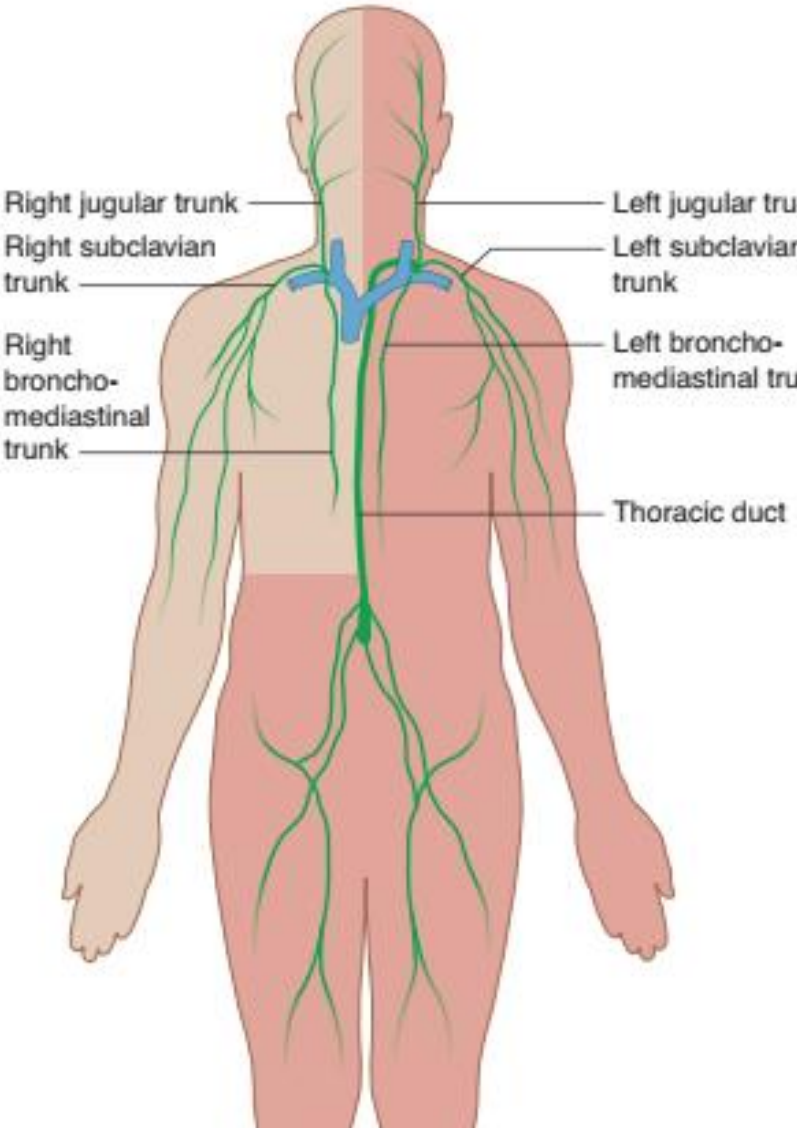
Components of the Lymphatic System

1- Lymphatic fluid
2- Lymphatic Vessels
   - Lymphatic Capillaries
   - Lymphatic Vessels
   - Lymphatic Trunks
   - Lymphatic Ducts
3- Lymphatic Organs
4- Lymphatic cells

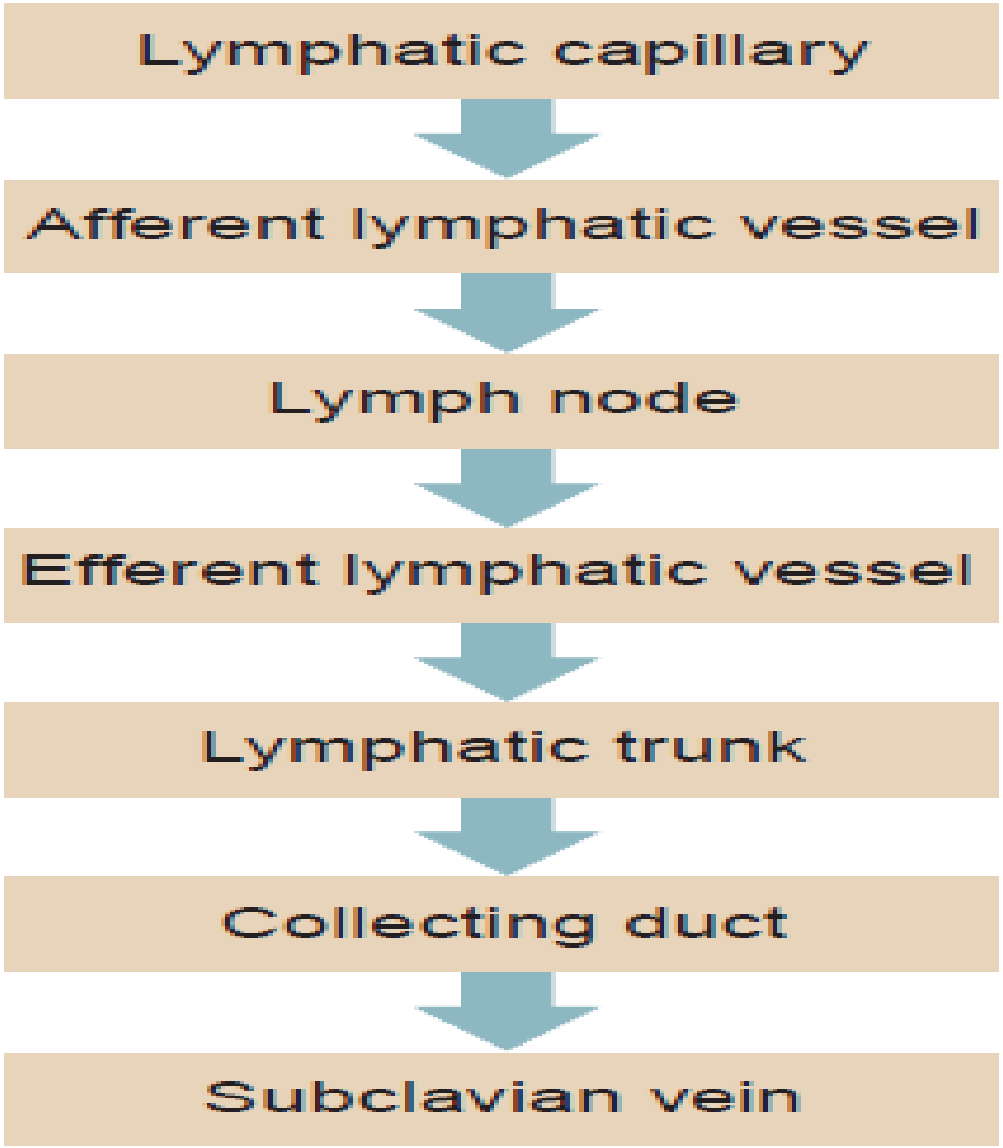


Lymphatic trunks and ducts

- All lymphatic vessels coalesce to form larger trunks or ducts, which drain into the venous system at sites in the neck where the internal jugular veins join the subclavian veins to form the brachiocephalic veins



The lymphatic pathway.

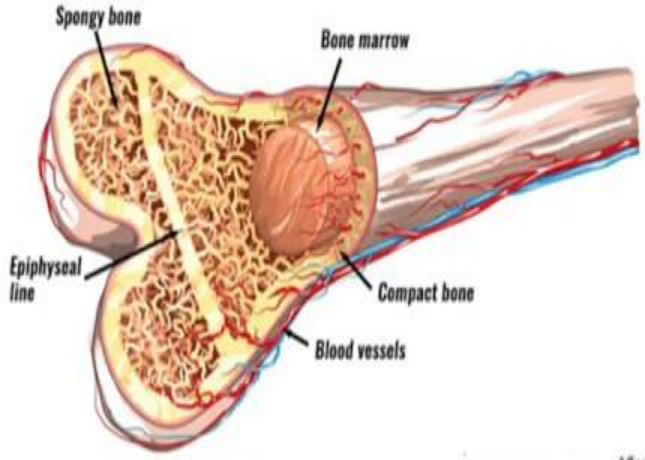


Lymphoid Organs

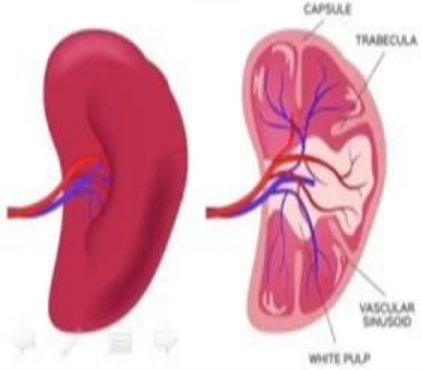
1. Bone marrow, sponge-like tissue found inside the bones.
2. Thymus, located behind the sternum above the heart.
3. Lymph nodes, are small bean-shaped tissues found along the lymphatic vessels. (contain elements of the body's defense system. They act as elaborate filters that trap and phagocytose particulate matter in the lymph that percolates through them)
4. Spleen
5. Tonsils
6. Mucous membranes

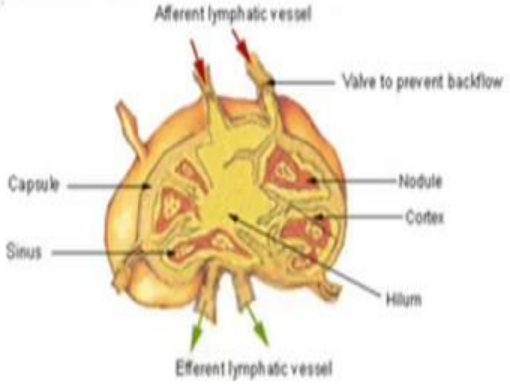
Lymphoid Organ

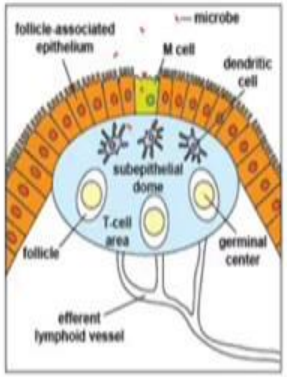
- Bone Marrow
- Thymus
- Spleen
- Lymph node
- Peyer's patches



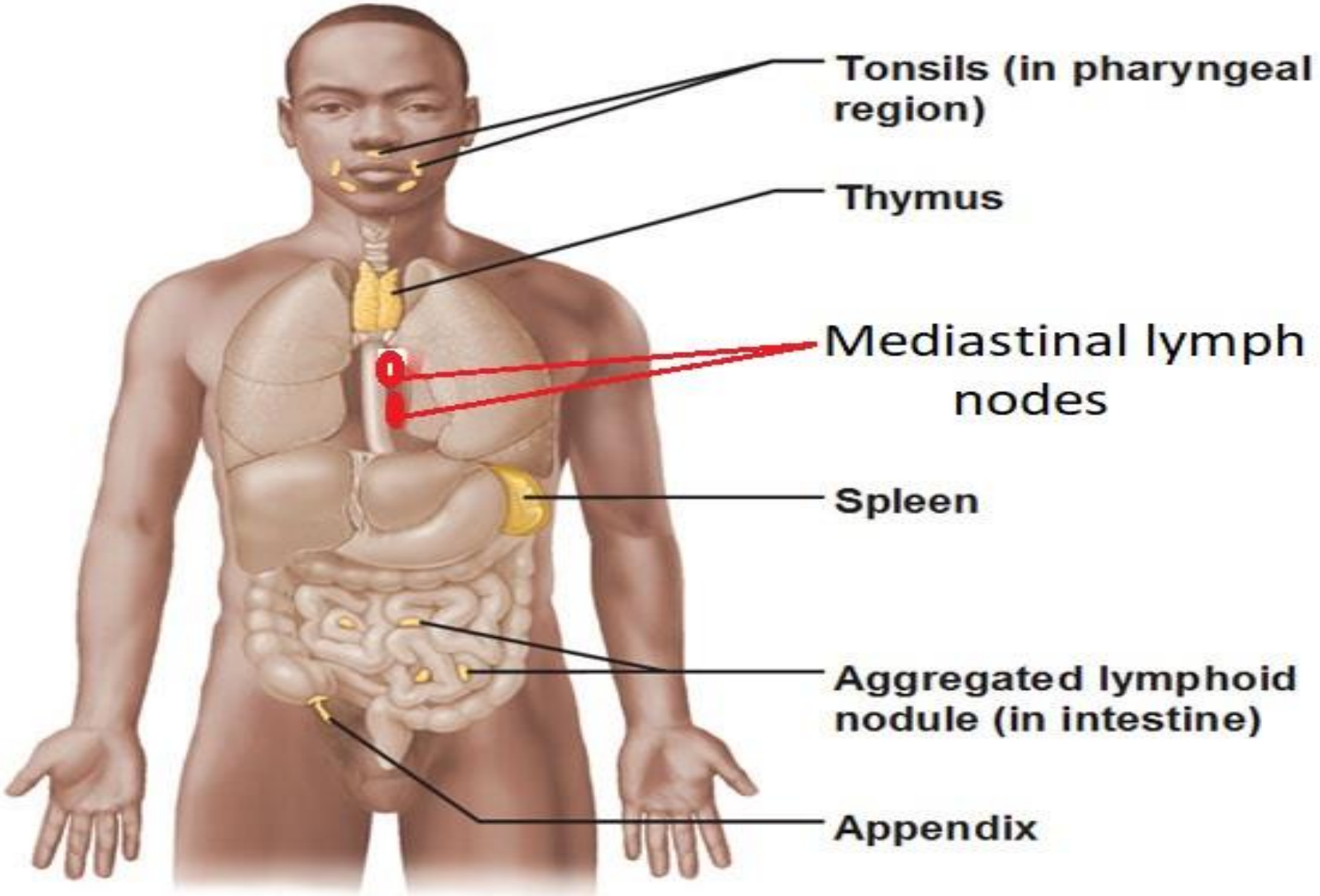
SPLEEN







Lymphoid Organs



Main body Lymph nodes

1. Cervical lymph nodes;

Drain the head and neck organs. It includes deep and superficial groups .

2. Axillary lymph nodes;

Drain the upper limb, breast,chest wall and the abdomen above the umbilicus .

3. Inguinal lymph nodes;

Drain the lower limbs and the abdomen below the umbilicus front and back.

4. Deep body lymph nodes include:

- Iliac lymph nodes
- Paraortic lymph nodes
- Intestinal lymph nodes

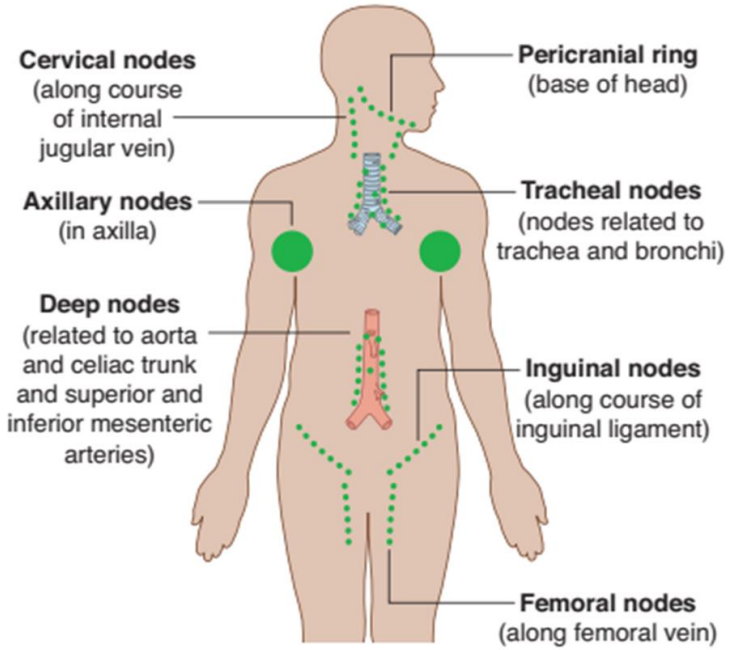
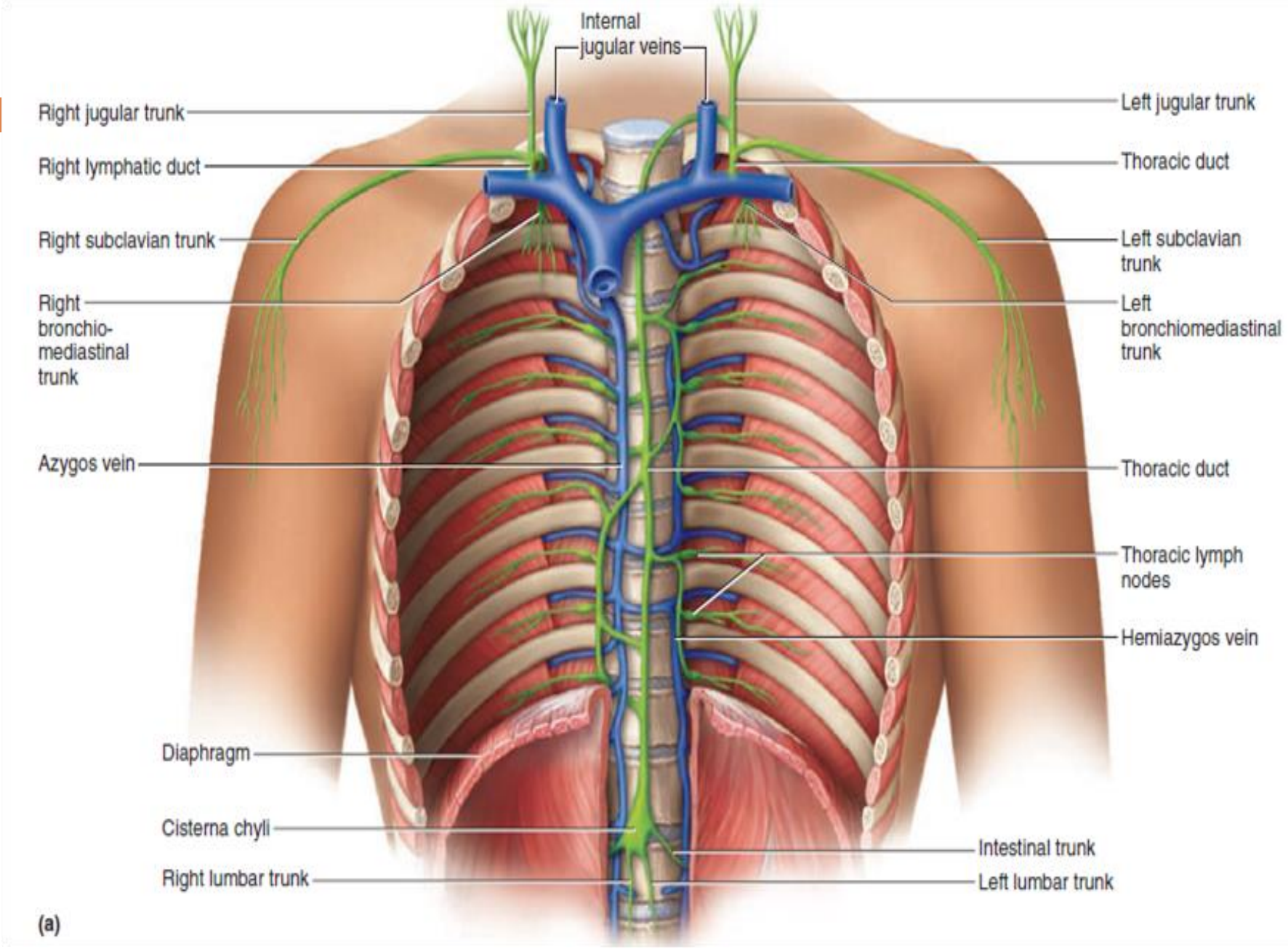


Fig. 1.29 Regions associated with clusters or a particular abundance of lymph nodes.

Venous drainage of all lymphatic vessels

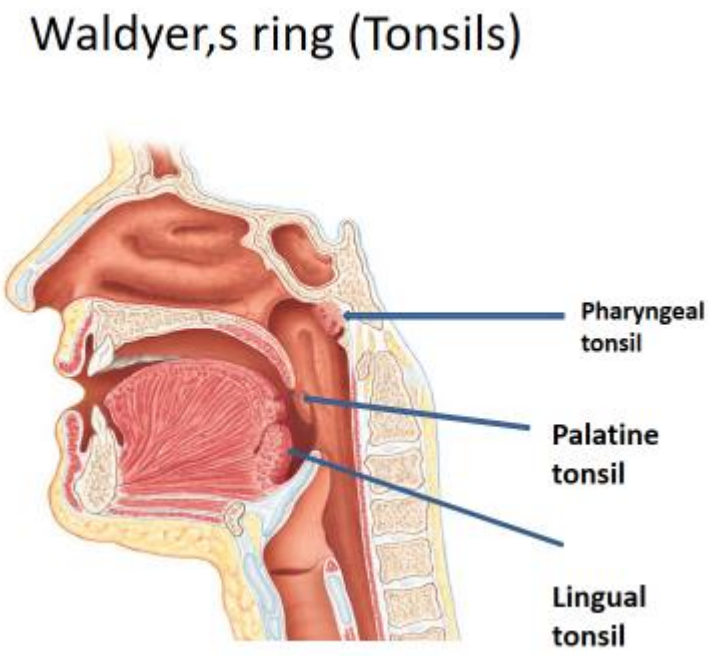


Tonsil

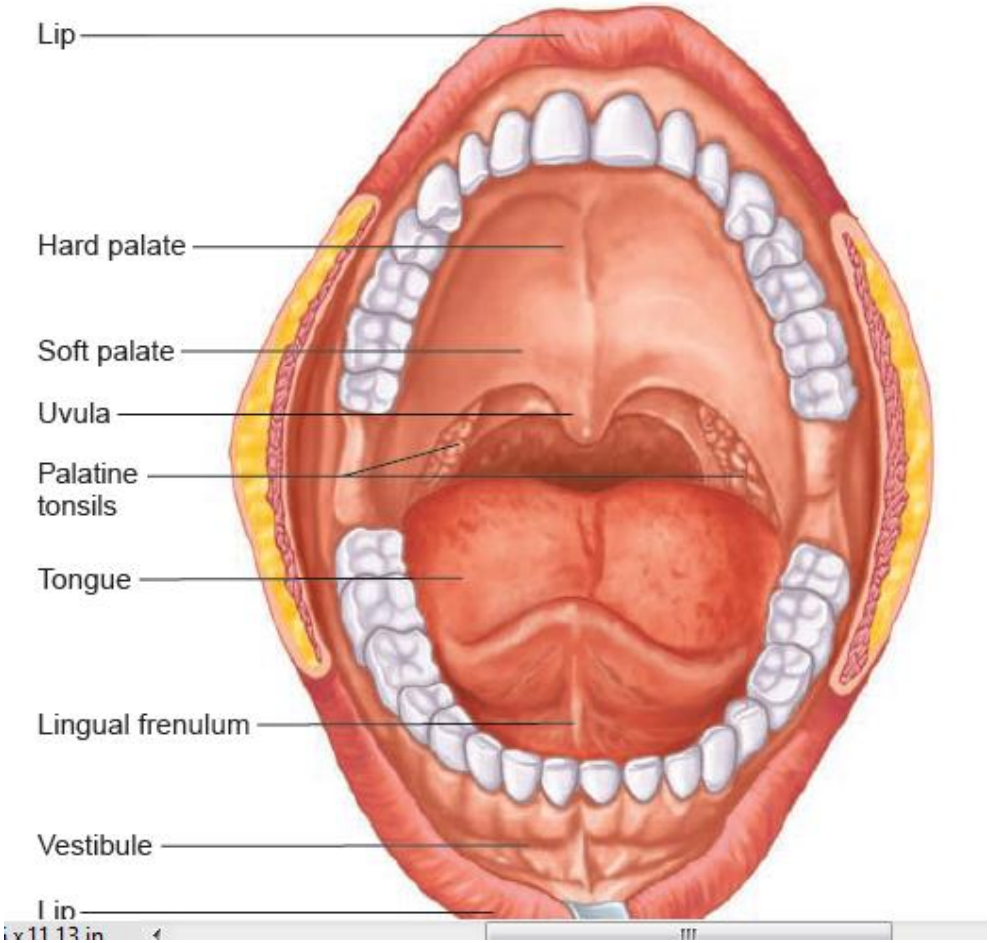
Aggregation of lymphoid ti
seen in the oropharyngea
region.

Four tonsils called Waldyer
ring, which includes

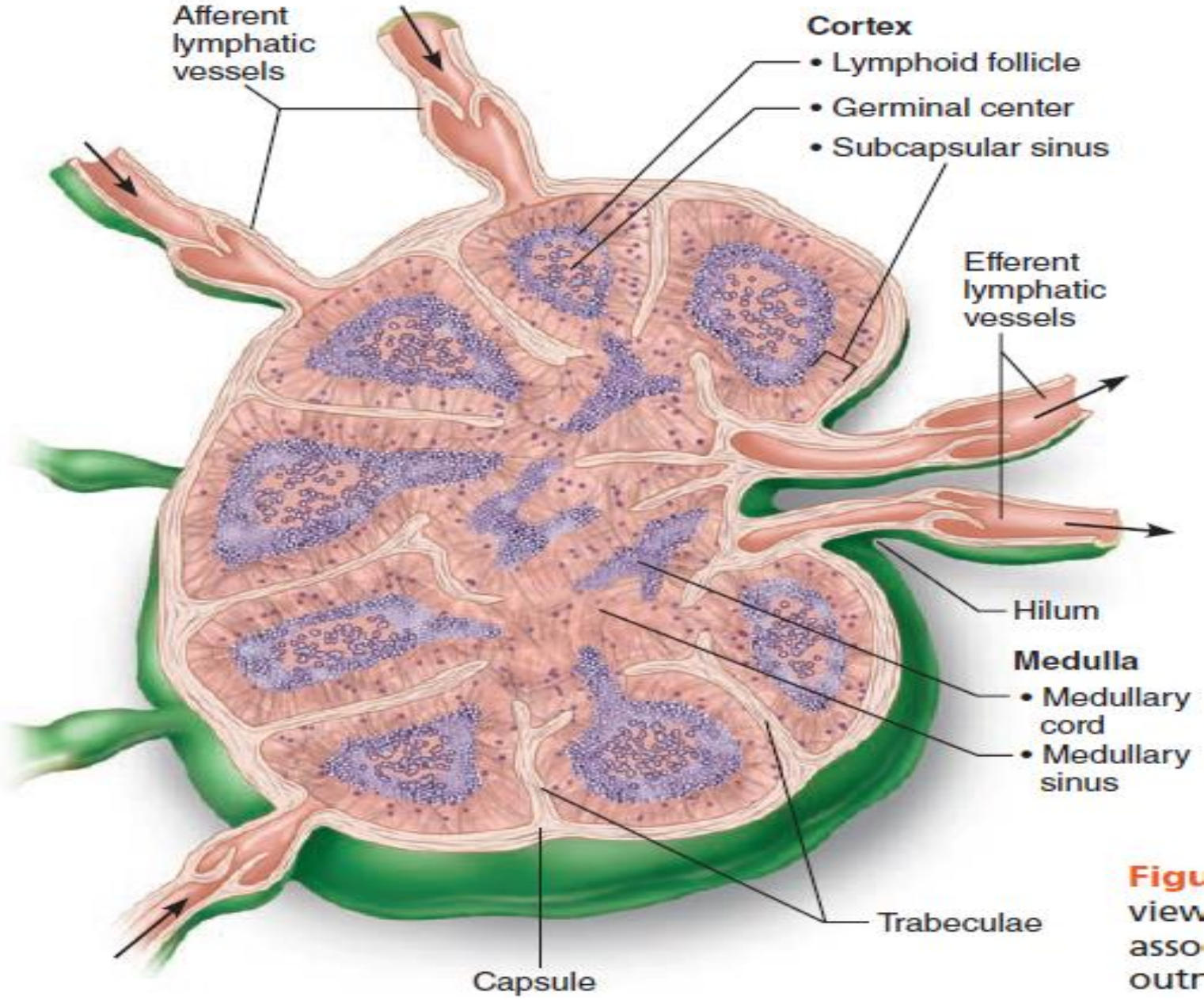
1. Palatine tonsil
2. Lingual tonsil
3. Pharyngeal tonsil
4. Tubal tonsil



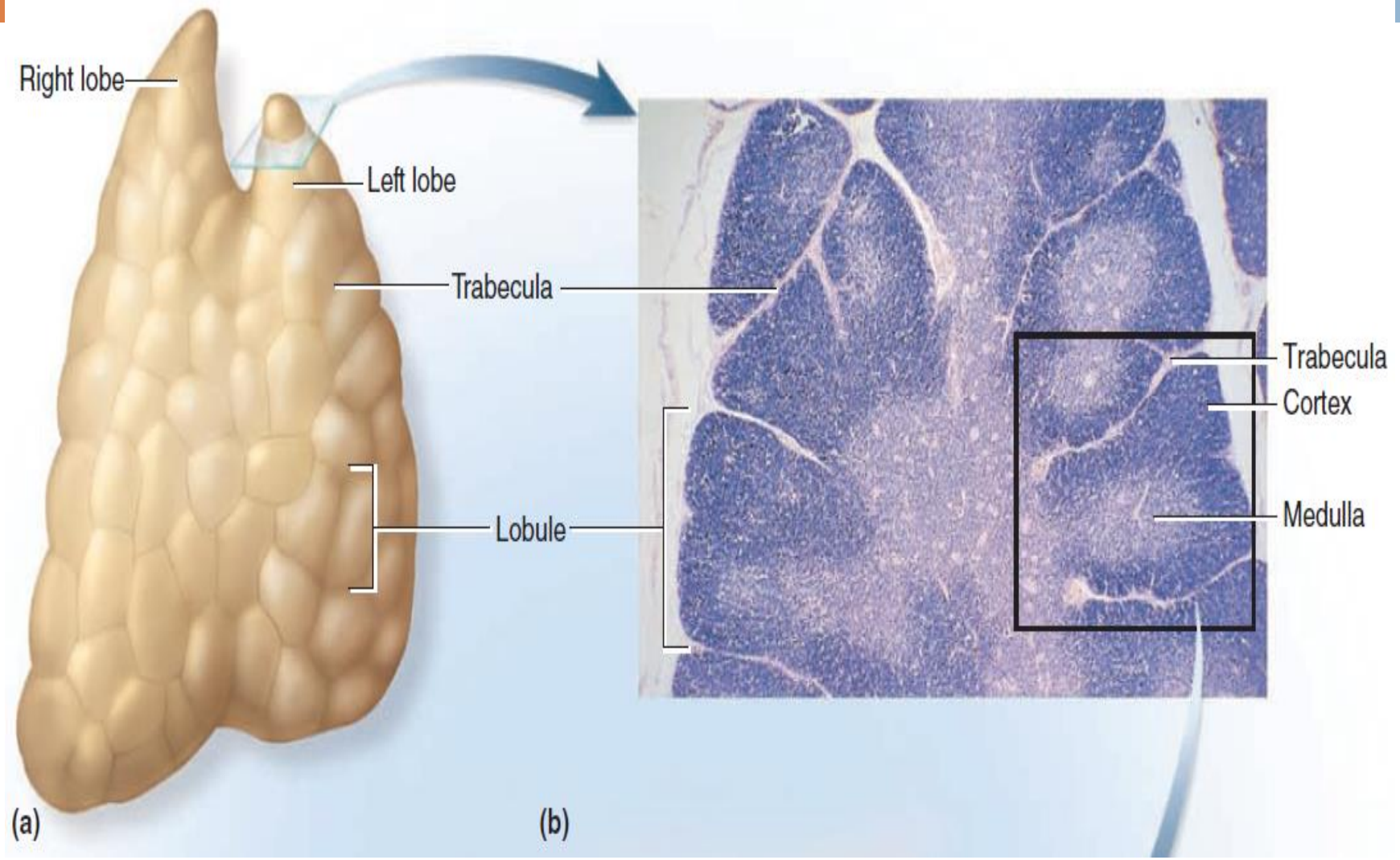
Location :**Palatine tonsil**



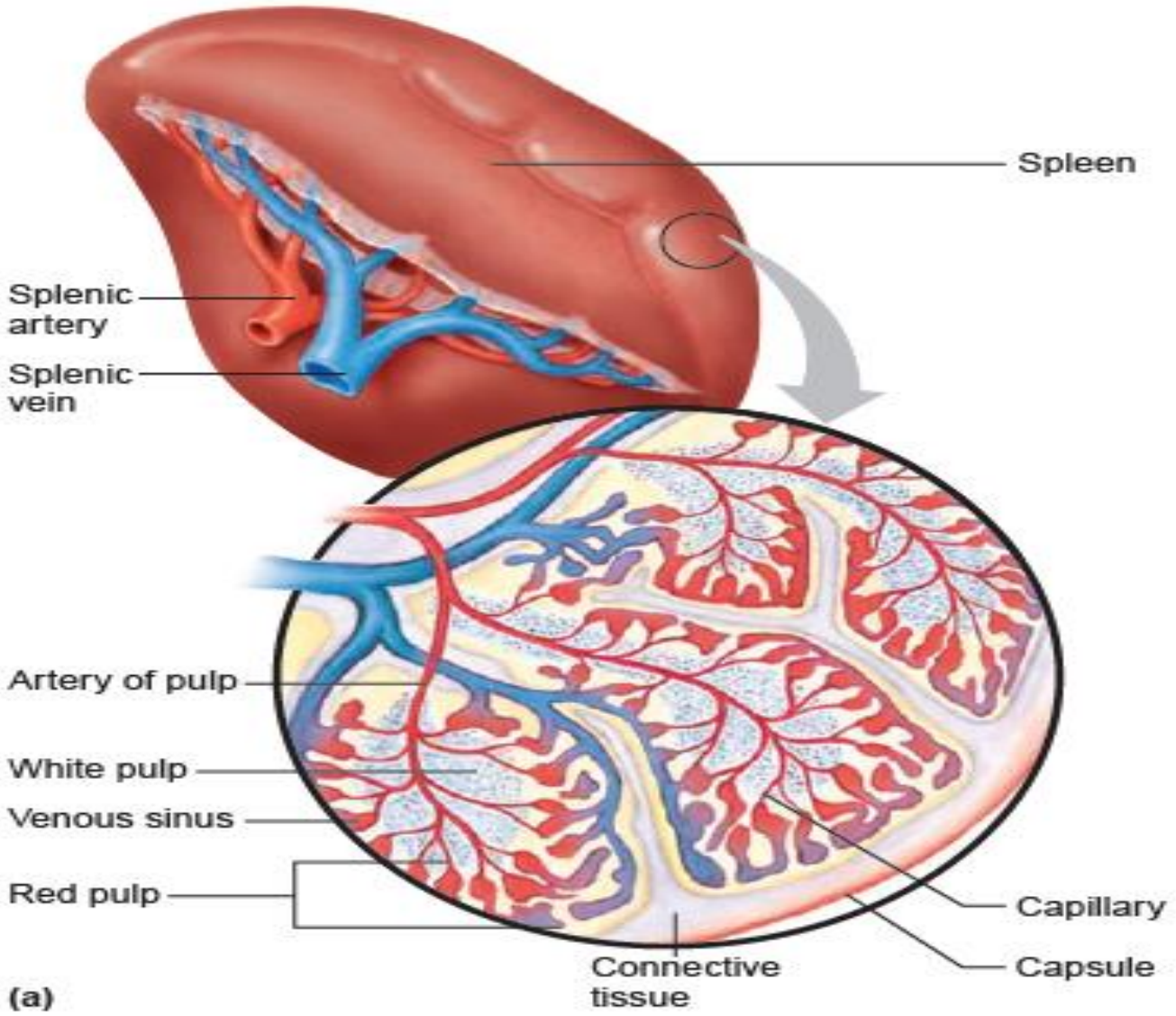
Structure of lymph node.

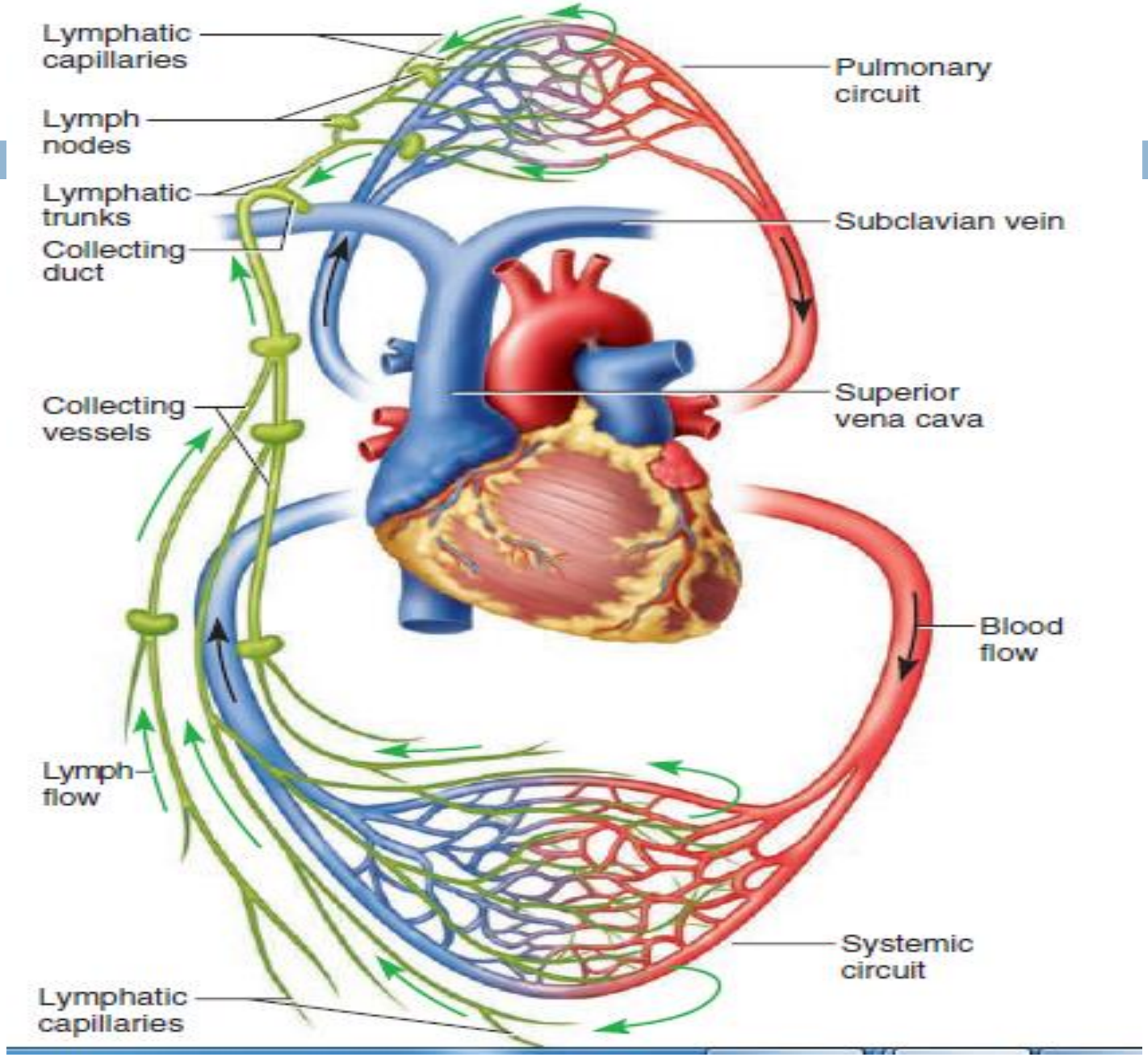


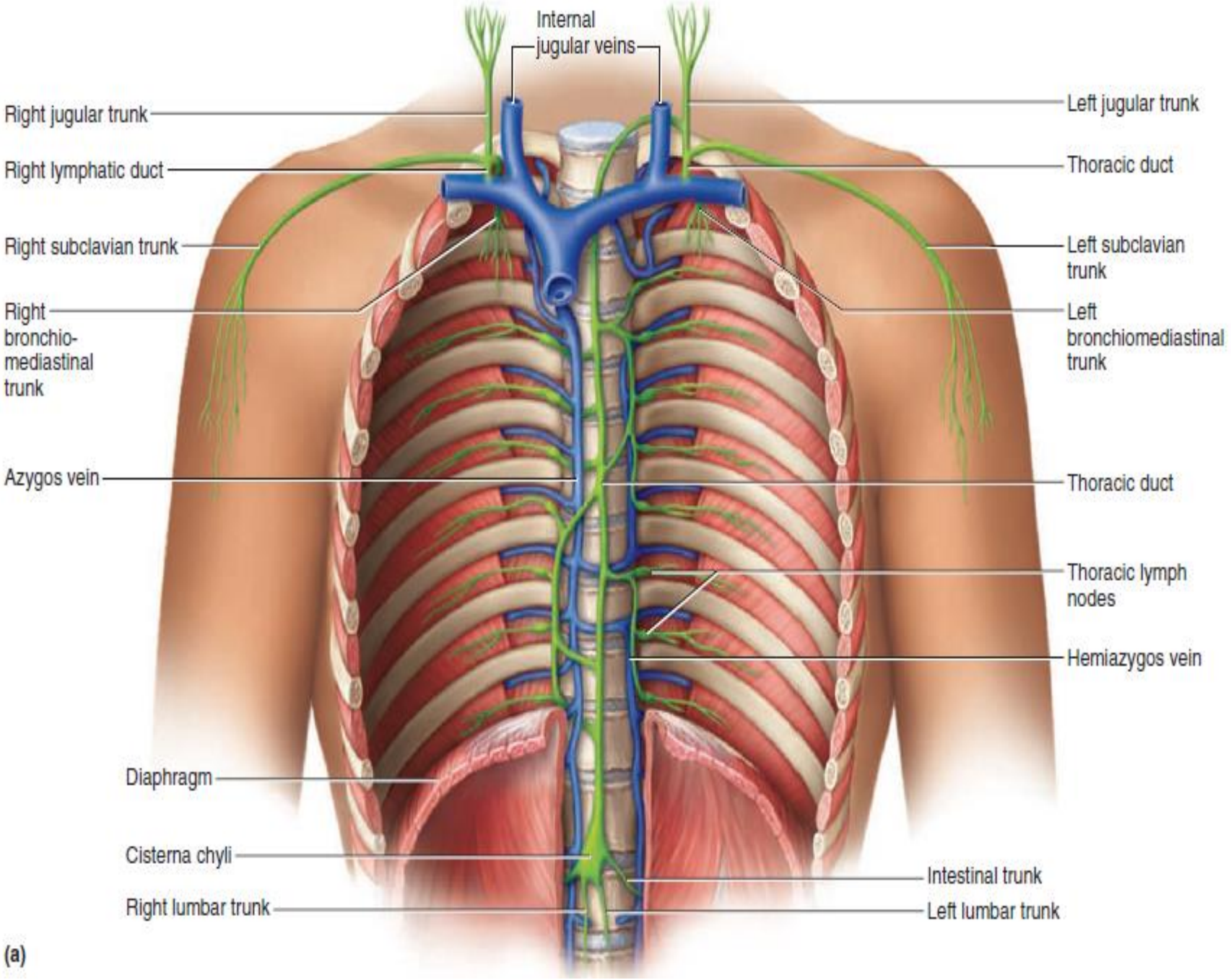
Structure of thymus



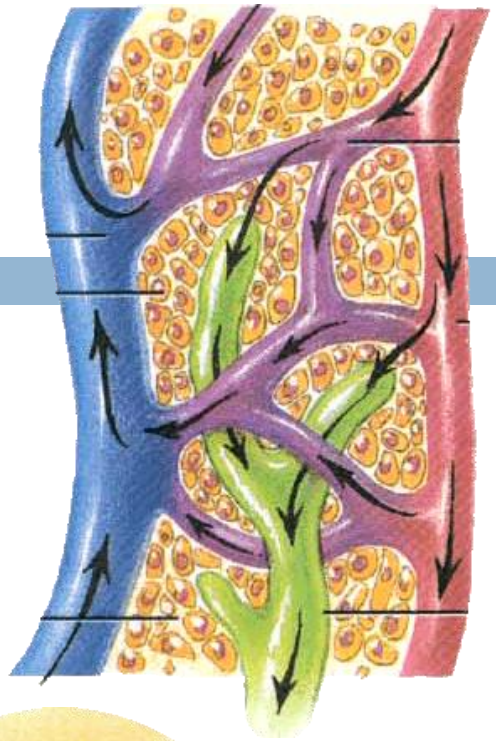
Structure of the Spleen




Lymphatic capillaries
Lymph nodes
Lymphatic trunks
Collecting duct
Collecting vessels
Lymph flow
Lymphatic capillaries
Pulmonary circuit
Subclavian vein
Superior vena cava
Blood flow
Systemic circuit

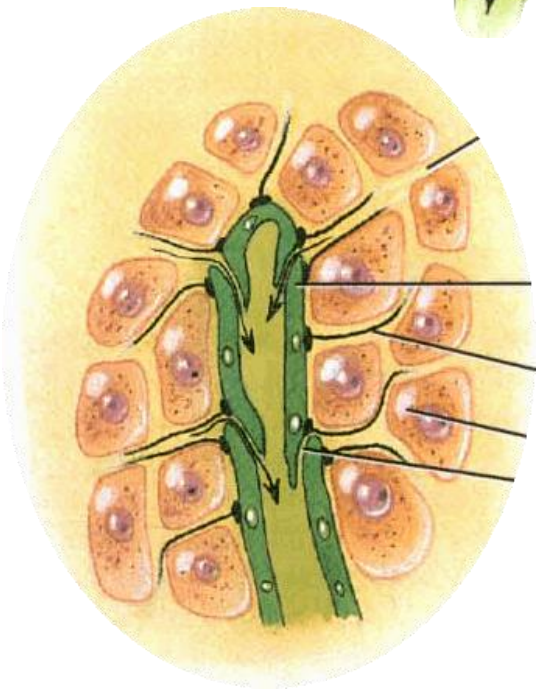

Internal jugular veins
Right jugular trunk
Left jugular trunk
Right lymphatic duct
Thoracic duct
Right subclavian trunk
Left subclavian trunk
Right bronchio-mediastinal trunk
Left bronchiomediastinal trunk
Azygos vein
Thoracic duct
Thoracic lymph nodes
Hemiazygos vein
Diaphragm
Cisterna chyli
Intestinal trunk
Right lumbar trunk
Left lumbar trunk
(a)

Lymphatic Capillaries



Features of structure :

- Blind end
- Single layer of overlapping endothelial cells
- More permeable than that of blood capillary
- Absent from avascular structures, brain, spinal cord splenic pulp and bone marrow



Lymphatic capillaries