

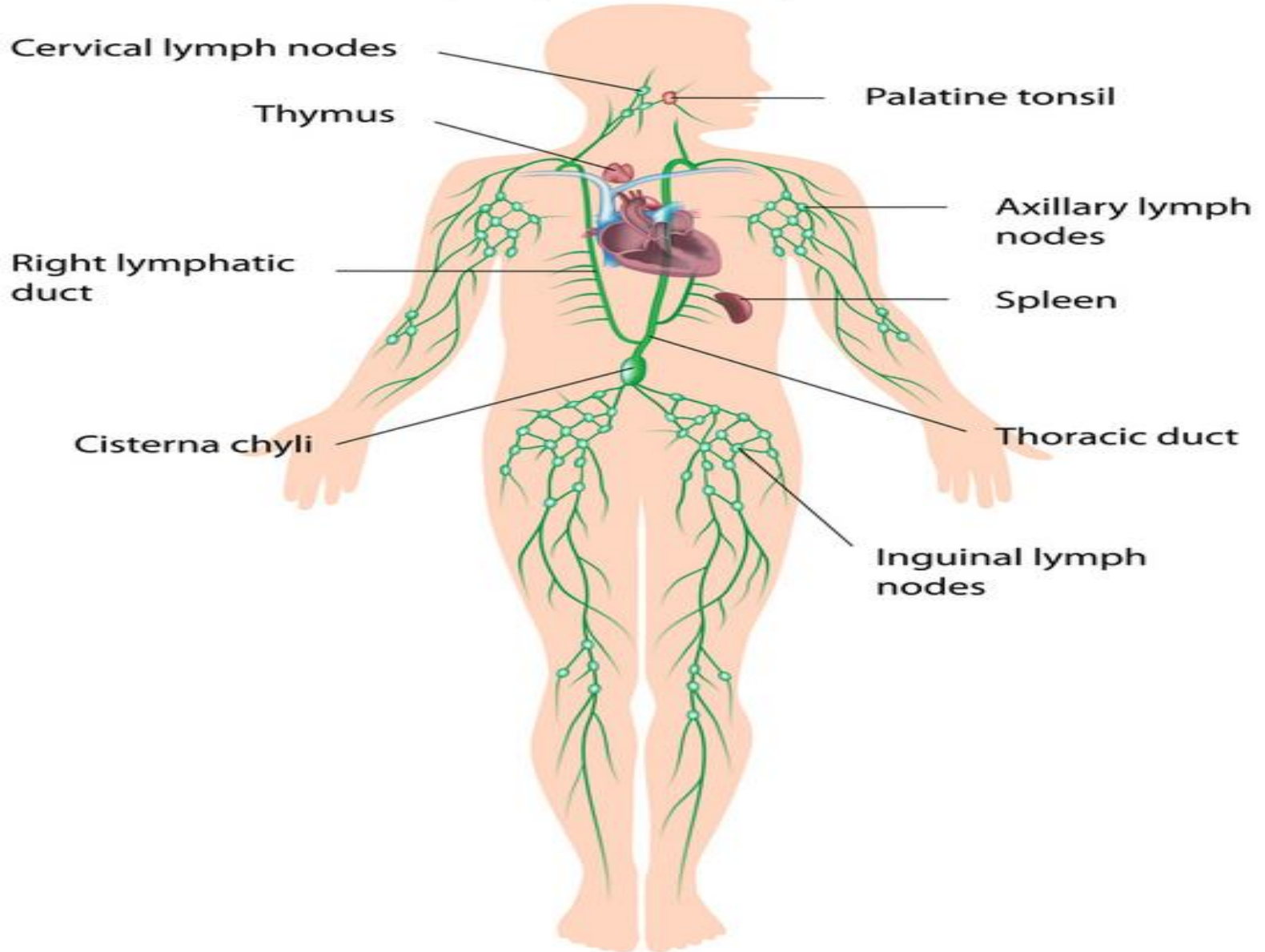
Lymphatic system

by

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Anatomy & physiology

The Lymphatic System



Course contents

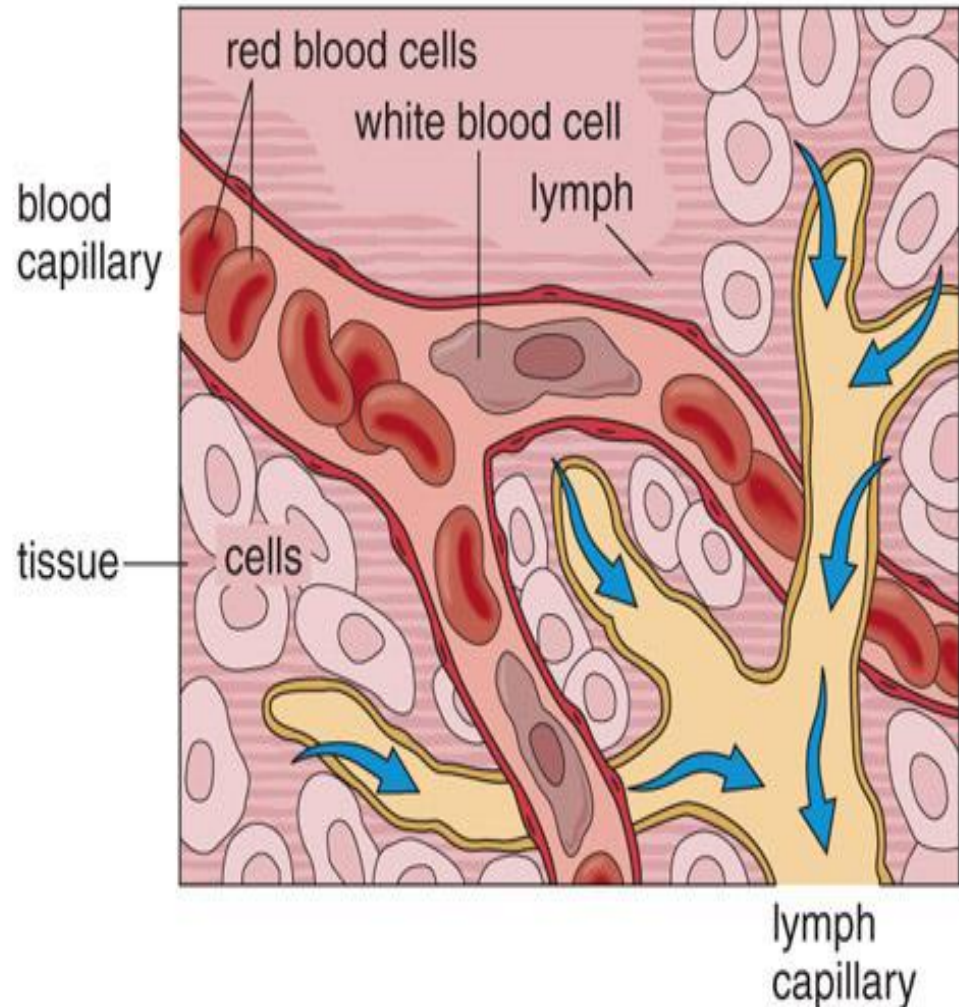
- What is lymphatic system ?
- Consisting organs of lymphatic system
- Functions of the lymphatic system
- What is lymph ?
- Lymph vessels
- What is lymph node and sites of lymph node
- Lymph circulation

What is lymphatic system

Lymphatic system is a network of tissue vessels and organs that help to maintain the body's fluid balance, clean the body fluid of foreign matter, and provide immune cells for defense.

Lymphatic system consists of.....

- ❖ Lymph
- ❖ Lymph vessels
- ❖ Lymph nodes
- ❖ Lymph glands



Functions of the lymphatic system

- To collect excess lymph and return it to blood circulation
- Fight infections: carries elements of the immune system such as antibodies and white blood cells that will neutralize antigens (viruses and bacteria);
- Transports molecules of fat
- Filters the blood and lymph

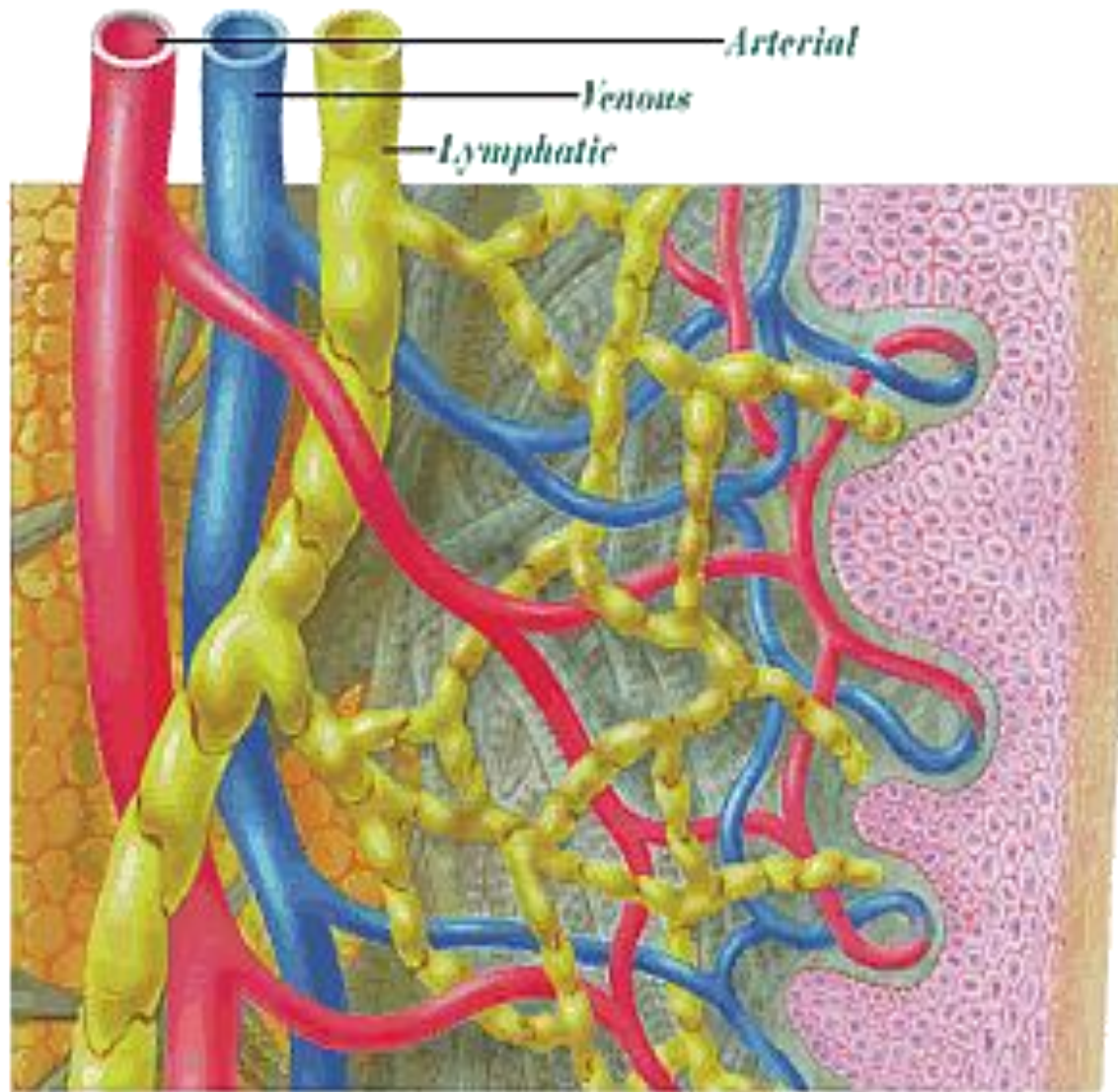
Lymph – straw-colored fluid similar to blood plasma composition but low protein contain

- Similar to plasma
- Interstitial fluid
- Carries the nutrients, oxygen and hormones to cells
- Carries waste back to capillaries

Lymph vessels – consists of lymph capillaries transport excess lymph fluid back to circulatory system.

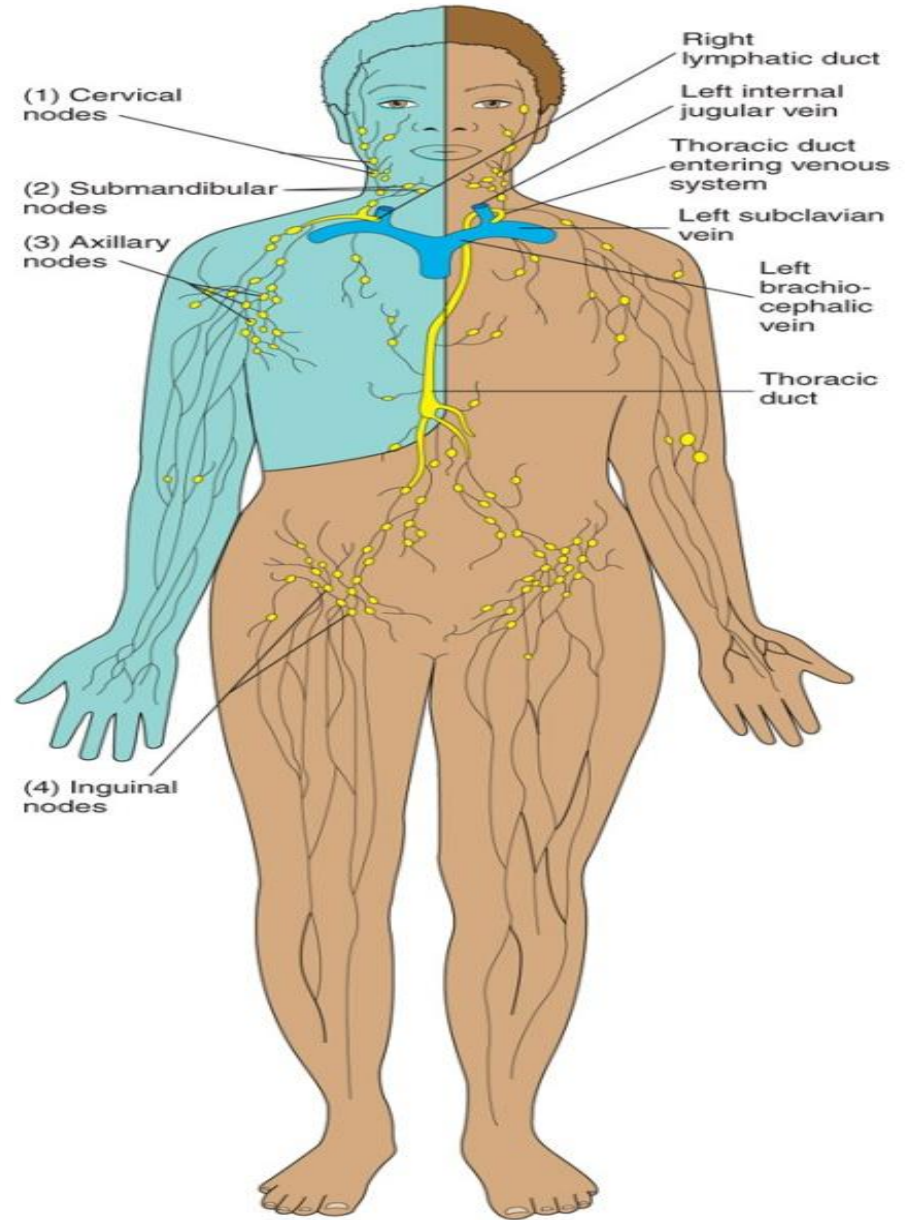
- Located in almost all tissues and organs
- Closely parallel veins
- Since the lymphatic system has no pump, skeletal muscle contractions moves lymph through the vessels
- Valves prevent backward flow
- Only move in one directions (from body towards heart)

- Lymph vessels parallel to blood vessels



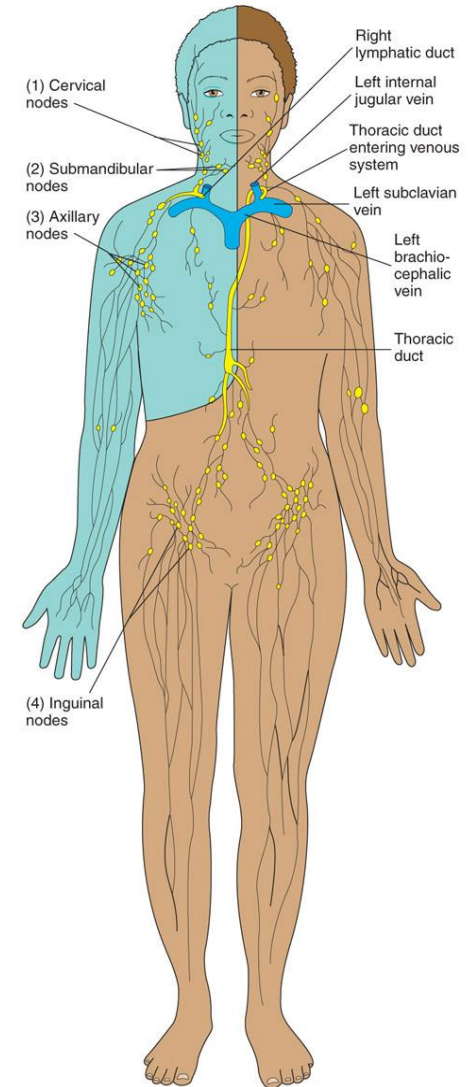
Lymph vessels

- Lacteals
 - Specialized lymph vessels in the small intestines that absorb digested fat



Lymph vessels -

- Lymph vessels join together to form larger lymph vessels →
- Large lymph vessels join together to form lymphatics →
- Two main lymphatics:



Thoracic duct

- Also called the left lymphatic duct
Receives lymph from the left side of chest, head, arm and neck, the entire abdominal area and entire lower Body
- Dumps back into left subclavian →
SVC

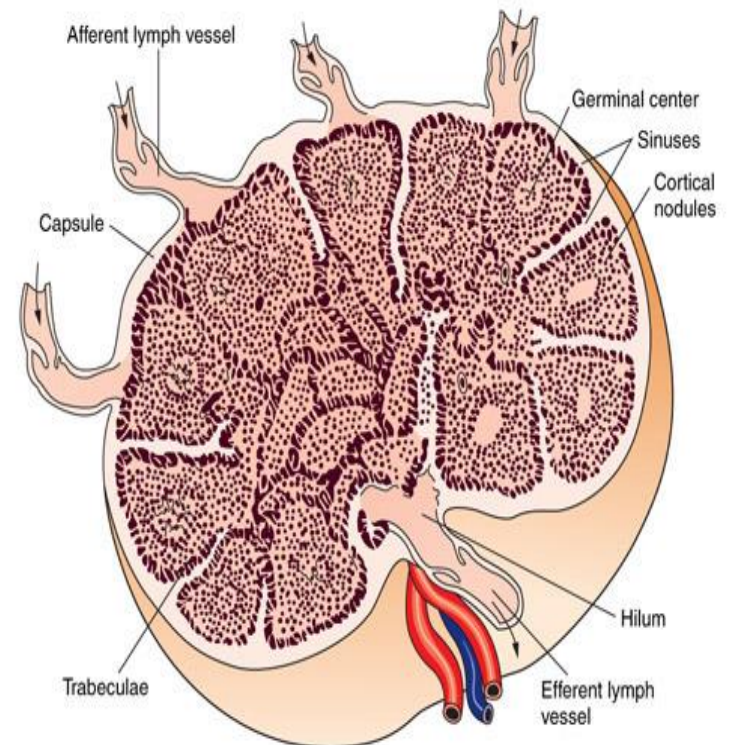
Right lymphatic duct

- Receives lymph from the right side of the chest, head, arm and neck
- Dumps back into right subclavian →
- SVC

Lymph nodes

- Tiny, oval-shaped structures!
- Range in size from a pinhead to an almond
- Site of lymphocyte formation and filter for screening out harmful substances (ex: bacteria, cancer)
- If substances can't be destroyed, node becomes inflamed

Lymph node

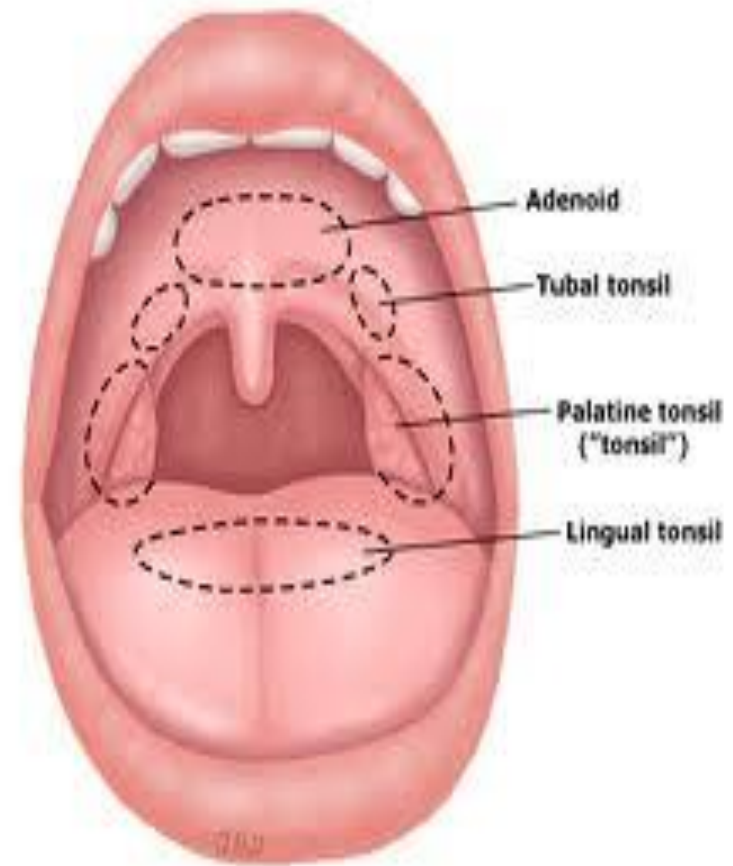


Lymph nodes

- Where are lymph nodes located?
- ◆ Found in 4 areas:
 - Groin
 - Neck
 - Armpits
 - Abdomen

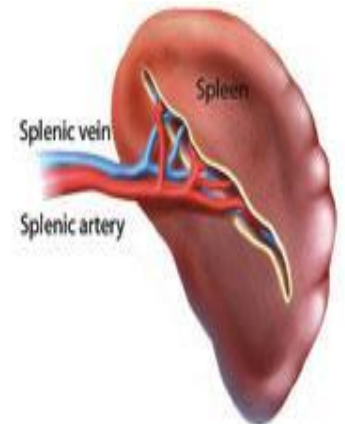
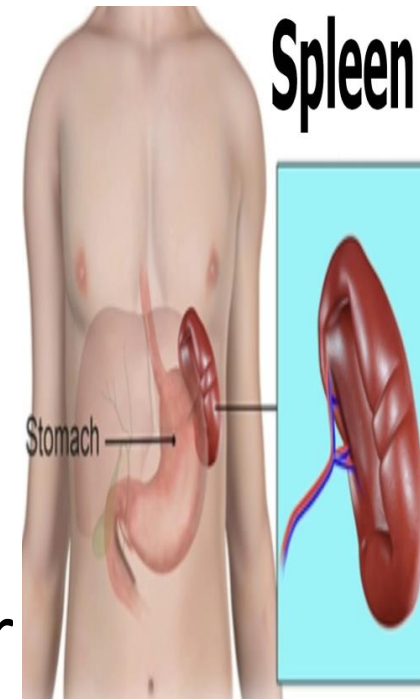
Tonsils – masses of lymphatic tissue that produce lymphocyte and filter bacteria

- 3 pairs
 - Palatine tonsils: sides of throat
 - Adenoids / Pharyngeal tonsils: upper throat
 - Lingual tonsils: back of tongue



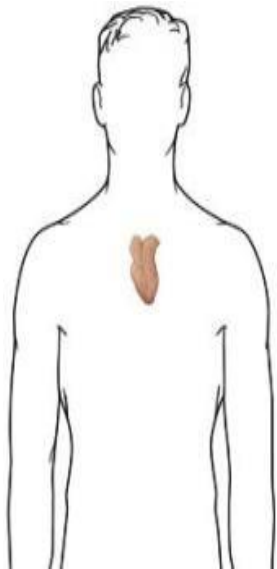
Spleen

- Sac-like mass of lymphatic tissue
- LARGEST lymphatic structure
- Located in the just below diaphragm
- Forms lymphocytes and monocytes
- Filters blood
- Stores large amounts of RBCs – contracts during vigorous exercise or loss of blood to release RBCs
- Destroys or removes old or fragile RBCs – preserves hemoglobin

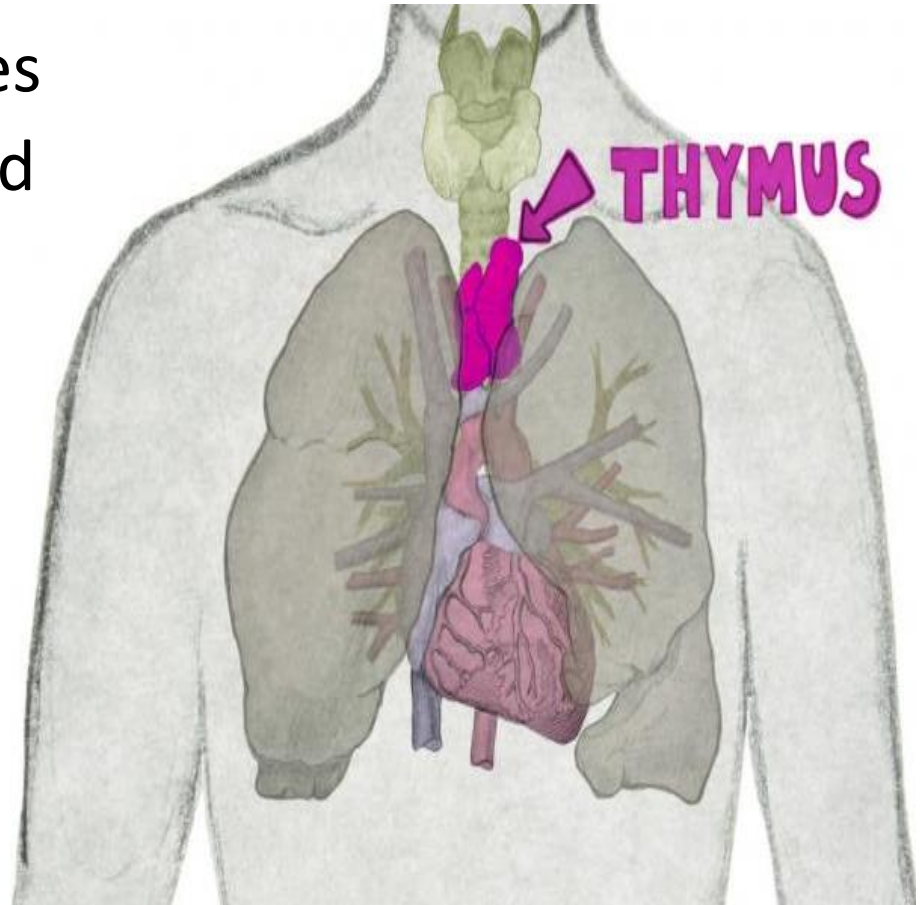


Thymus gland

- Located in the upper, anterior thorax (chest), above the heart
- Produces T lymphocytes
- Also an endocrine gland because also secretes hormones



Thymus gland



Lymph Circulation

- Lymph vessels are thin walled, valved structures that carry lymph
- Lymph is not under pressure and is propelled in a passive fashion
- Fluid that leaks from the vascular system is returned to general circulation via lymphatic vessels.
- Lymph vessels act as a reservoir for plasma and other substances including cells that leaked from the vascular system

Lymph Circulation

- The lymphatic system provides a one-way route for movement of interstitial fluid to the cardiovascular system.
- Lymph returns the excess fluid filtered from the blood vessel capillaries, as well as the protein that leaks out of the blood vessel capillaries.
- Lymph flow is driven mainly by contraction of smooth muscle in the lymphatic vessels but also by the skeletal-muscle pump and the respiratory pump.

LYMPH CIRCULATION

Interstitial fluid → Lymph → Lymph capillary
→ lymph vessel → Lymph node → Lymph
trunk → Lymph duct {Right lymphatic duct
and Thoracic duct (left side)} → Subclavian
vein (right and left) → Blood → Interstitial
fluid

When the Lymphatic System Goes Wrong



Lymphedema

- Happens when the lymphatic vessels are blocked
- This may be caused by an injury to the lymph vessels or it may be inherited

When the Lymphatic System Goes Wrong



Elephantiasis

-Happens when the lymphatic vessels are blocked due to a parasite