

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

In the Name of Allāh, the Most Gracious, the Most Merciful

## Lecture

Dr. Naveed Afzal Khan



Idea's as to what this maybe?

# Objectives

By the end of this Lecture the medical students should be able:



To describe the Lymphatic System.

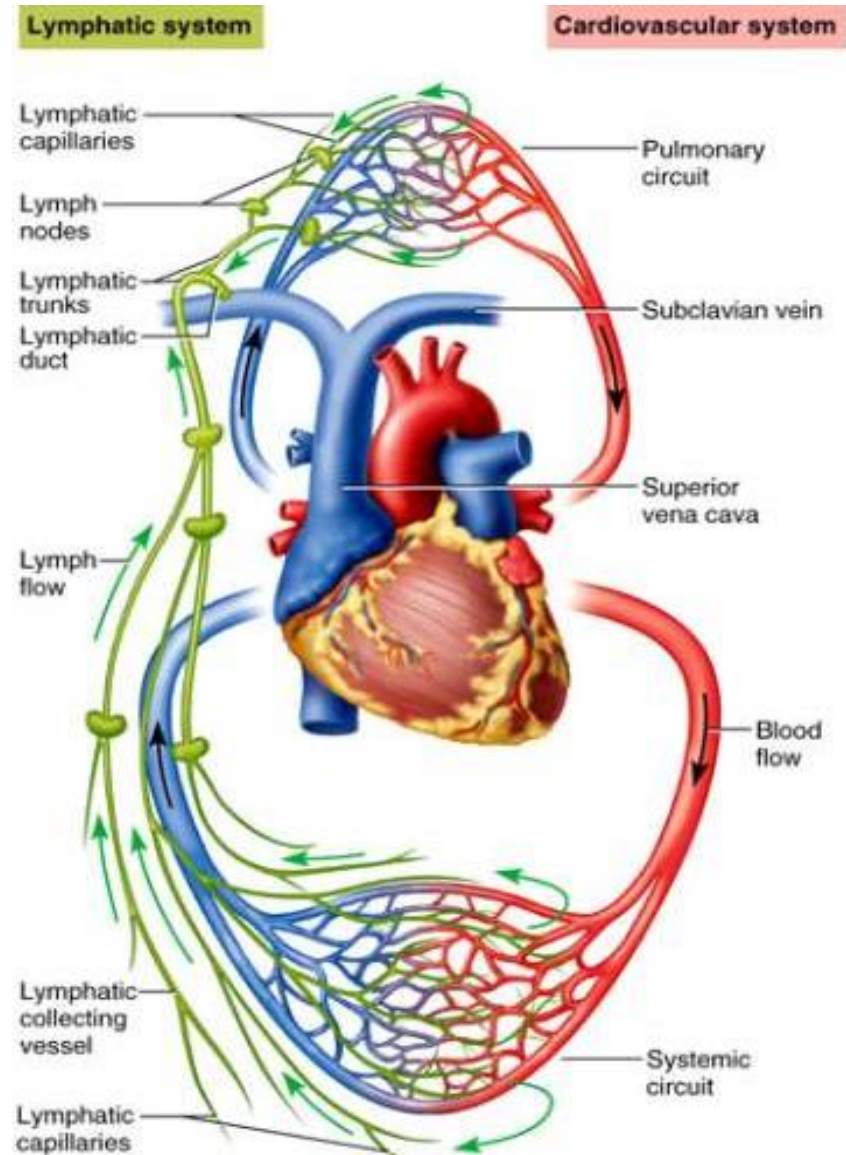


To Explain the functions of Lymphatic system.

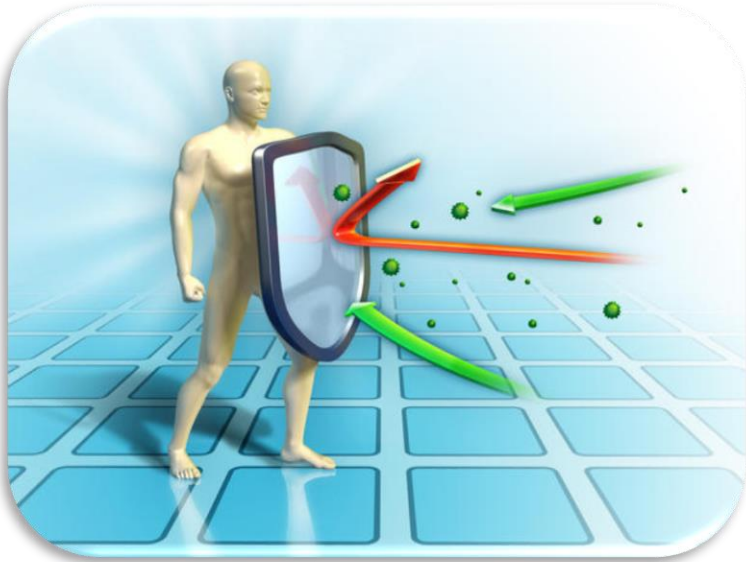


To identify the clinical correlates of Lymphatic system.

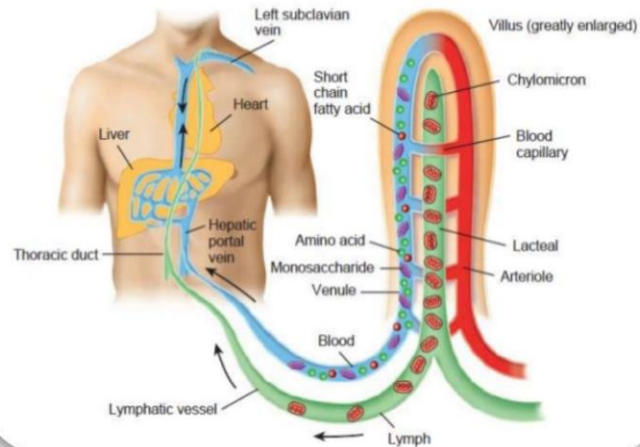
# The Fluid Cycle



# Functions



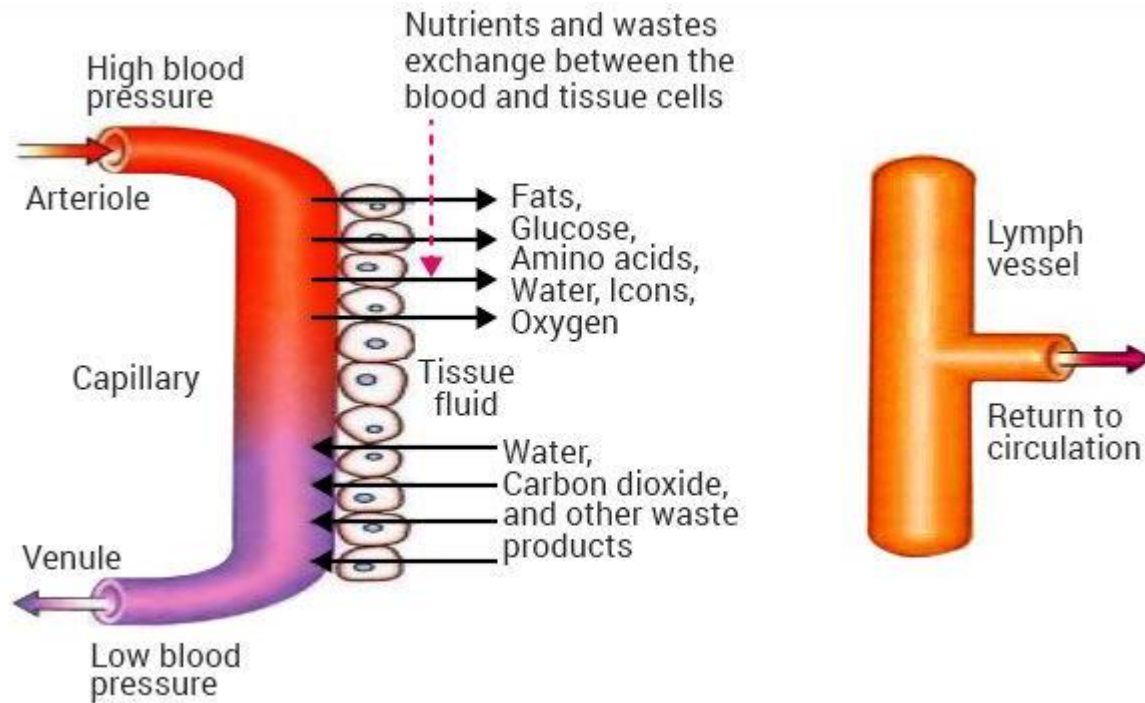
## Transport of lipids



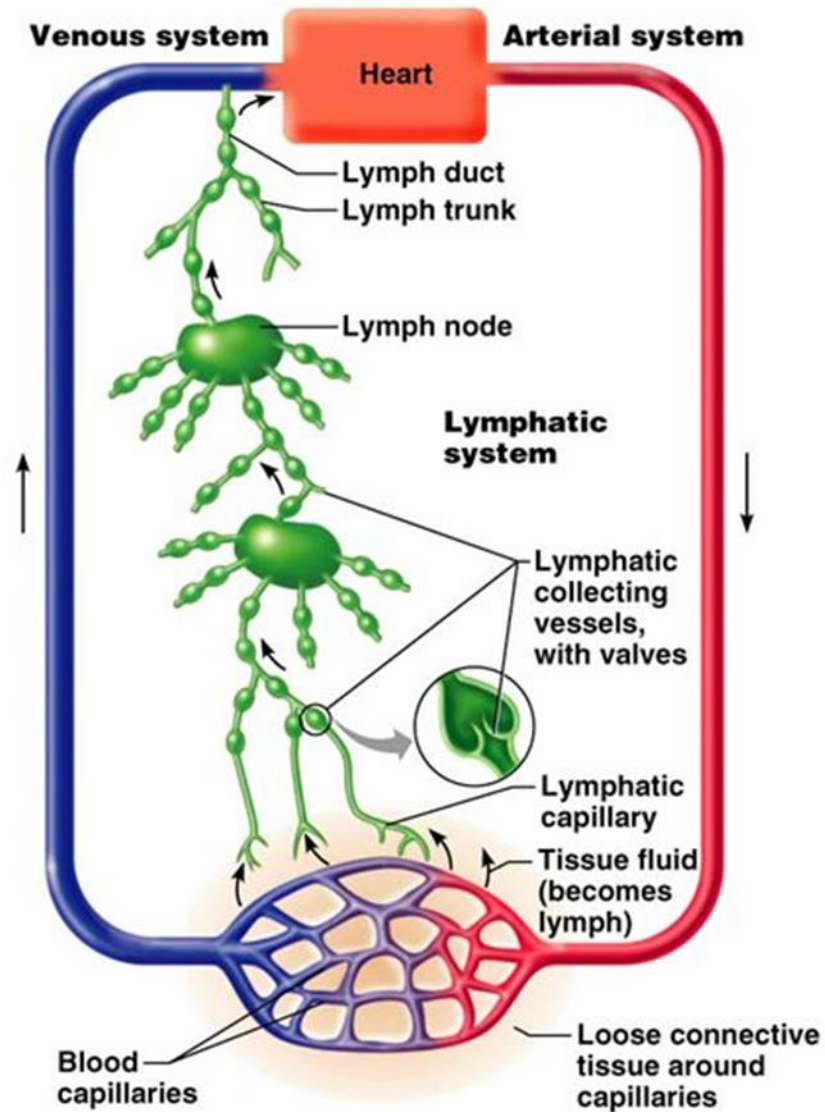
# Components of the Lymphatic System

- Lymph
- Lymphatic Vessels
- Lymphatic Organs
- Lymphatic cells

# Lymph



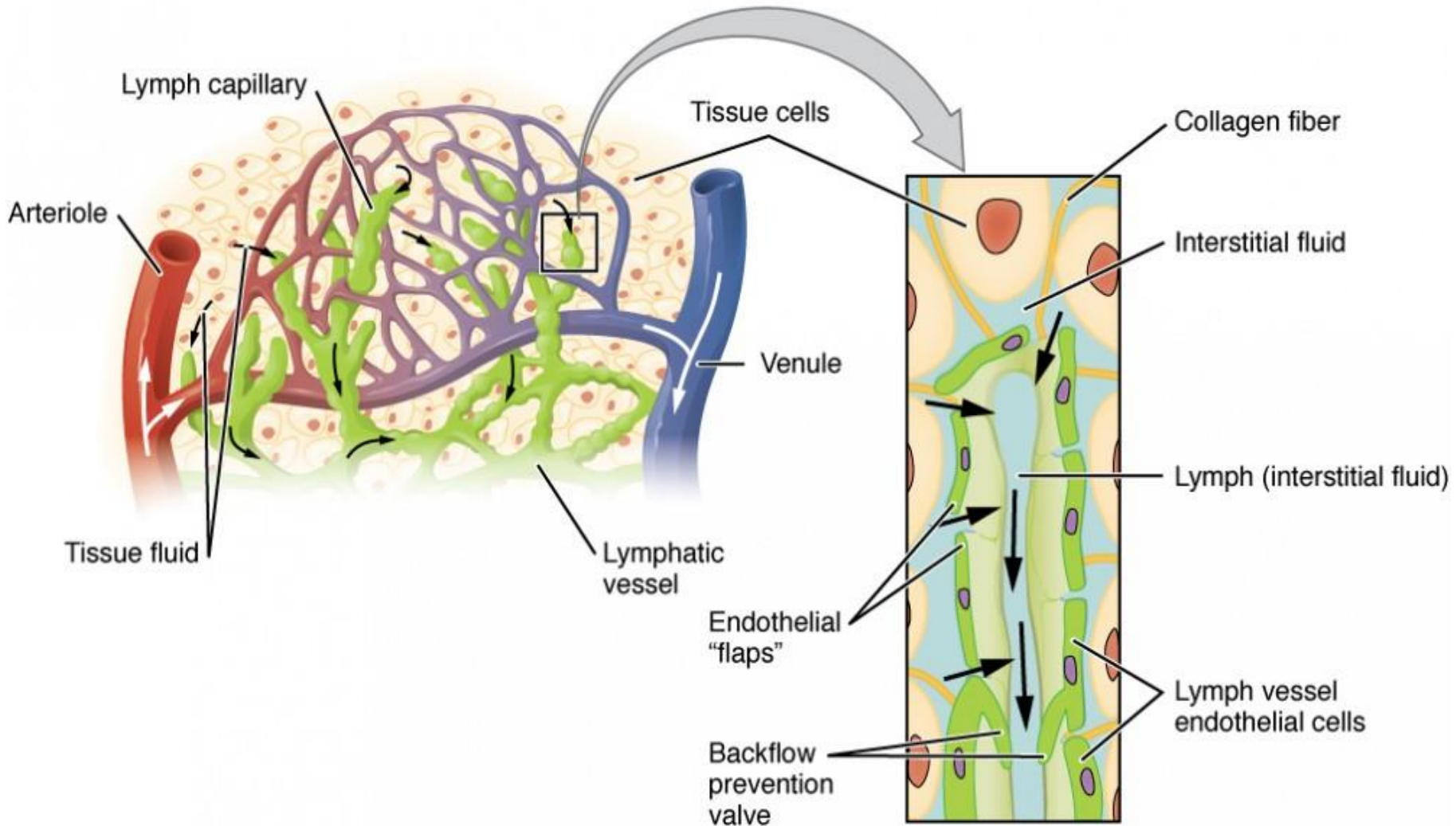
# Route of Lymph Flow





# Lymphatic Vessels

Lymph capillaries in the tissue spaces



# Lymphatic Vessels

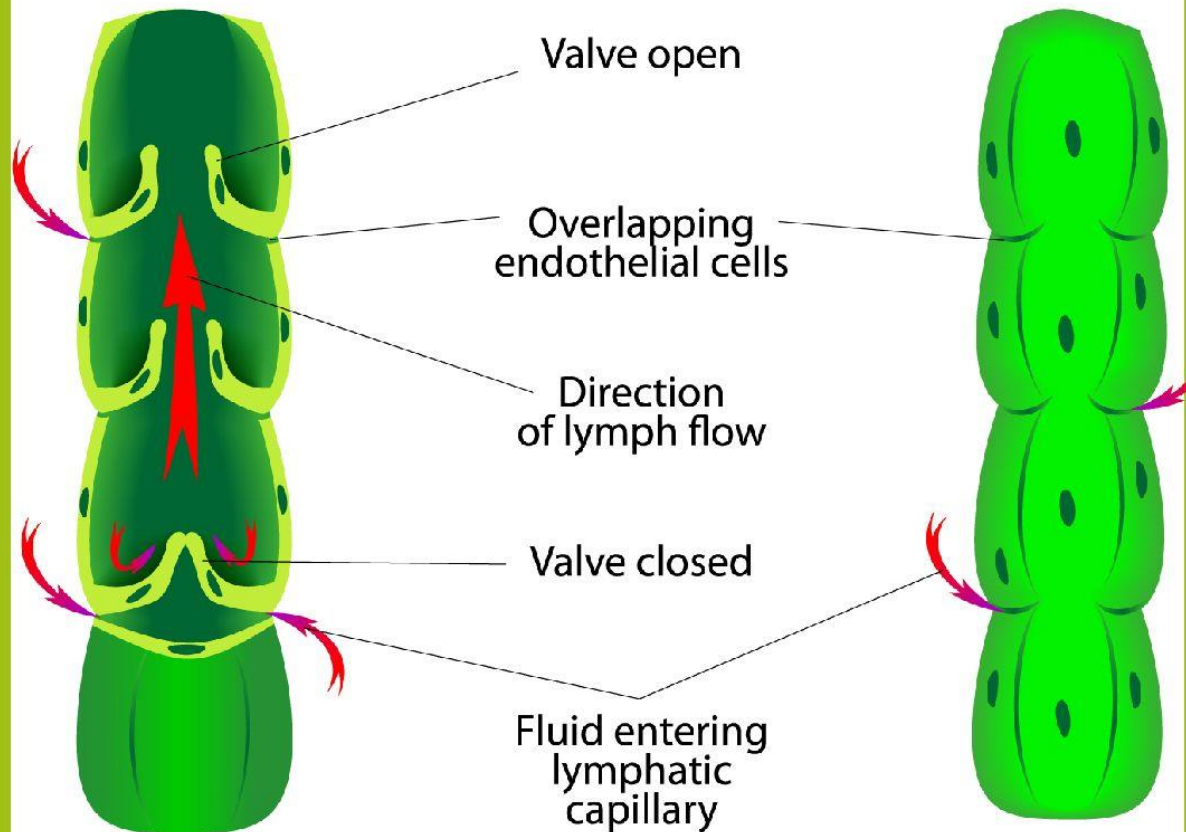
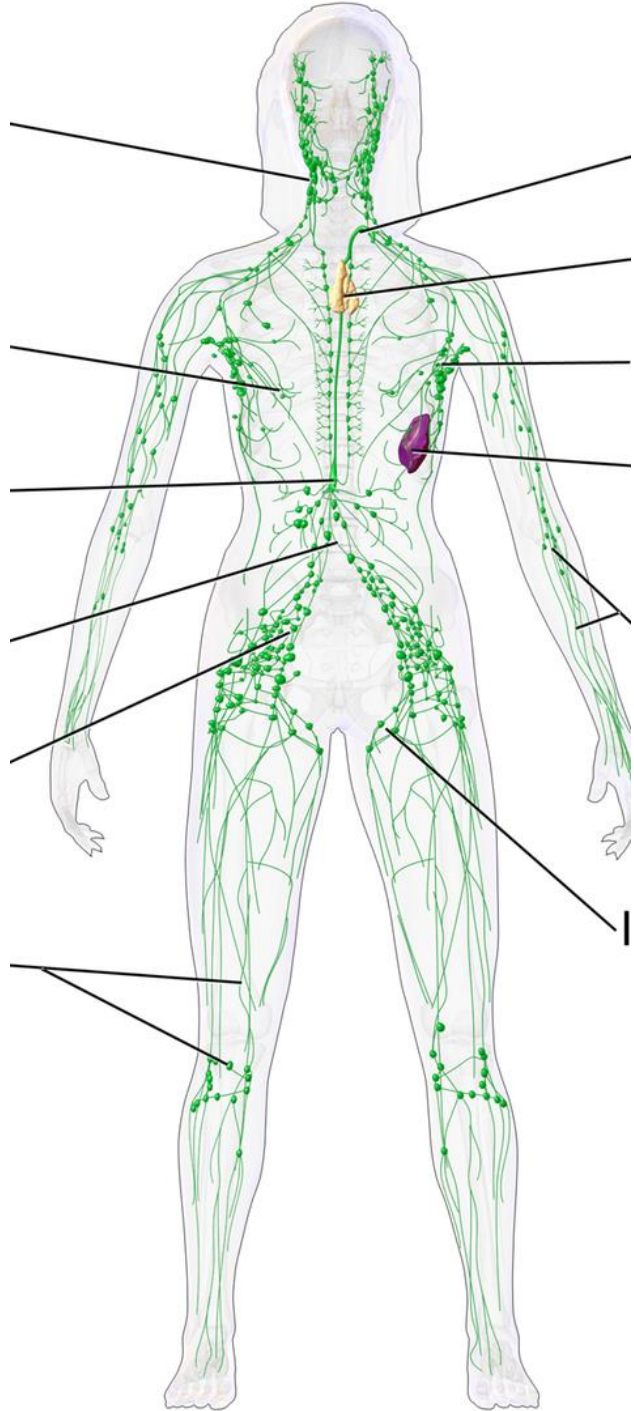
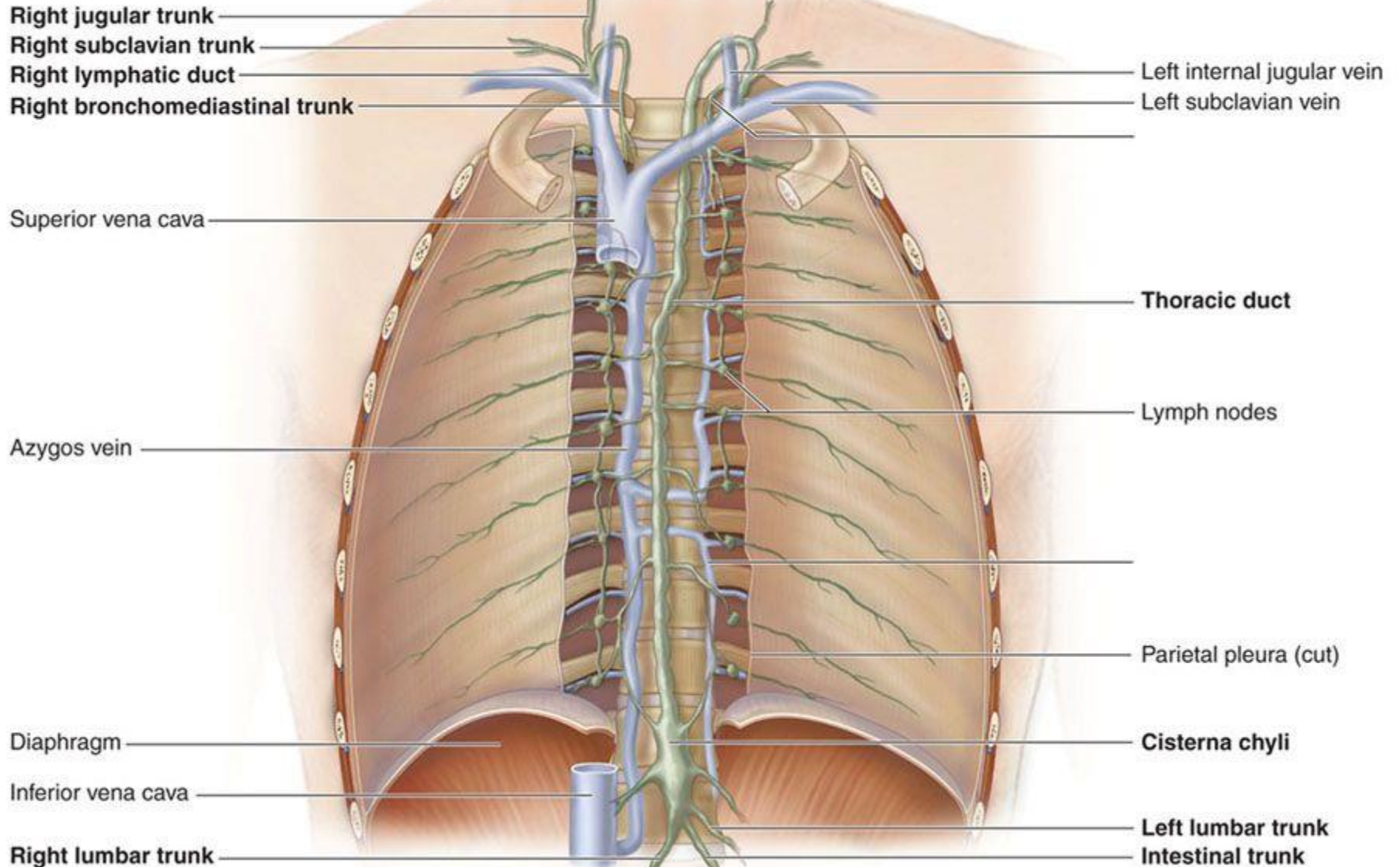


image via <http://cnx.org/>



# Lymphatic Trunks



Posterior thoracic wall, anterior view

**Regional lymph nodes:**

Cervical nodes

Axillary nodes

Inguinal nodes

Entrance of right lymphatic duct into right subclavian vein

Internal jugular vein

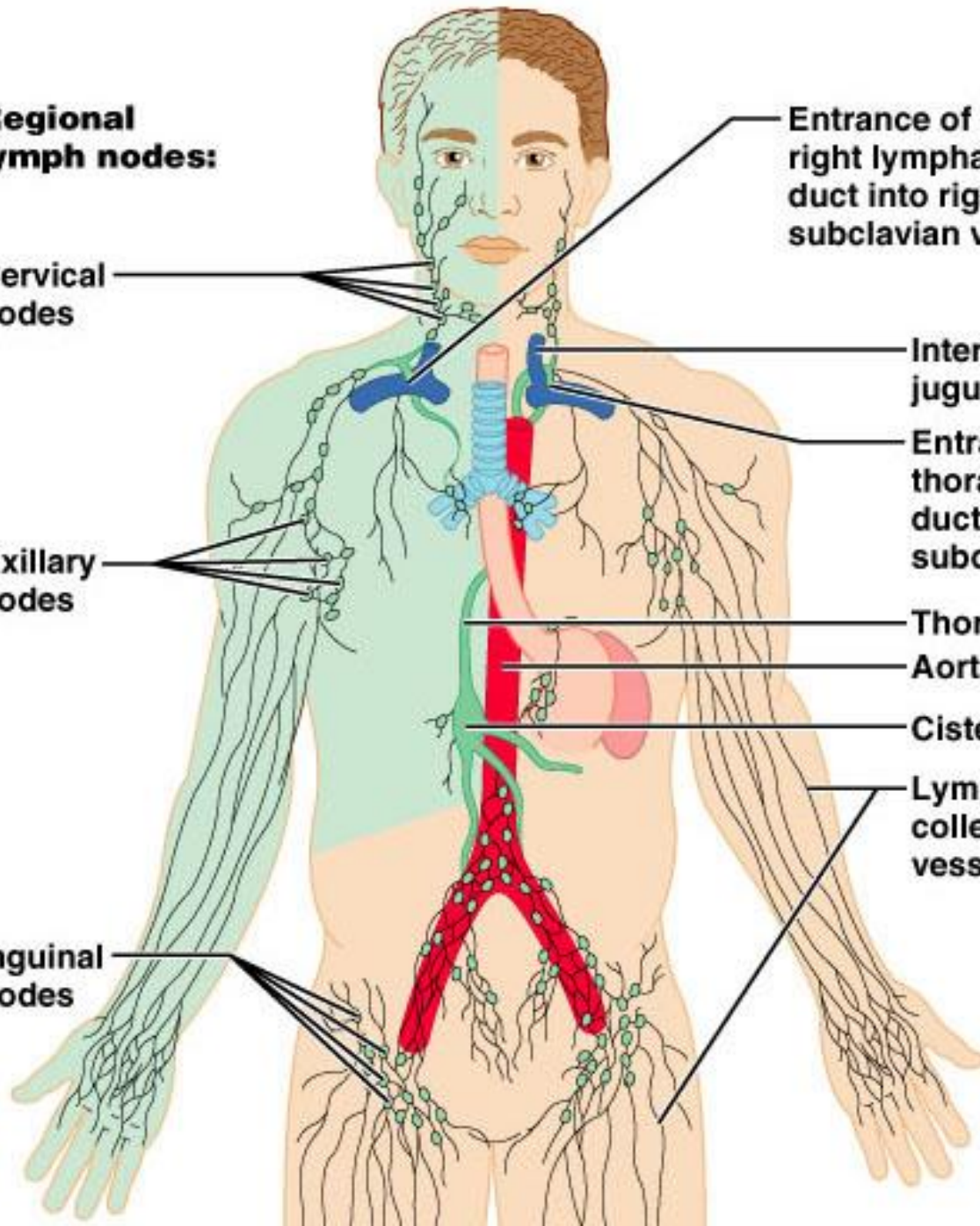
Entrance of thoracic duct into left subclavian vein

Thoracic duct

Aorta

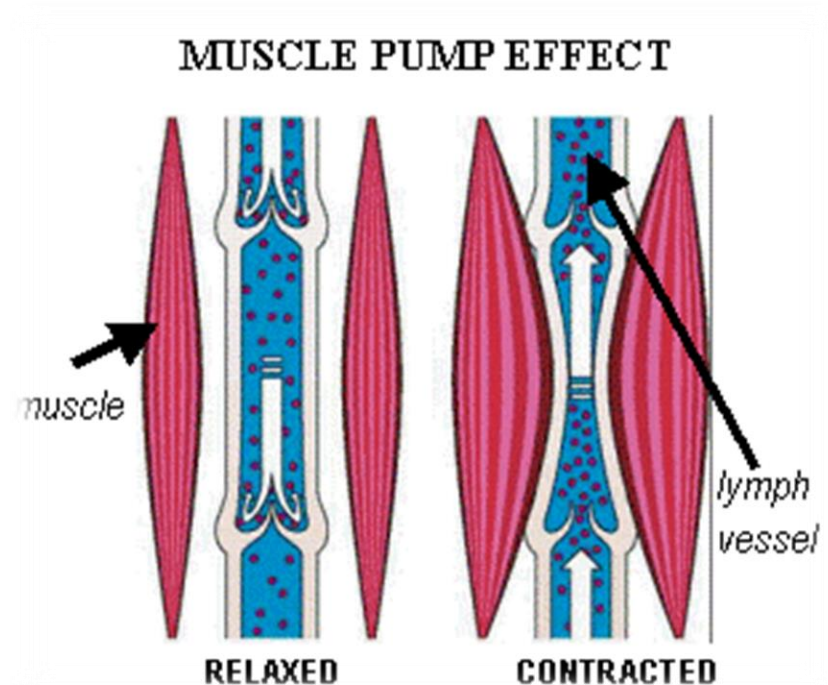
Cisterna chyli

Lymphatic collecting vessels



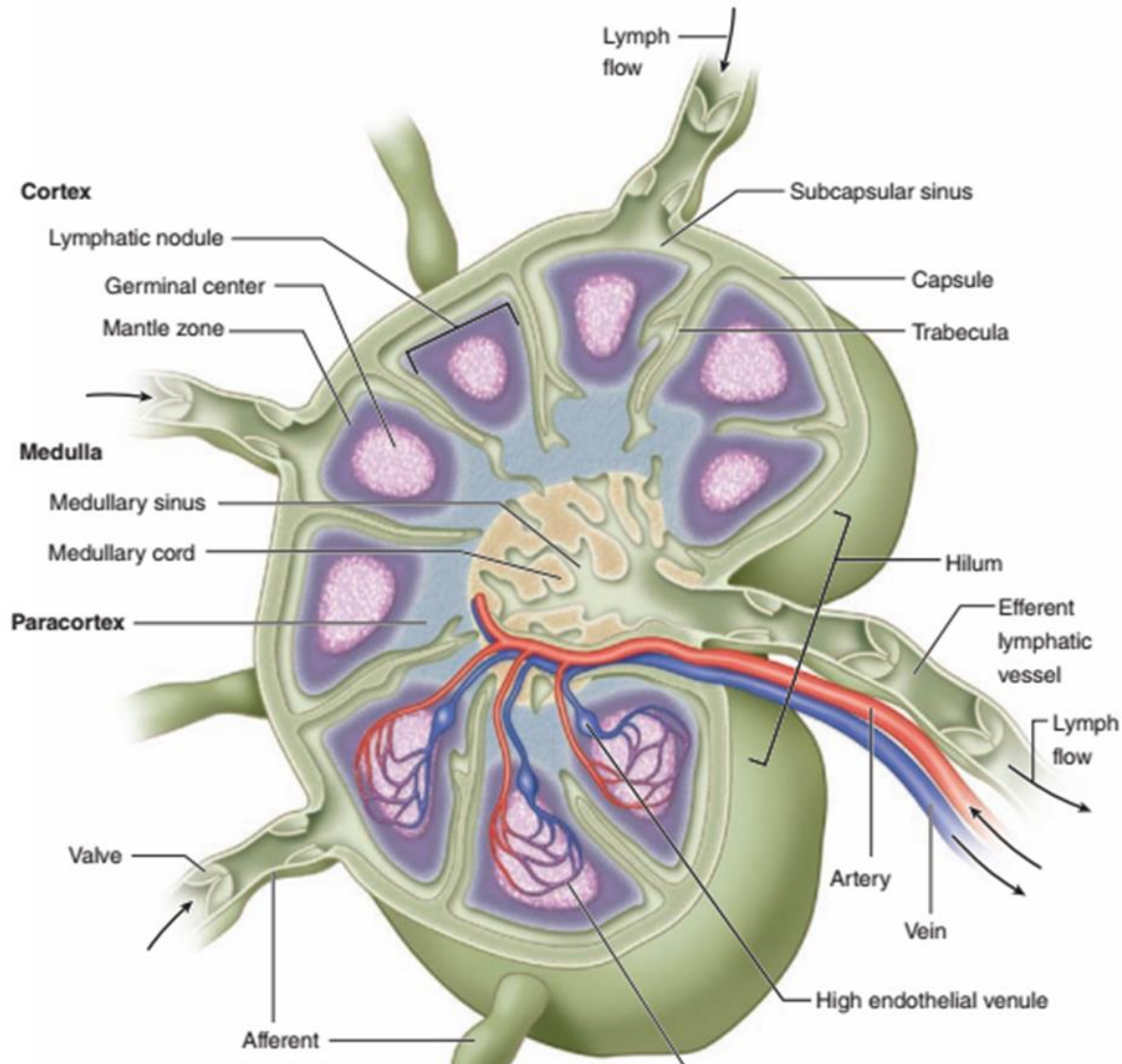
# Mechanisms of Lymph Flow

- low pressure and speed
- Skeletal muscle pump
  - Thoracic pump aids flow from abdominal to thoracic cavity
  - Valves prevent backward flow
  - Exercise
- Rapidly flowing blood in subclavian veins, draws lymph into it



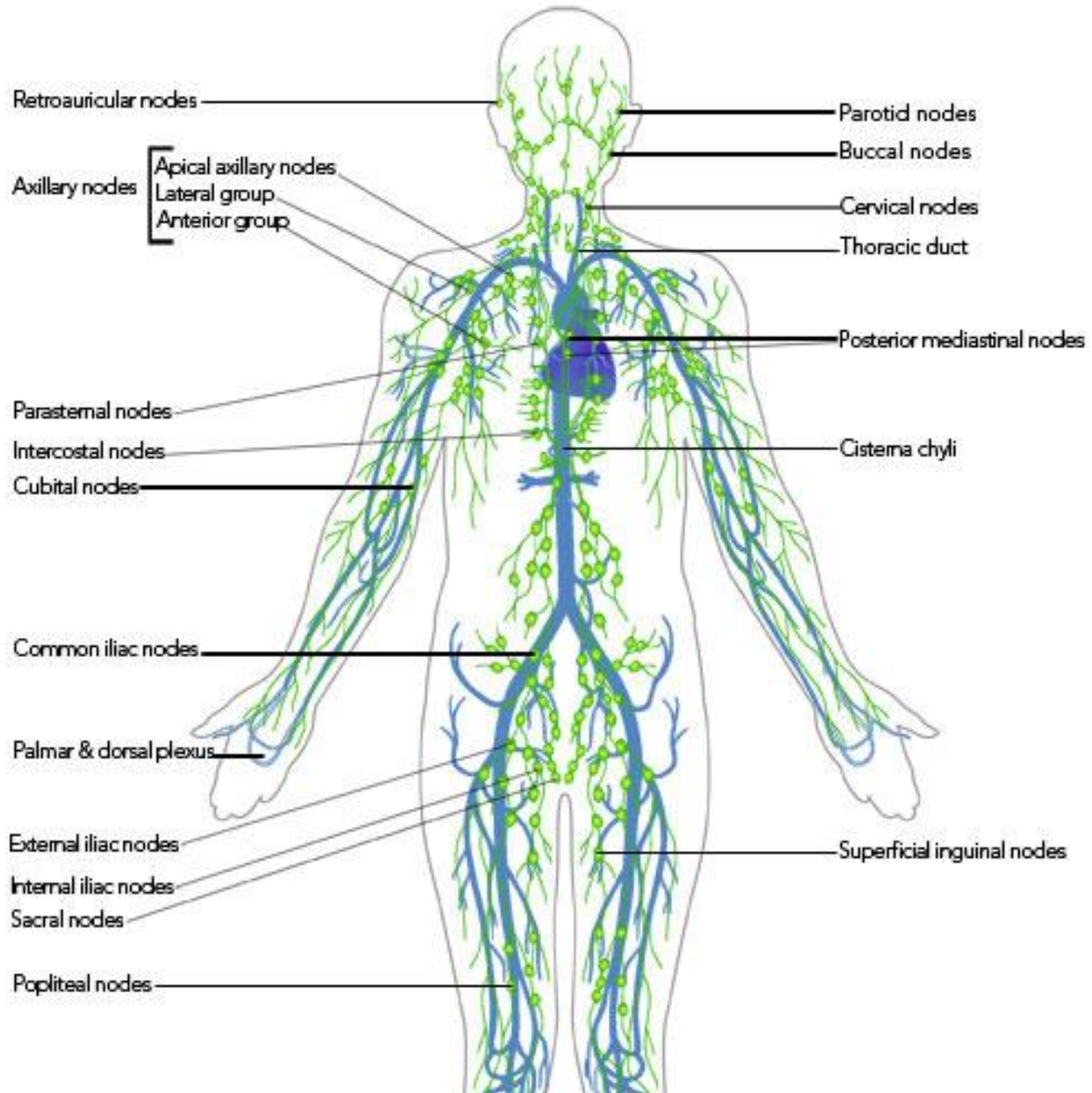


# Lymph Node



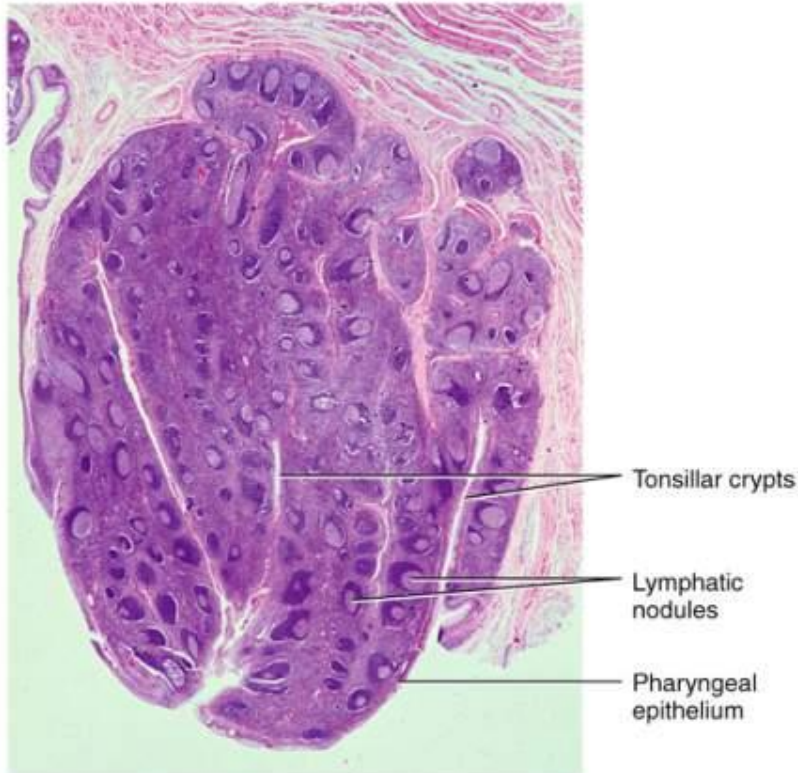


# FRONTAL VIEW OF THE LYMPHATIC SYSTEM SHOWN OVER THE BLOOD CIRCULATORY SYSTEM



# Tonsil

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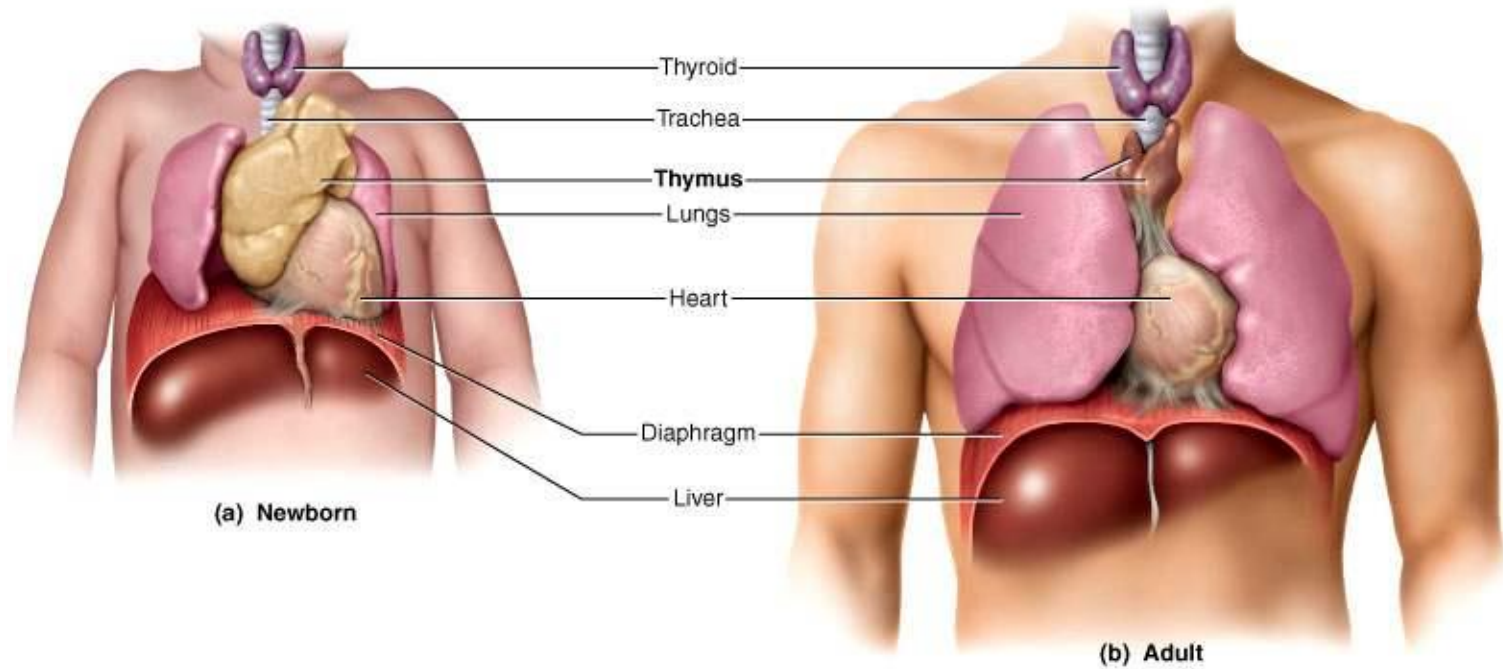


(b)

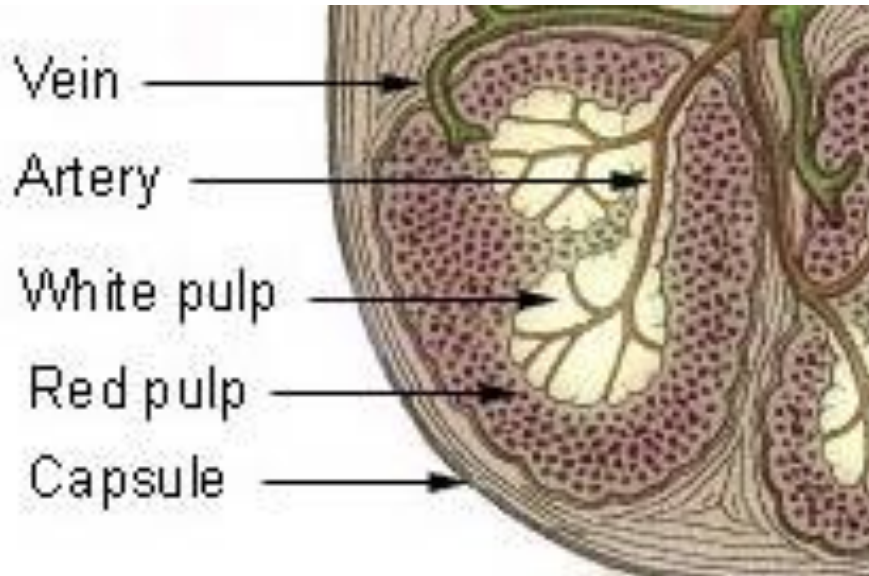
- Covered by epithelium
- Palatine tonsils
  - pair at posterior margin of oral cavity
  - most often infected
- Lingual tonsils
  - pair at root of tongue
- Pharyngeal tonsil (adenoid)
  - wall of pharynx

# Thymus

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# Spleen



## Red pulp

- store blood
- break down old red blood cells.

## White pulp

- filtering the blood for antigens.
- traps antigens
- site for initiation of the immune response

# Lymphatic Cells

Natural killer (NK)  
cells

T lymphocytes



B lymphocytes

Antigen  
Presenting Cells

# APPLIED ANATOMY

# LYMPHANGITIS

- Inflammation
  - Lymph vessels appear as red streaks through the skin
  
- Commonest Cause
  - streptococcus pyogenes.



# FILARIASIS





# The Life Cycle of Lymphatic Filariasis

## MOSQUITO STAGES

7 Larvae migrate to a mosquito's head and proboscis.



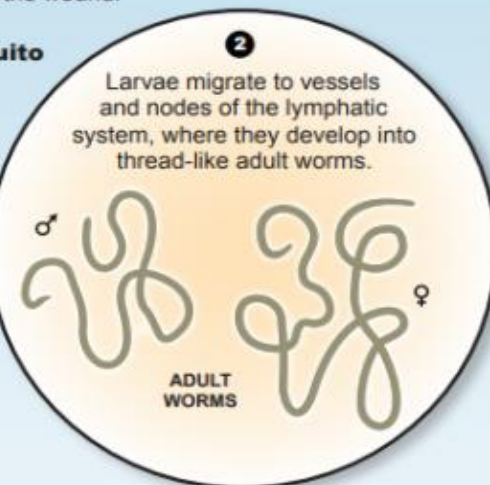
8 An infected mosquito continues the cycle.



## HUMAN STAGES

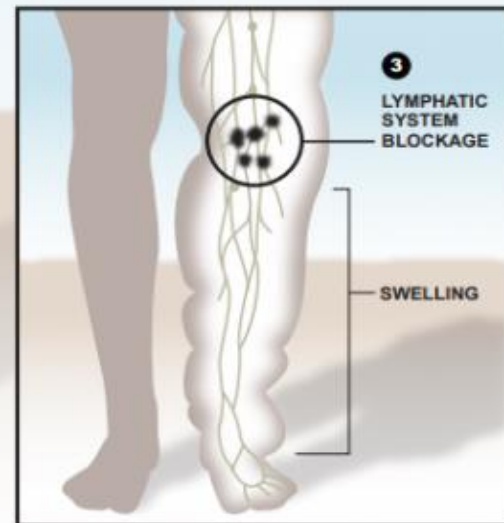
1 An infected mosquito deposits larvae on the skin while biting, and the larvae enter the wound.

An infected mosquito starts the cycle



2 Larvae migrate to vessels and nodes of the lymphatic system, where they develop into thread-like adult worms.

3 Adult worms, which typically live five to seven years, damage the lymphatic system, causing infections that result in blockages, swelling, and fevers.



4 Fertilized female worms release embryonic offspring, called microfilariae, that enter the blood stream. They circulate at night, when mosquitoes bite, in blood vessels near the skin.

6 In several stages, inside a mosquito's midgut, microfilariae develop into infectious larvae.

L3 LARVAE



L1 LARVAE



Another mosquito becomes infected, continuing the cycle

5 A mosquito, feeding on the blood of an infected person, ingests microfilariae, becoming infected.

LYMPH NODES AND VESSELS

BLOOD STREAM

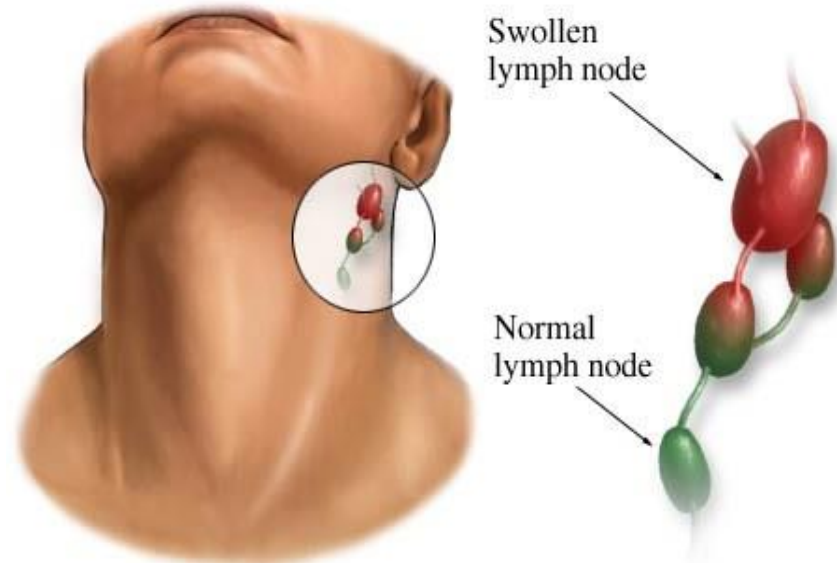
# LYMPHEDEMA

- accumulation of lymphatic fluid in the interstitial tissue



# LYMPHADENOPATHY

- Means a **disease of the lymph nodes**
- Lymph nodes become **swollen/ enlarged** and may be painful to touch



# LYMPHOMAS

- Cancers originating either from the lymphocytes in the lymph nodes or the lymphatic tissue in organs



- Risk factors -- HIV, HEPATITIS, EBV infections

# TONSILLITIS

- Infection of the tonsils
- Tonsils are swollen,
  - Fever and pain during swallowing usually present



# QUESTION. 2

- I am a part of lymphatic system and protect the body by clearing worn out red cells and foreign bodies from the blood stream. Who am I?



- A. Thymus**
- B. Palatine Tonsil**
- C. Spleen**
- D. Lymph node**

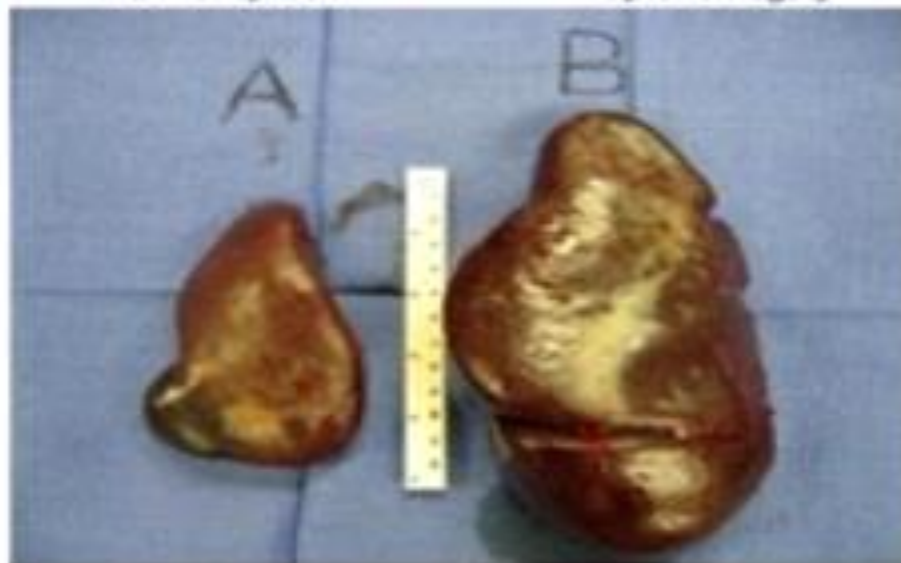
# SPLENOMEGALY



Normal spleen



Splenomegaly



**LET'S REVISE  
SOME IMPORTANT  
FACTS**



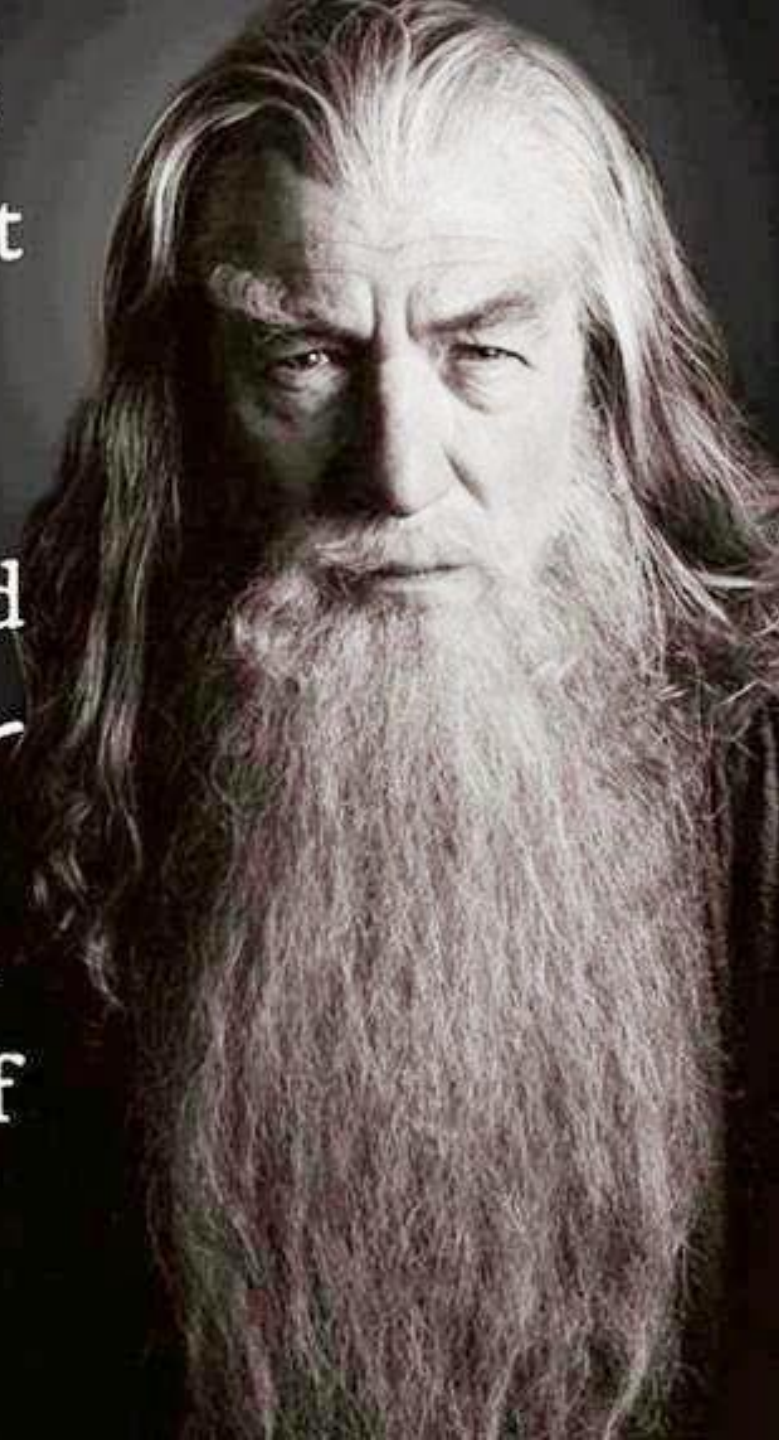
# Task

What role does the lymphatic system play in regards to cancer in the body?

“Some believe it is only  
**GREAT POWER** that  
can hold evil in check.

But that is not what I  
have found. I have found  
that it is the small every-  
day deeds of ordinary  
folk that keep the dark-  
ness at bay. Small acts of  
kindness and love.”

- Gandalf



**THE END.**

*Thank You*