Muscles and blood vessels with lymphatics

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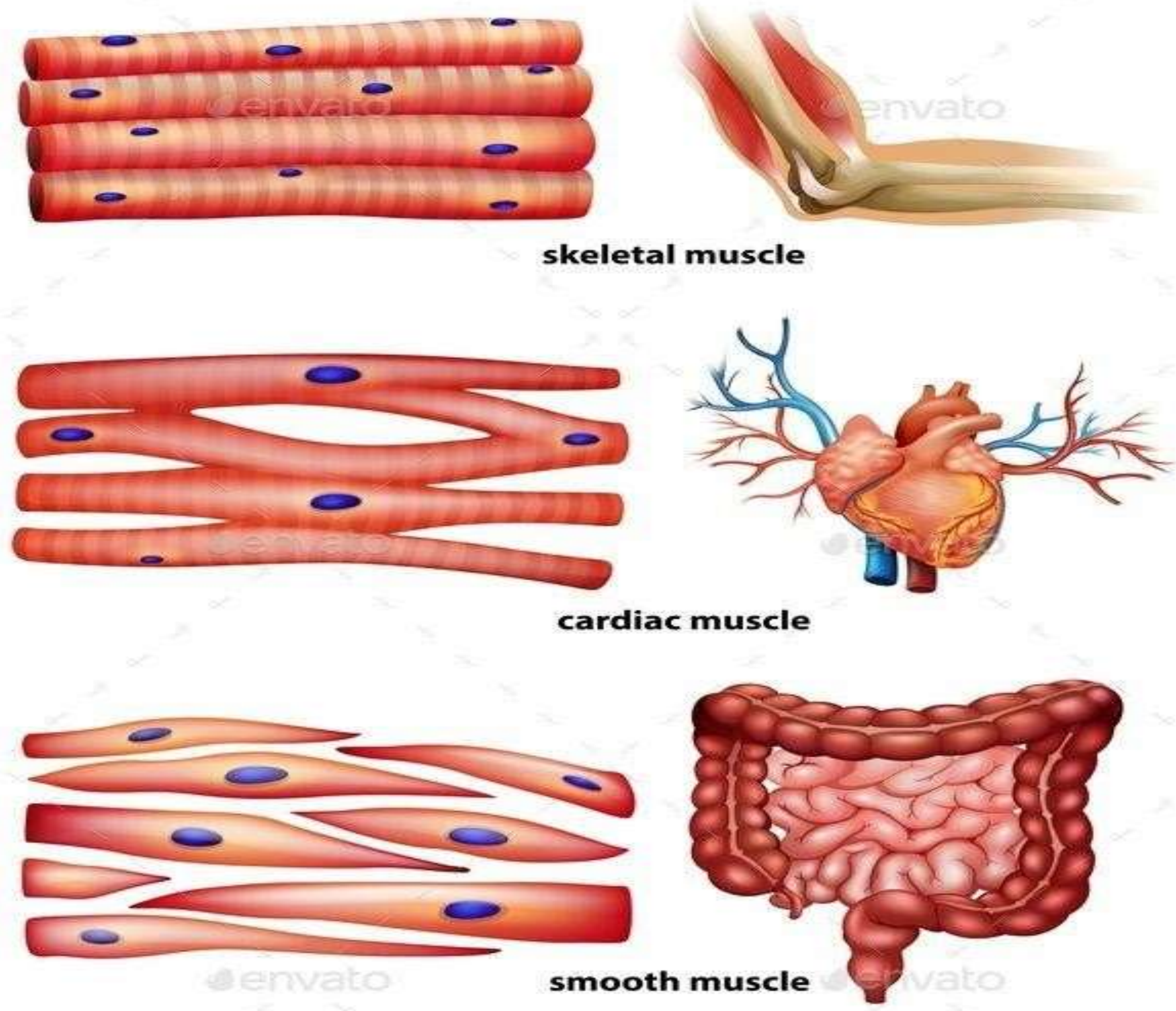
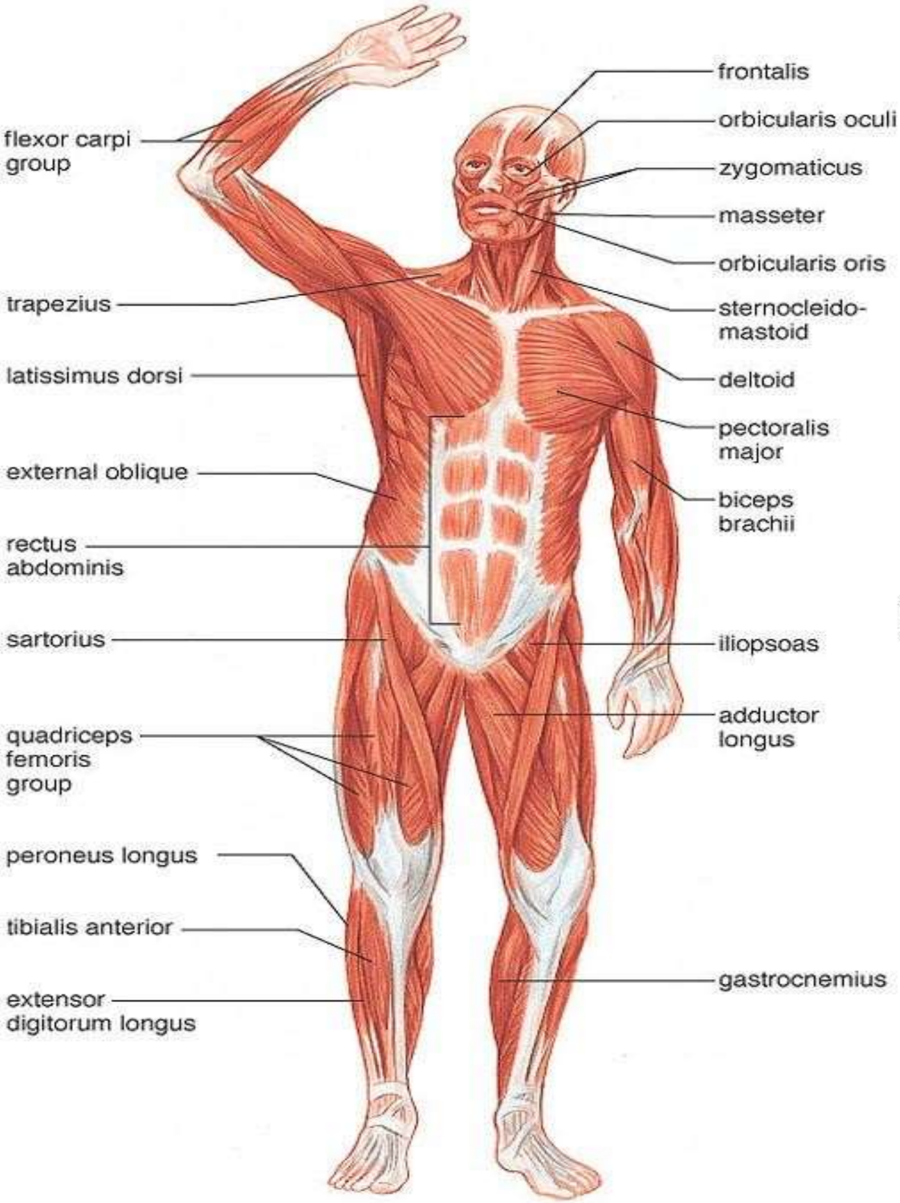
Types of Muscle Cells



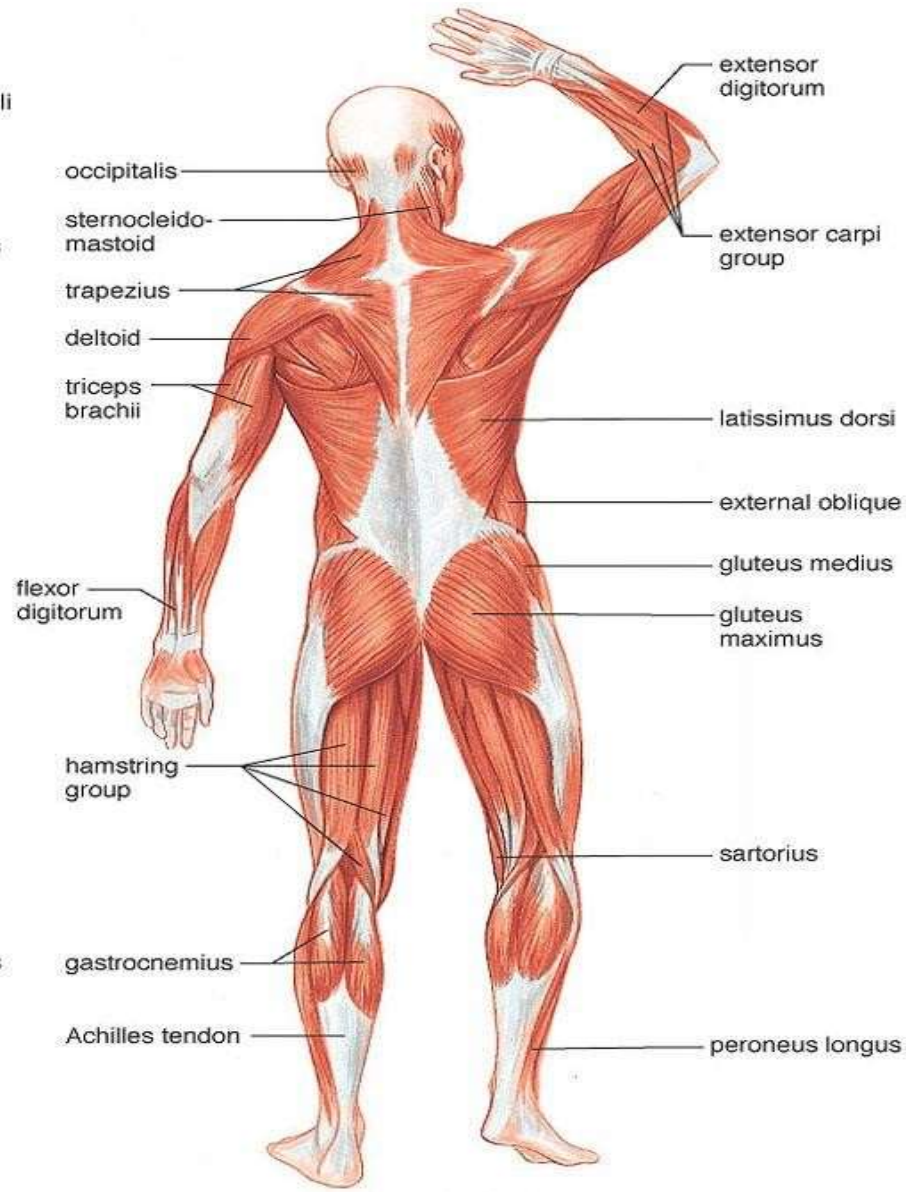
Skeletal muscle

- Produce the movement of the skeleton
- Voluntary muscle
- Made up of striated muscle fibers
- Has two or more attachment (proximal less mobile called **origin ,** the more distal ,more mobile called **insertion .**

Skeletal Muscles



a. Anterior view



b. Posterior view

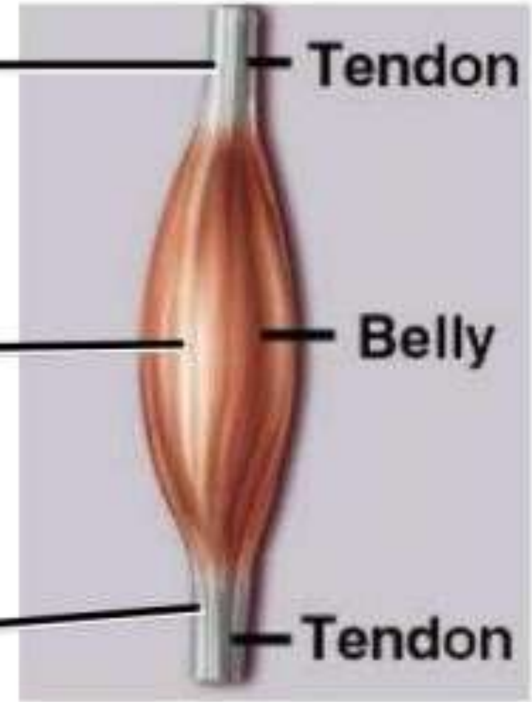
Parts of a Skeletal Muscle

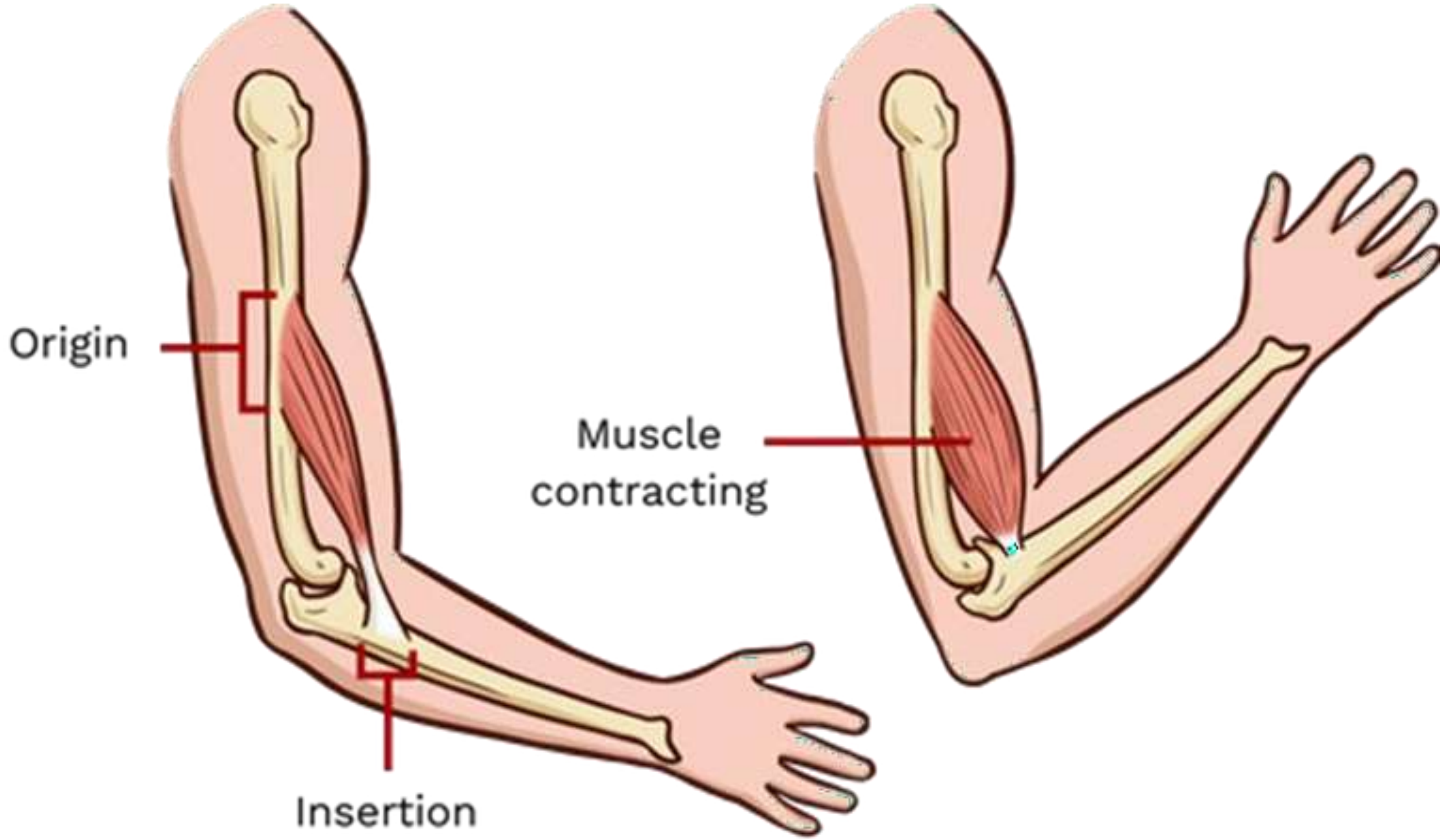
- Origin
  - attachment to stationary end of muscle

Proximal end

- Belly
  - thicker, middle region of muscle
- Insertion
  - attachment to mobile end of muscle

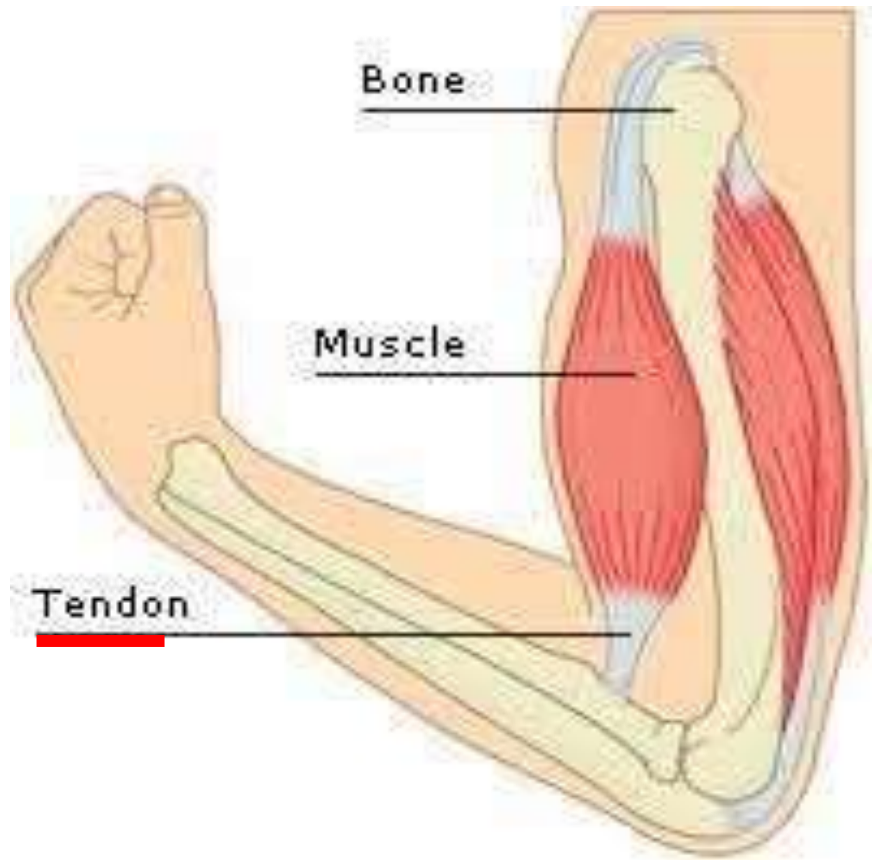
Distal end

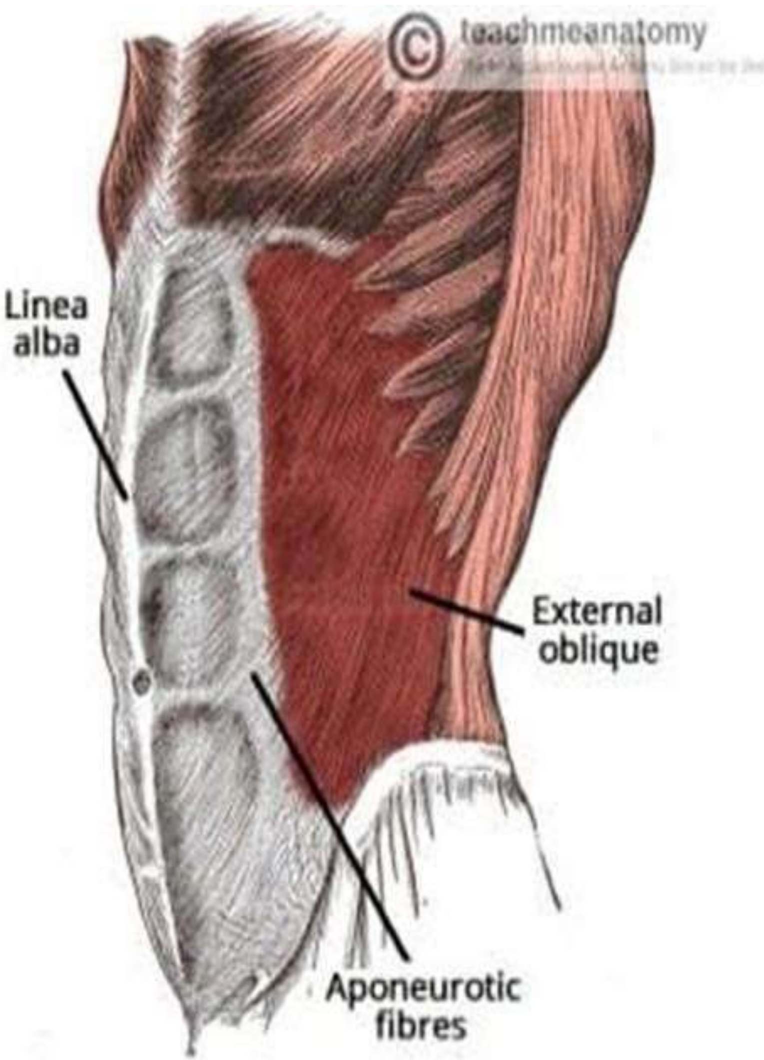


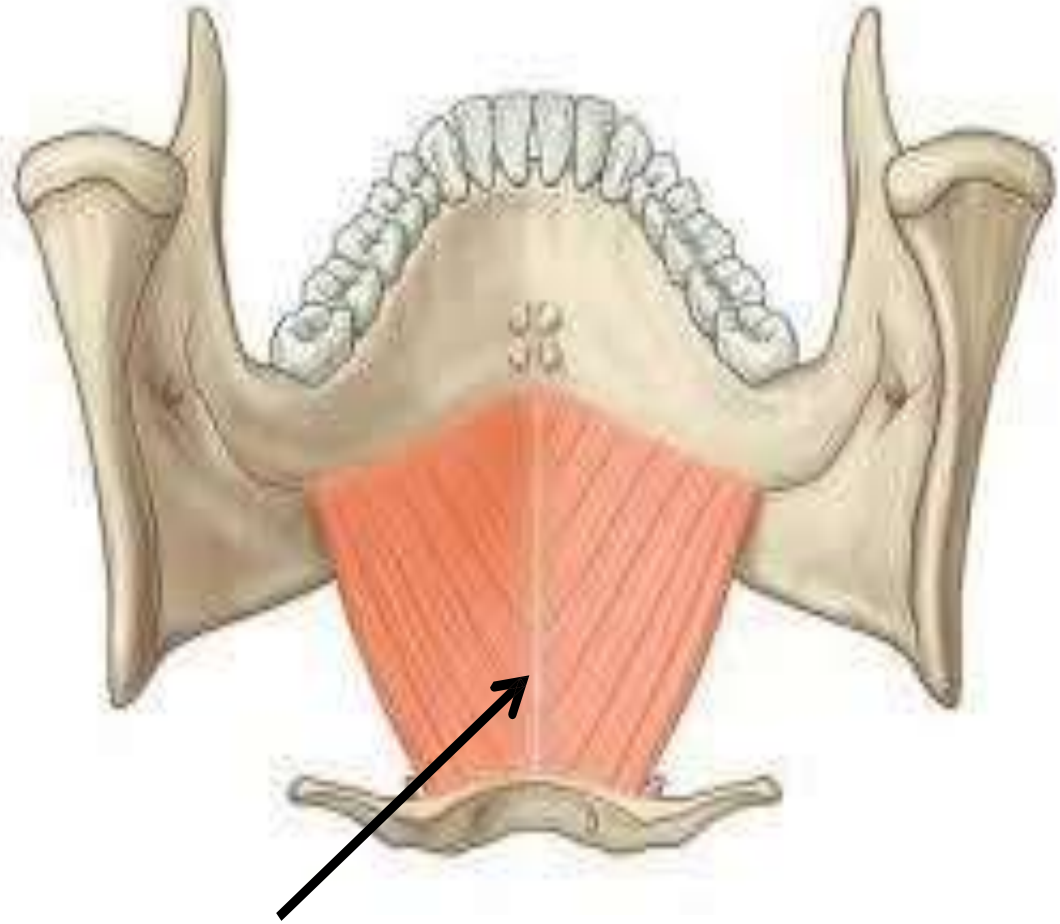

Origin
Muscle
contracting
Insertion

Tendon

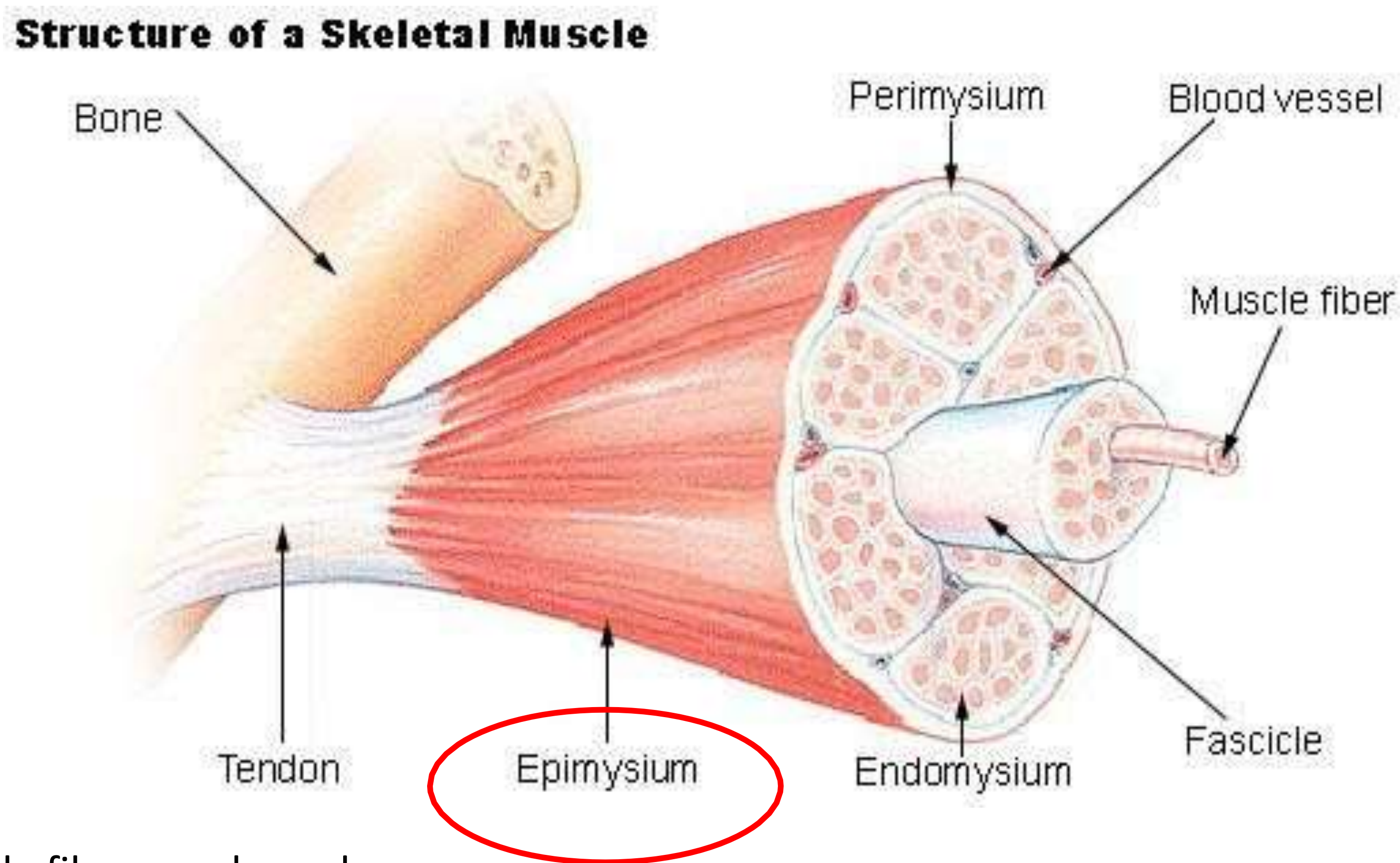
- **cords** of fibrous tissue connect the ends of a muscle to supporting elements like bone , cartilage , ligaments or other muscles .
- Some tendons form a **thin strong** sheet called **aponeurosis** like in abdomen oblique muscle
- **Raphe** which is an interdigitation of the tendinous ends of fibers of flat muscles







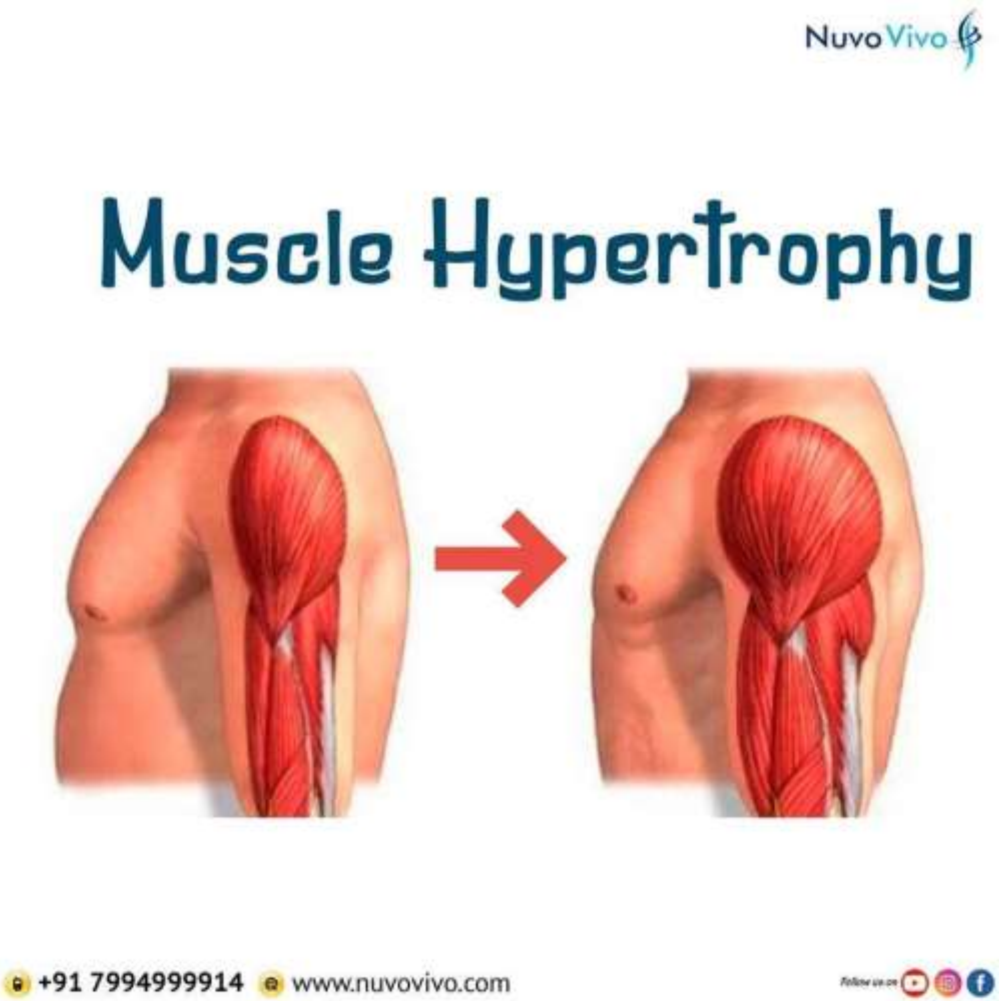
Raphe of mylohyoid muscle



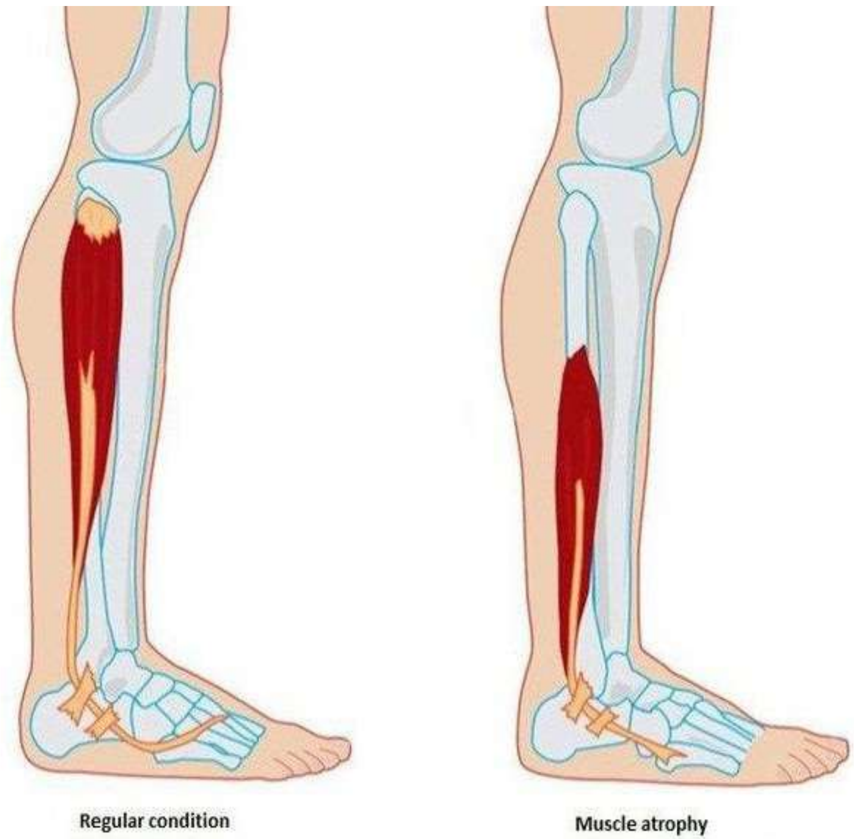
- ❖ Individual muscle fibers are bound together with continuous ,delicate sheaths of areolar tissue , which are condensed on the surface of muscle to form a fibrous envelope called **epimysium**

- Fibers within the belly are arranged either parallel or oblique to the long axis of the muscle
- Muscle fibers shortens by 1/3 to ½ its resting length when it contract

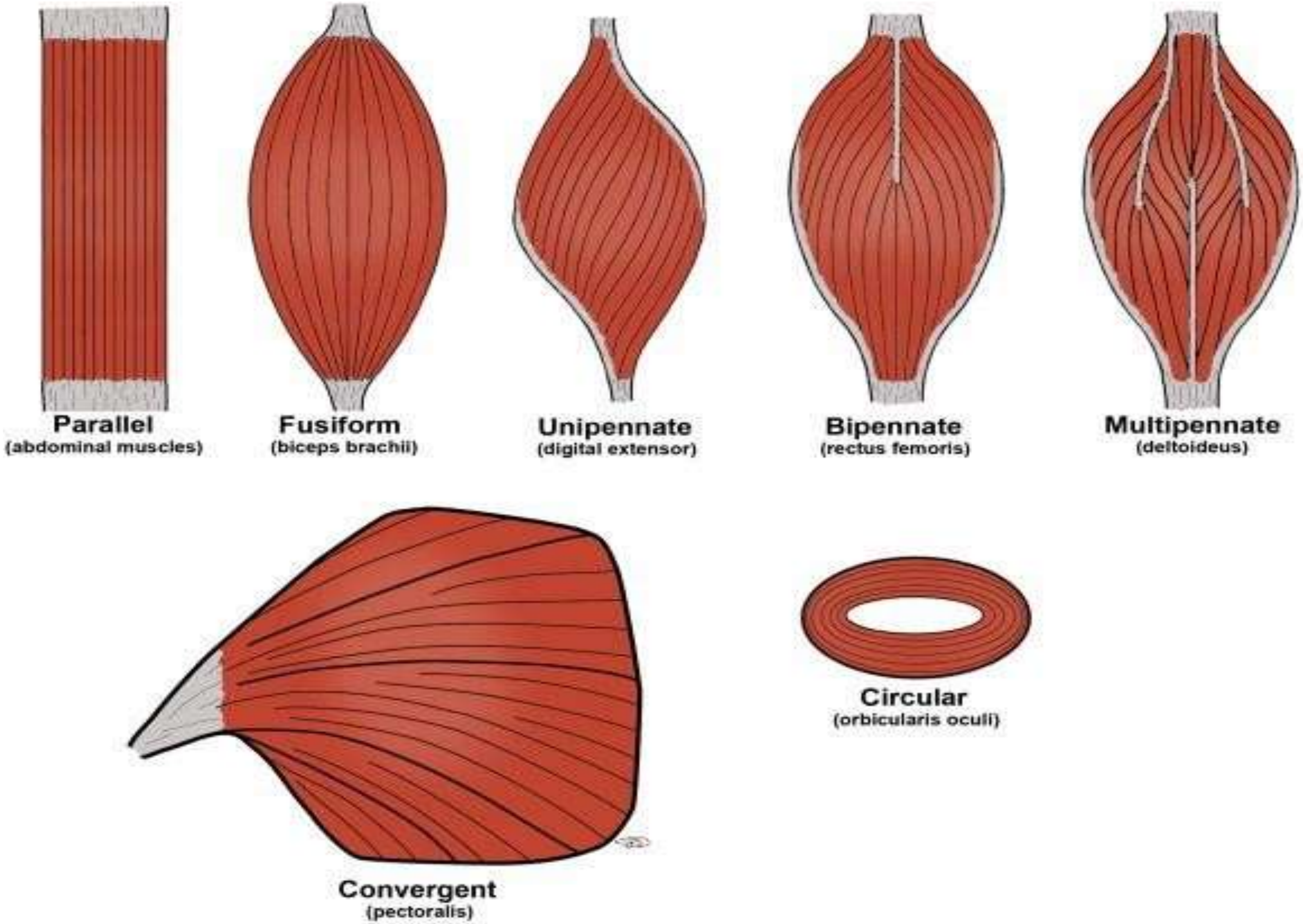
Changes in the size of individual muscle fibers



Muscle atrophy



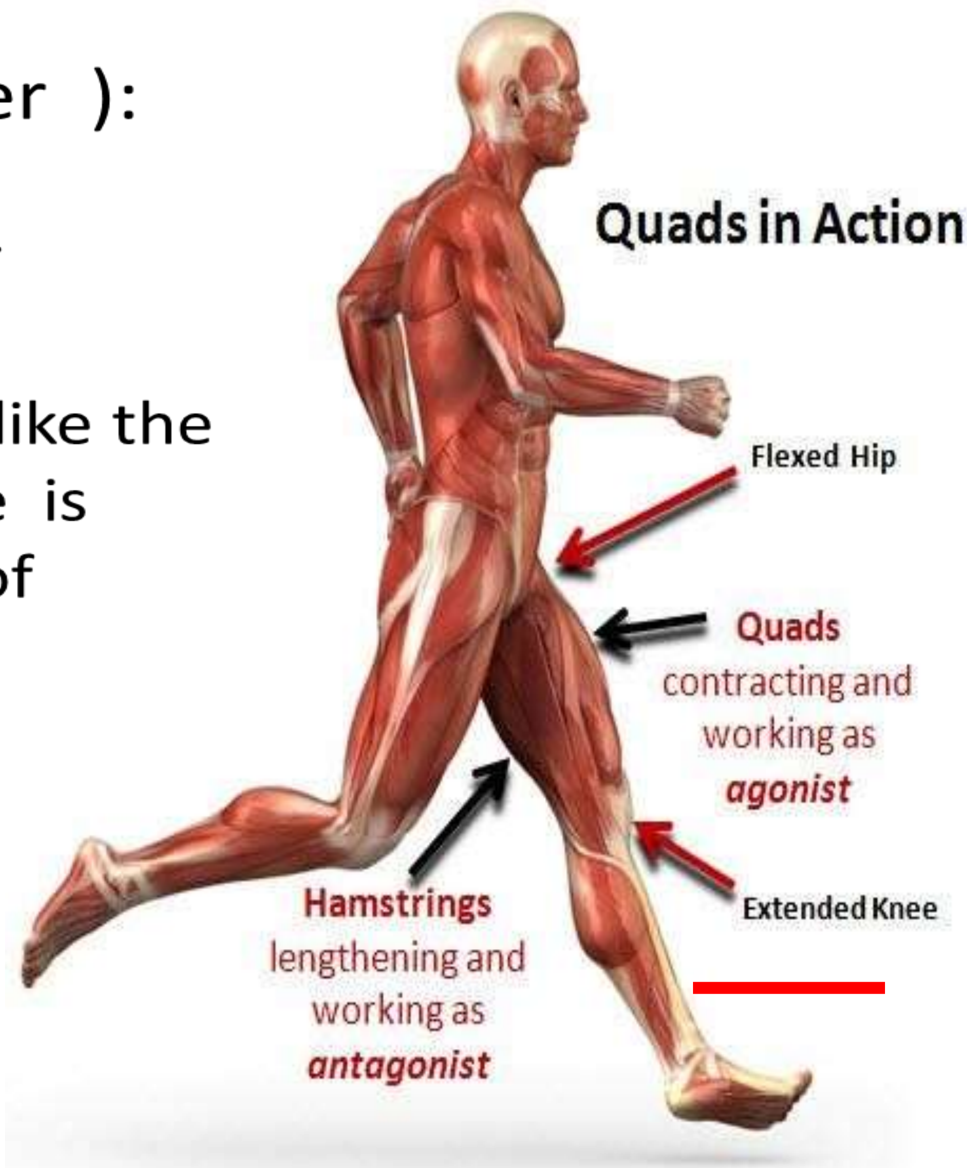
Belly of skeletal muscle



Actions of skeletal muscles

- Agonist (prime mover):

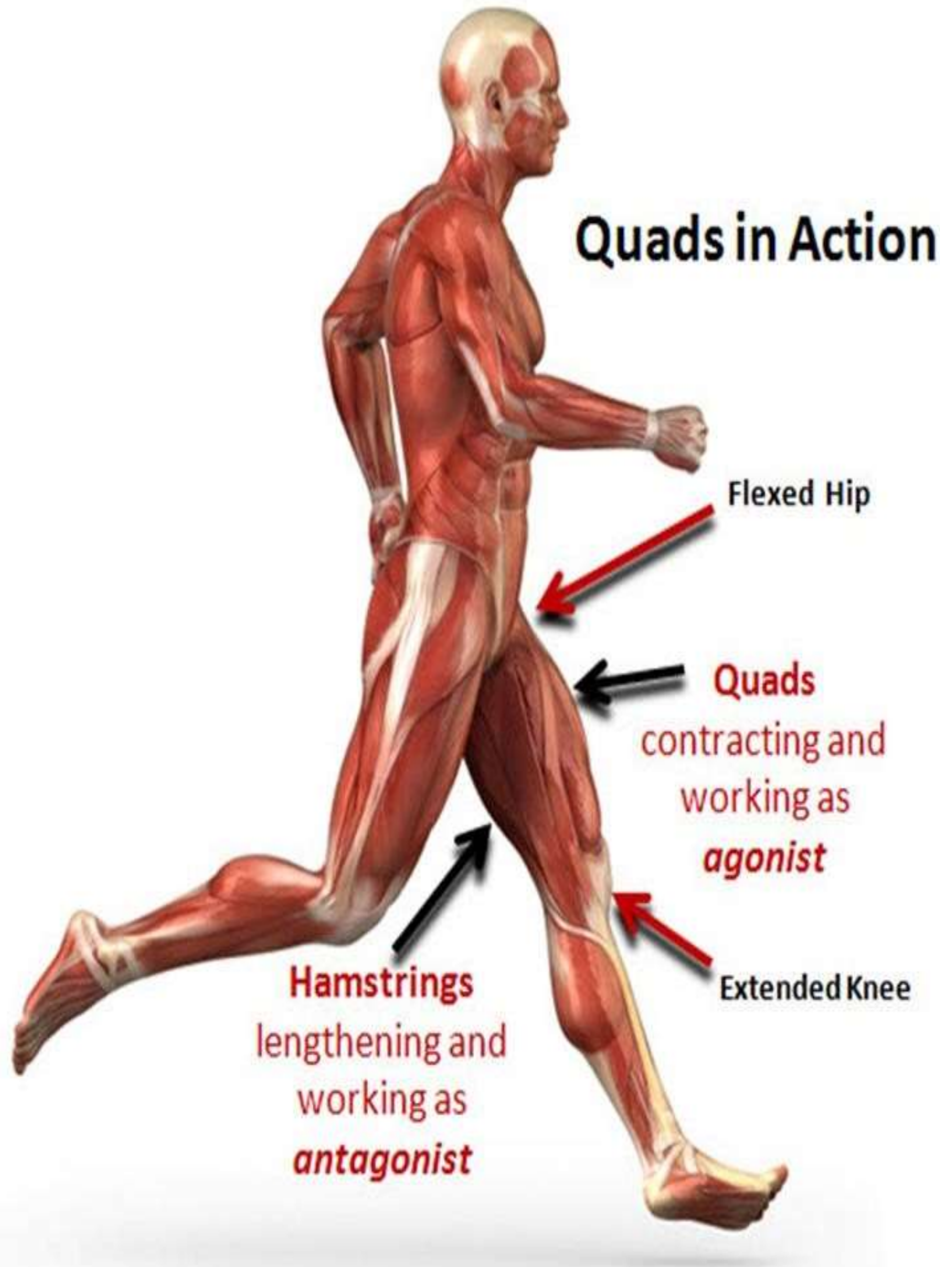
When the chief muscle or members of chief group of muscles responsible for production of movement like the quadriceps femoris muscle is agonist in the movement of extending knee joint



- Antagonist :

Any muscle that opposes the action of agonist such as biceps femoris which antagonist to during knee extension because its opposes

to action of quadriceps femoris .

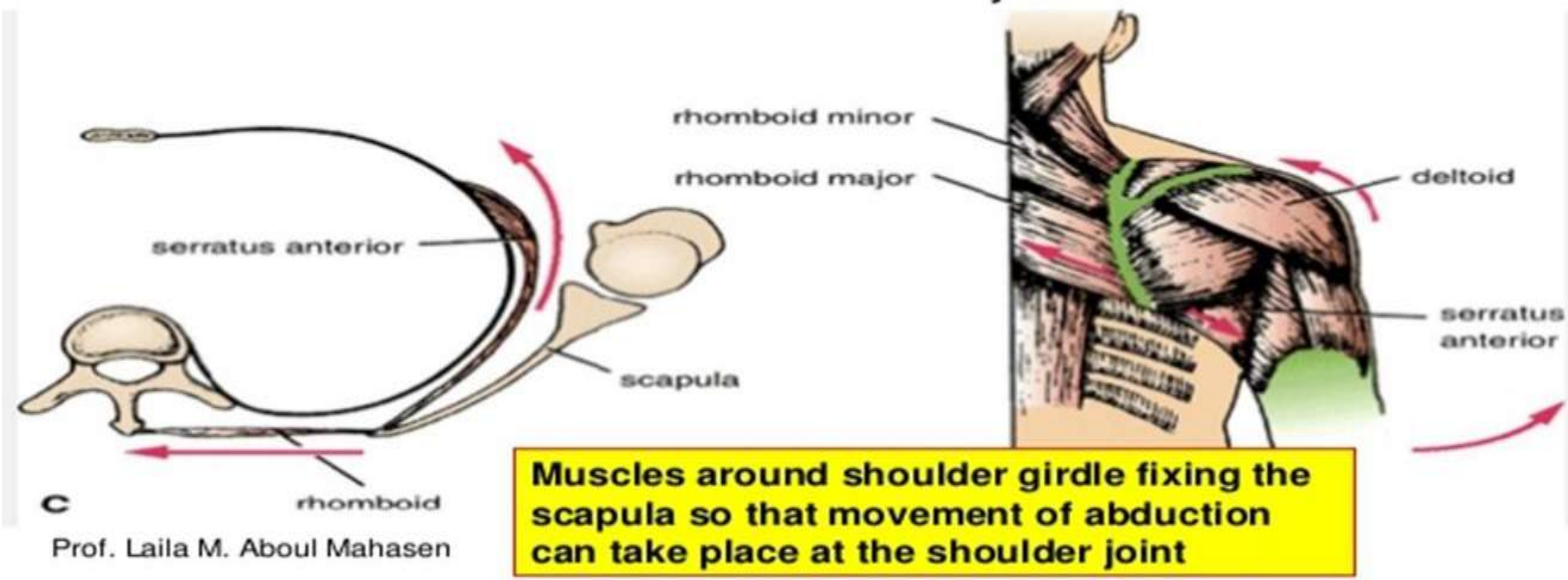


- **Fixator :**

Fixator contraction **increase the tone** but dose not itself produce movement in to stabilize the origin of prime movement like the muscle attaching the shoulder girdle to the trunk contract as fixator to a allow the deltoid act on shoulder

Fixator

- A fixator contracts isometrically (i.e., contraction increases the tone but does not produce movement) to stabilize the origin of the prime mover so that it can act efficiently e.g., the muscles attaching the shoulder girdle to the trunk contract as fixators to allow the deltoid to act on the shoulder joint.

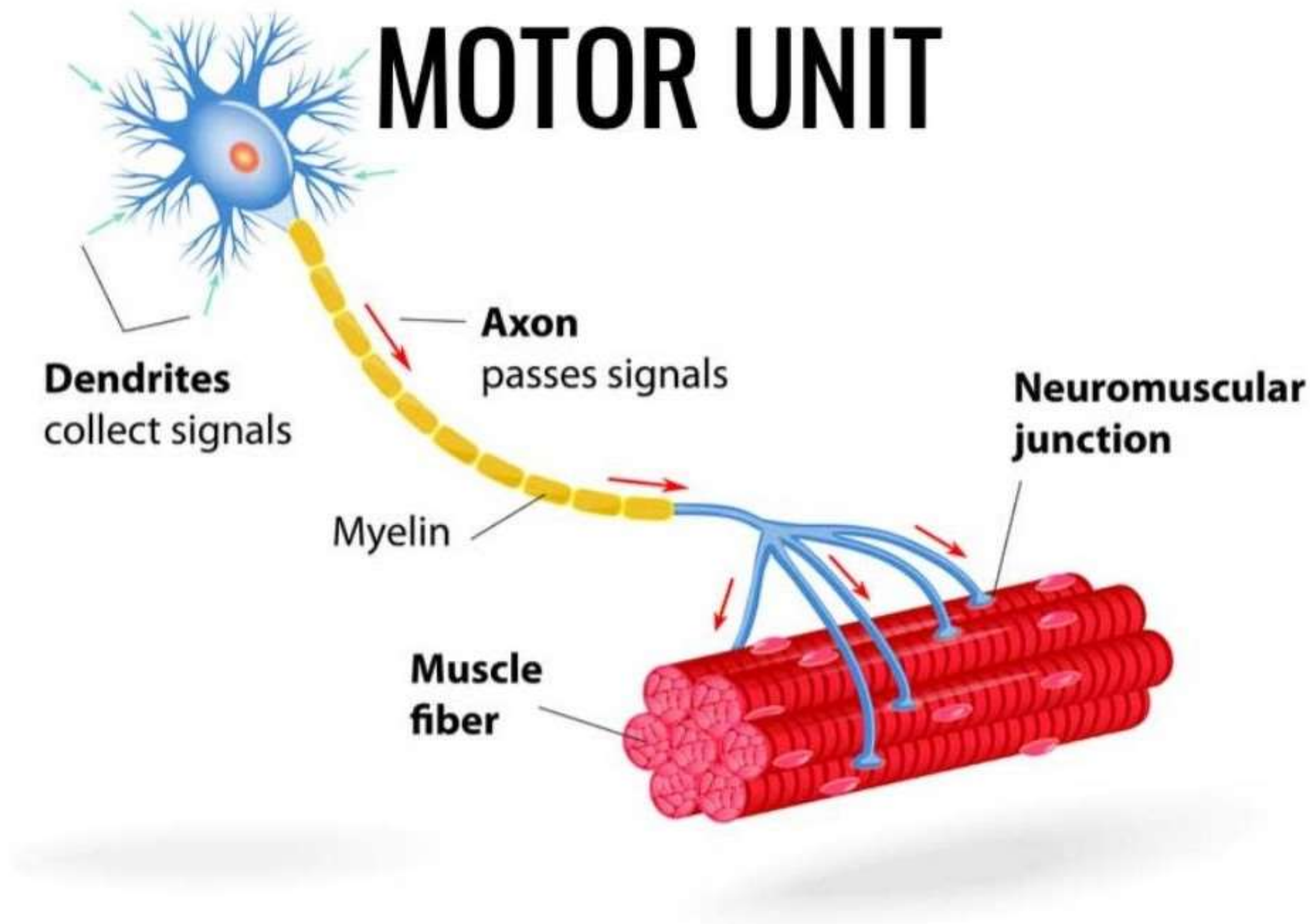


- Synergist

in many location in the body ,the **agonist muscle crosses multiple joints** before it reaches the joint at which its main action take place .To prevent unwanted in an intermediate joint theses muscles called synergist .

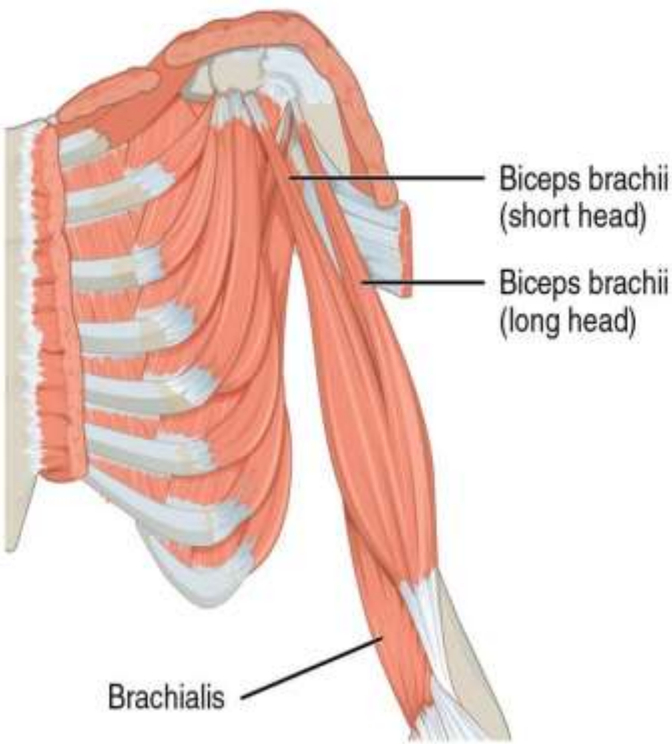
Like **extensor and flexor muscles** of carpus contract to fix the wrist joint and this allows the long flexor and extensor of the fingers work efficiently .

MOTOR UNIT


Axon
passes signals
Dendrites
collect signals
Neuromuscular
junction
Myelin
Muscle
fiber

Names of skeletal muscles

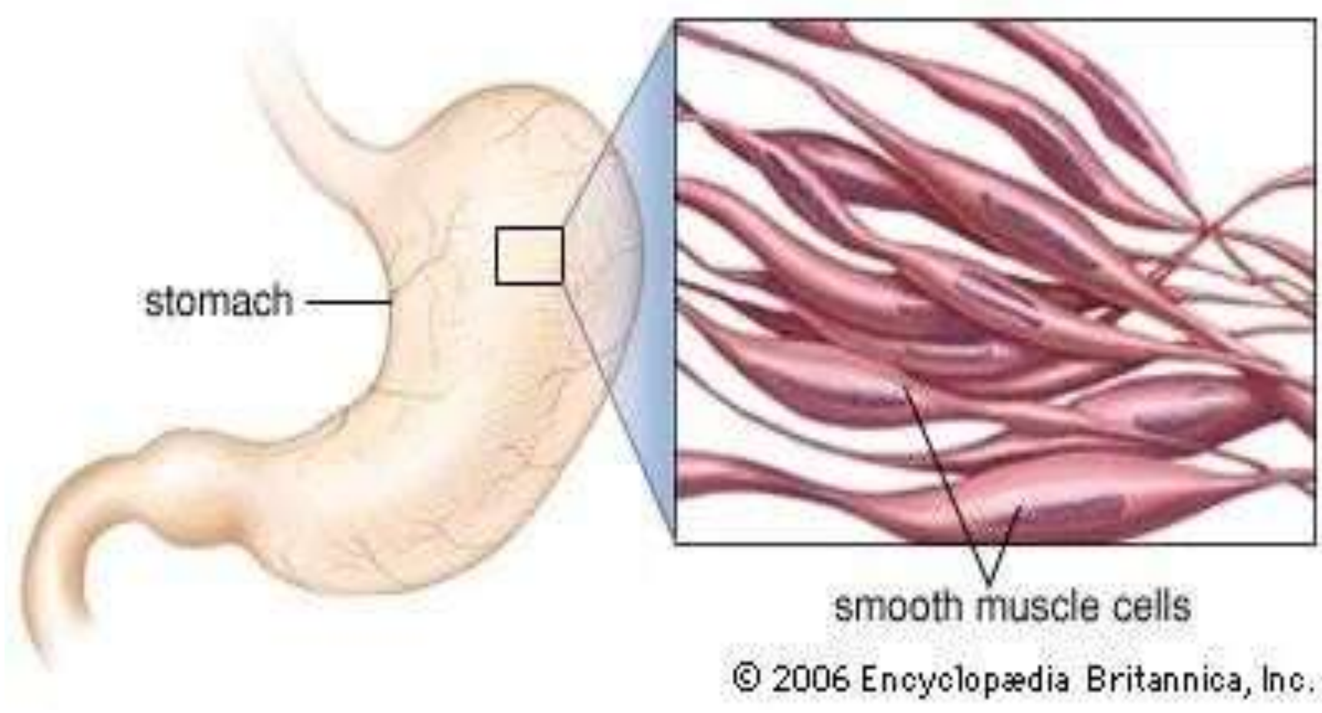
- The muscles are named according to shape , size ,position ,number of heads and depth like deltoid, biceps muscles and others



Deltoid Muscle

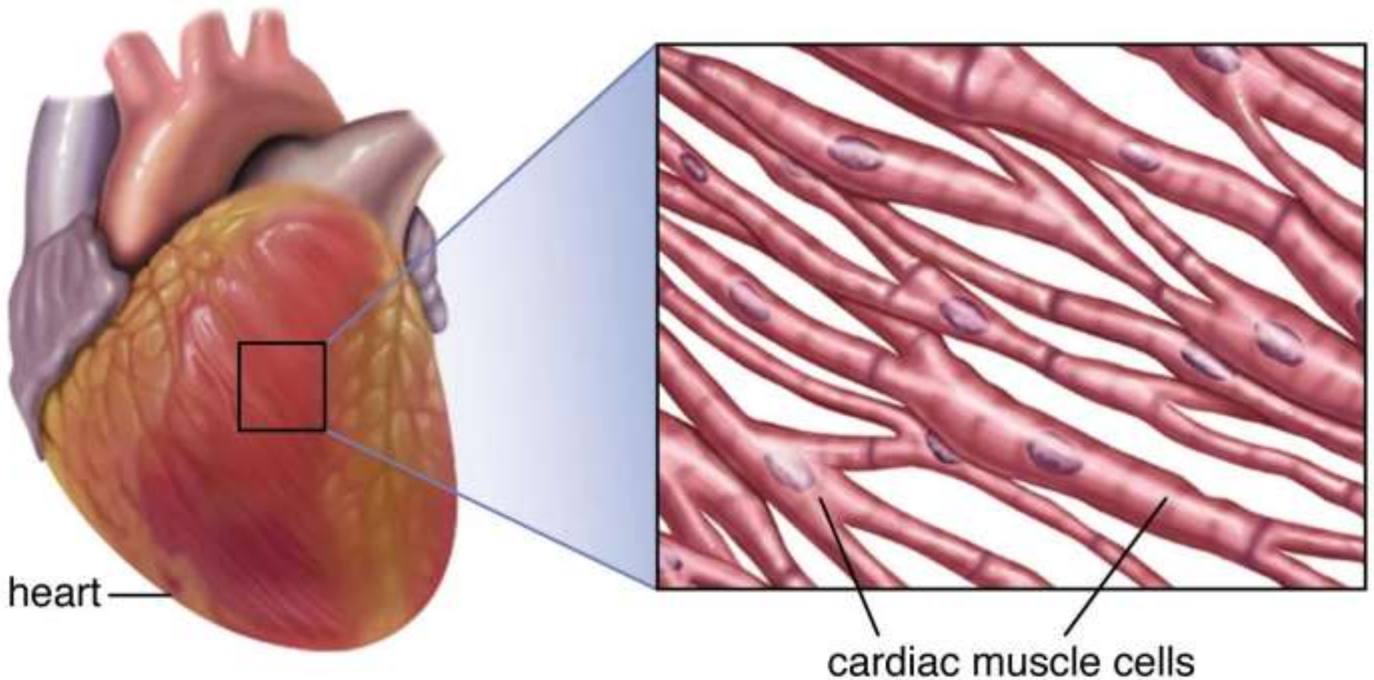
Smooth muscles

- Widely distributed within the walls of internal viscera, and blood vessels in addition to the eye and skin
- Supplied by autonomic nerves

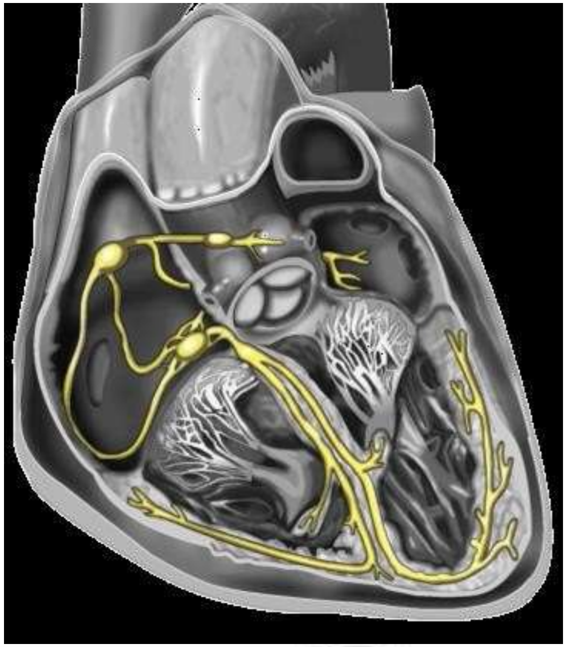


Cardiac muscle

- Fibers are striated and involuntary
- Forms the myocardium of the heart

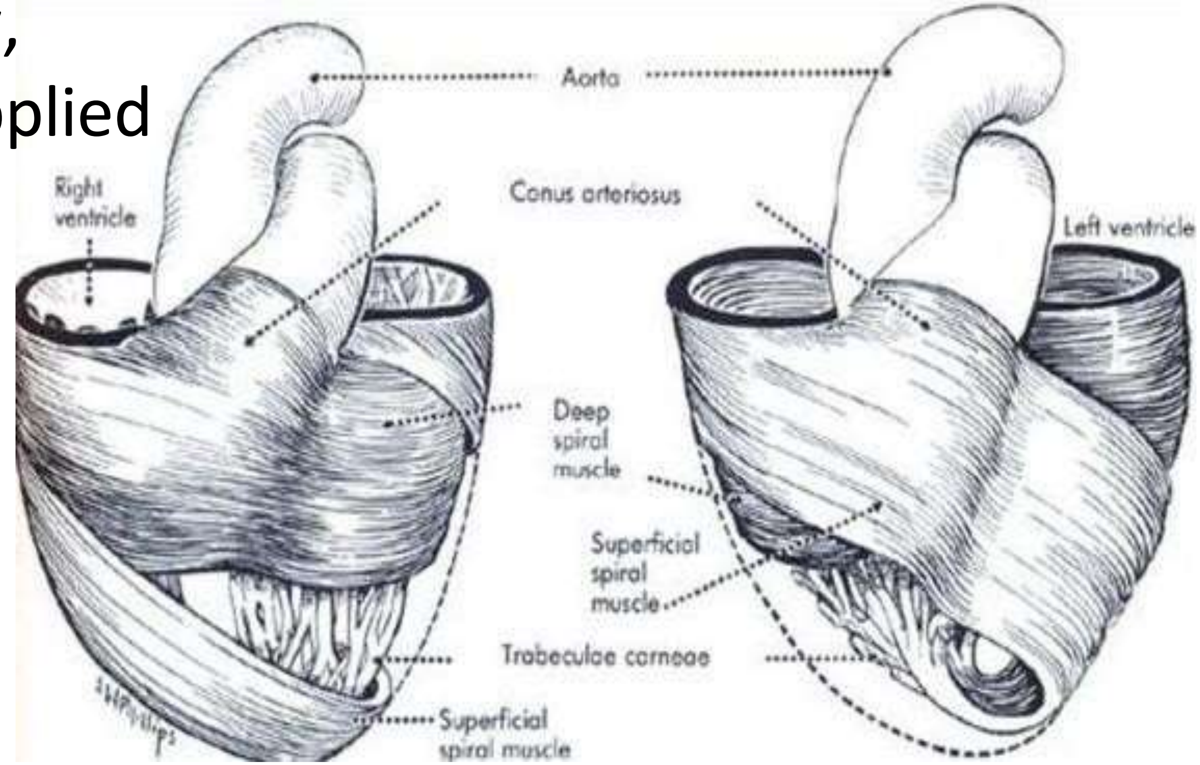


- Fibers tend to be arranged in whorls and spirals
- Spontaneous and rhythmic contraction



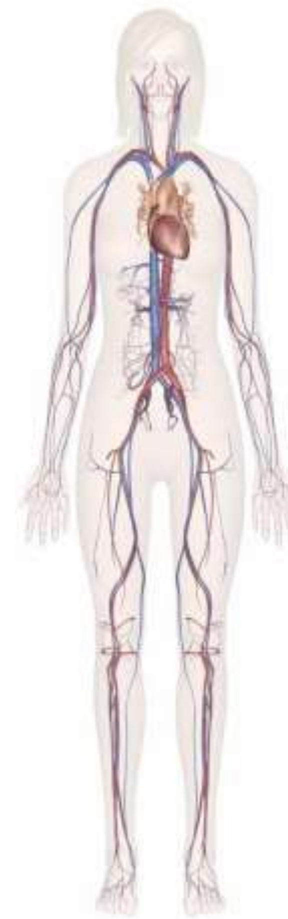
- Specialized cardiac muscle fibers form the conducting system of the heart

- Although involuntary, Cardiac muscle is supplied by autonomic nerves

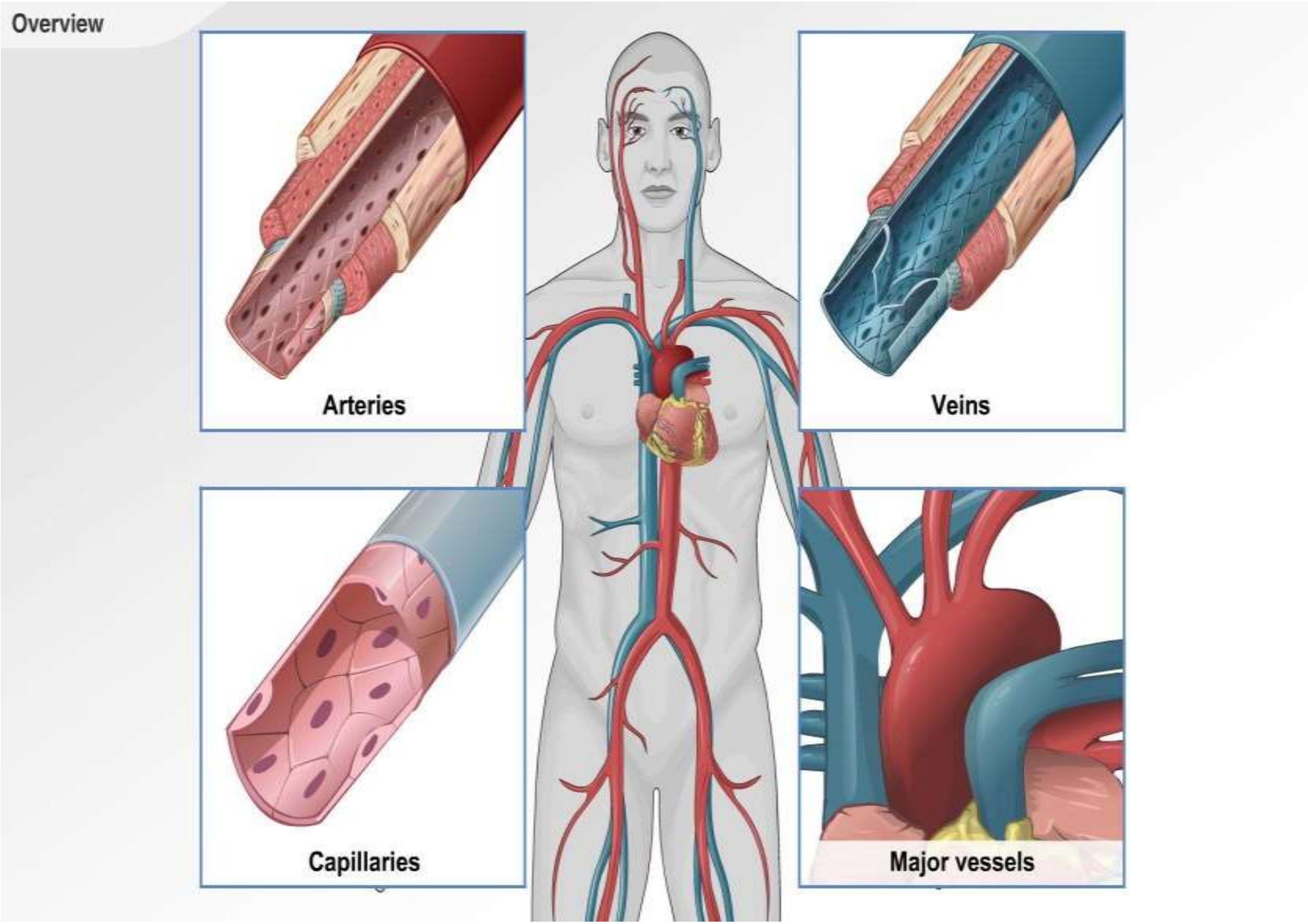


Blood and lymphatic vascular systems

The cardiovascular system is made of the heart and three types of blood vessels, arteries, veins and capillaries .

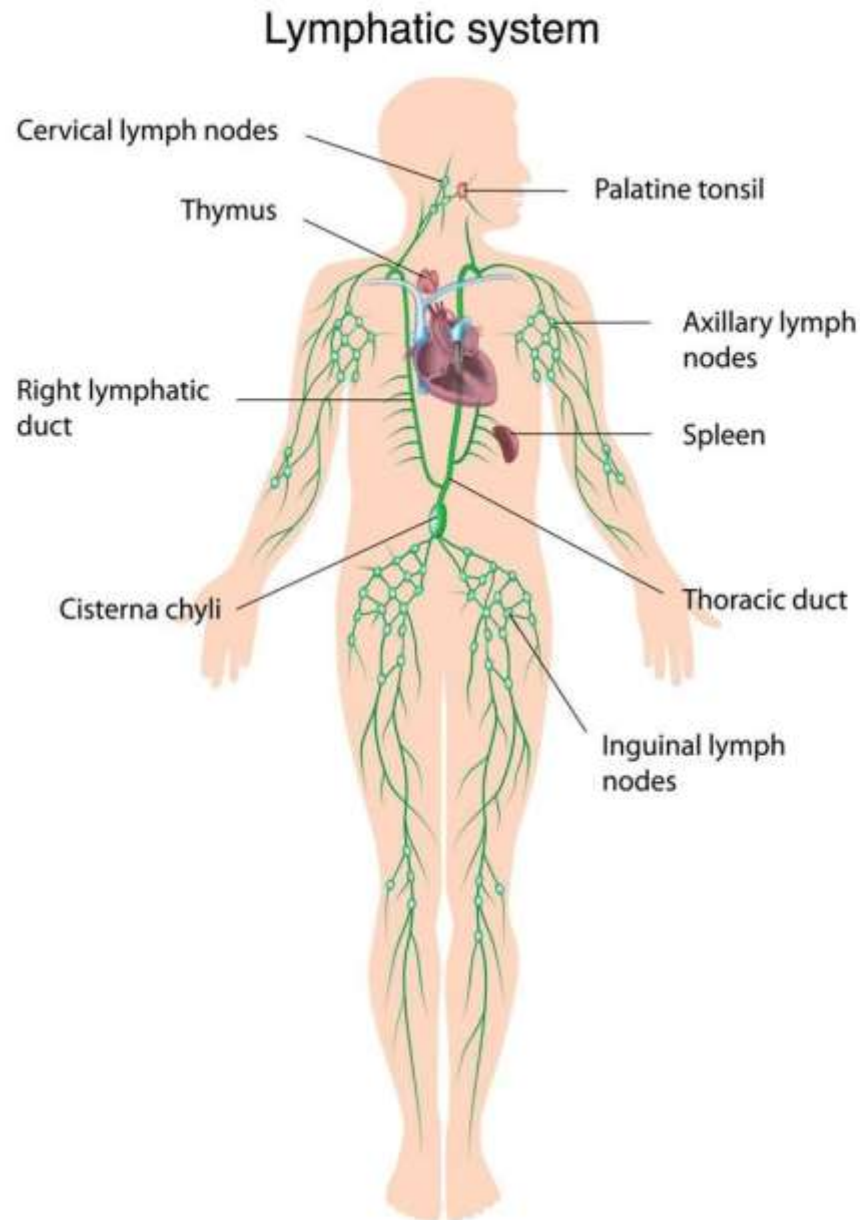


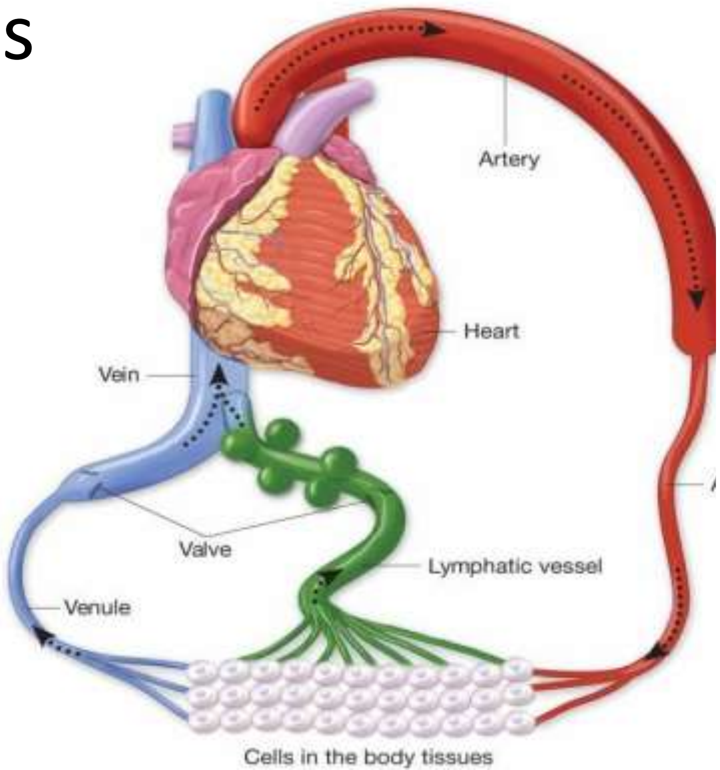
- Heart is a pump (right and left pumps)
- Blood vessels distribute blood
- Blood carries nutrients/ O2 to cells and bring back their waste products


Overview
Arteries
Veins
Capillaries
Major vessels

Blood and lymphatic vascular systems

- The lymphoid vascular system provides a path for the drainage of excess tissue fluid to blood vessels

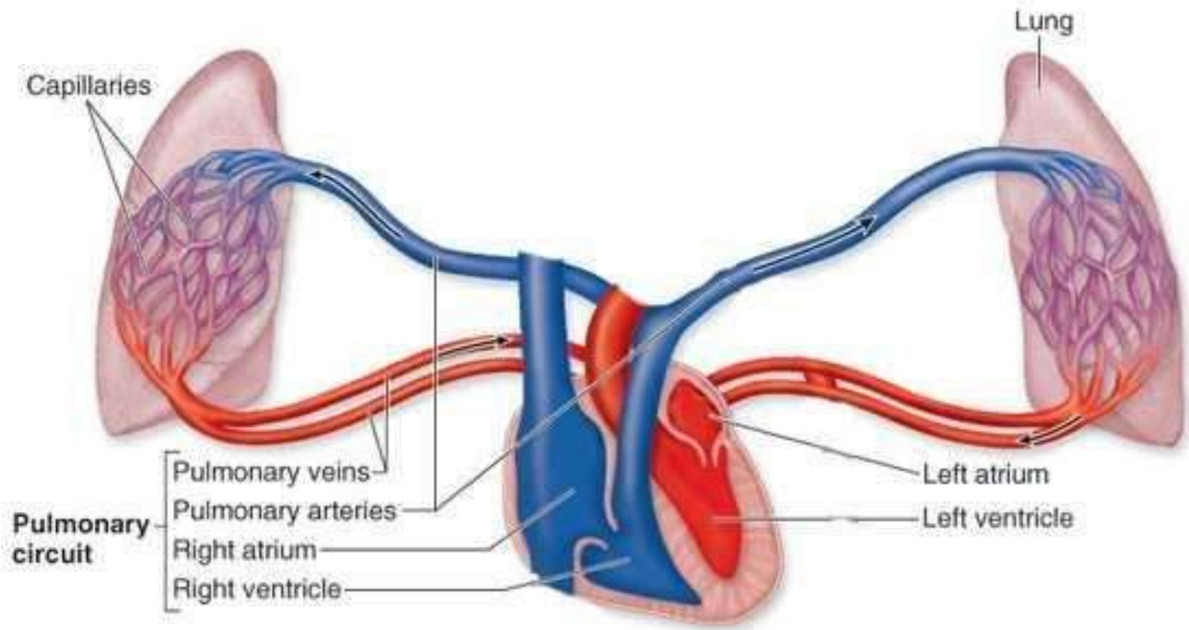




Pulmonary, systemic and portal circulations

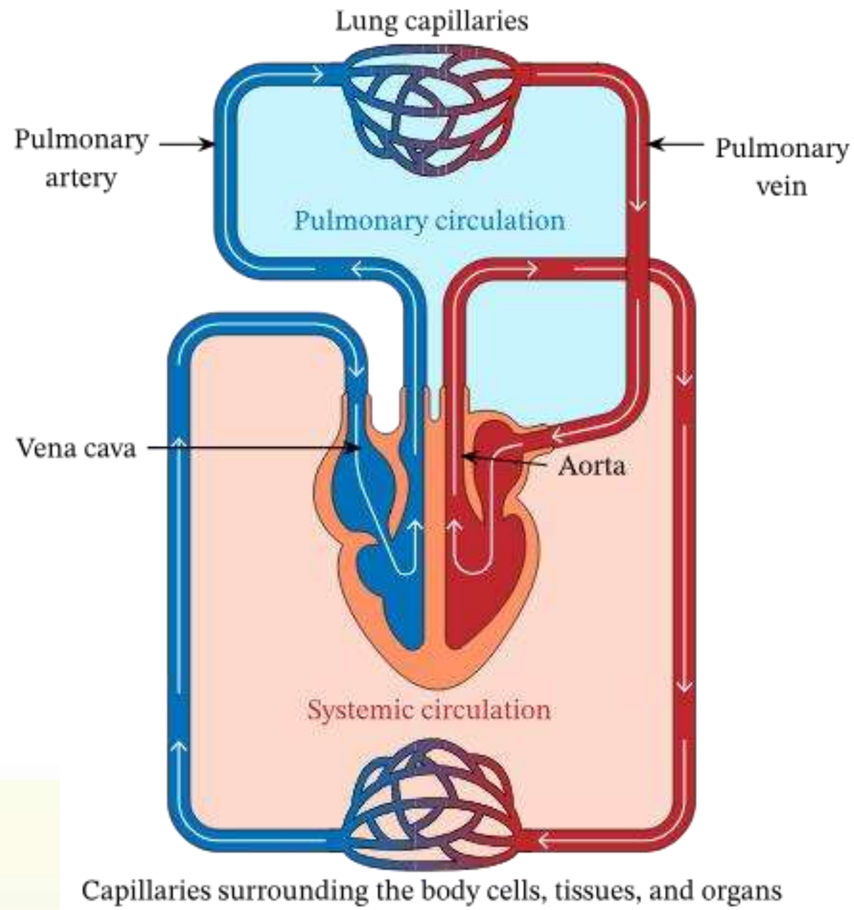
- Pulmonary circulation

RV (venous blood) ⟶ pulmonary arteries
both lungs(Co2 for O2) ⟶pulmonary veins ⟶
(O2-rich blood) ⟶ left atrium



- Systemic circulation

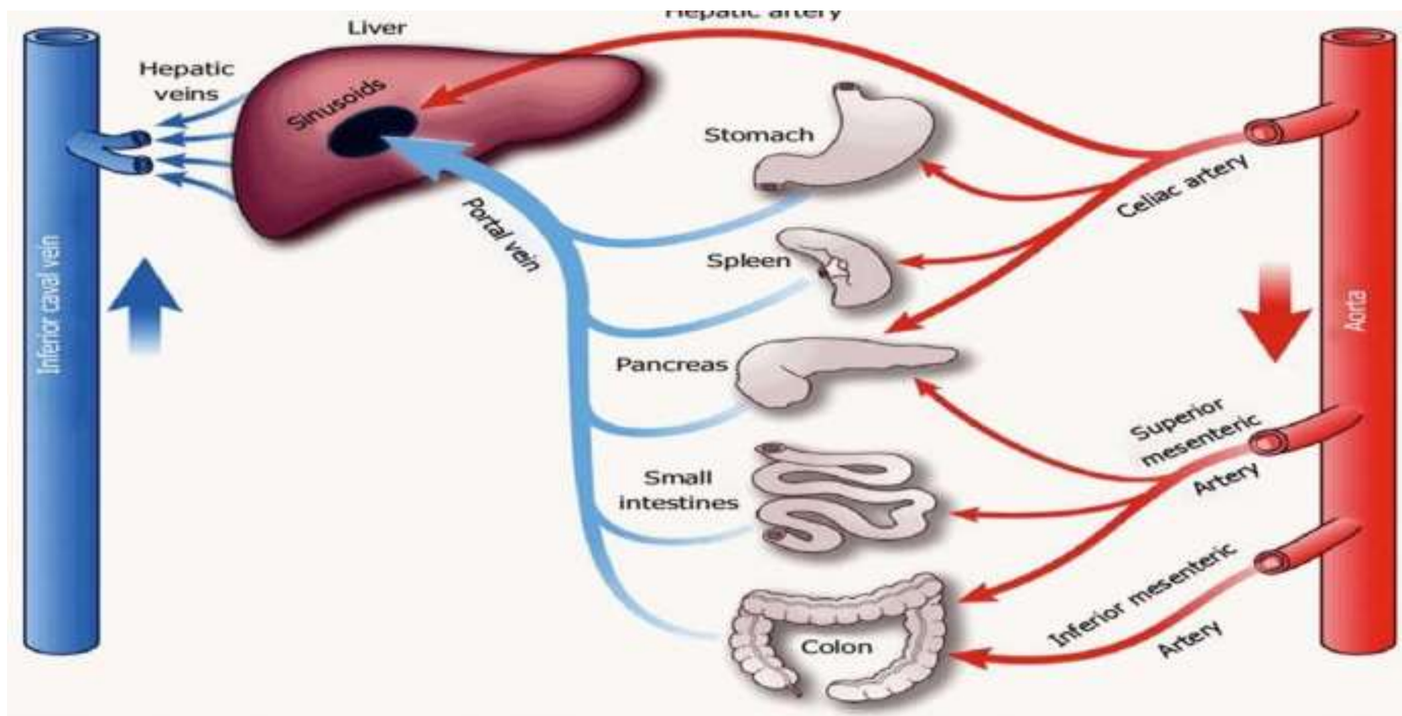
left ventricle (O2- rich blood) ⟶ Aorta & branches ⟶ all parts of the body (O2 and nutrients for Co2)⟶SVC & IVC (low o2) ⟶ right atrium



- Portal circulation

➢ Part of systemic circulation (on the venous side)

➢ Abdominal organs (capillary bed) ⟶ portal vein (venous blood) ⟶ liver sinusoids (exchange nutrient) hepatic veins ⟶ IVC



Arteries, veins, and capillaries

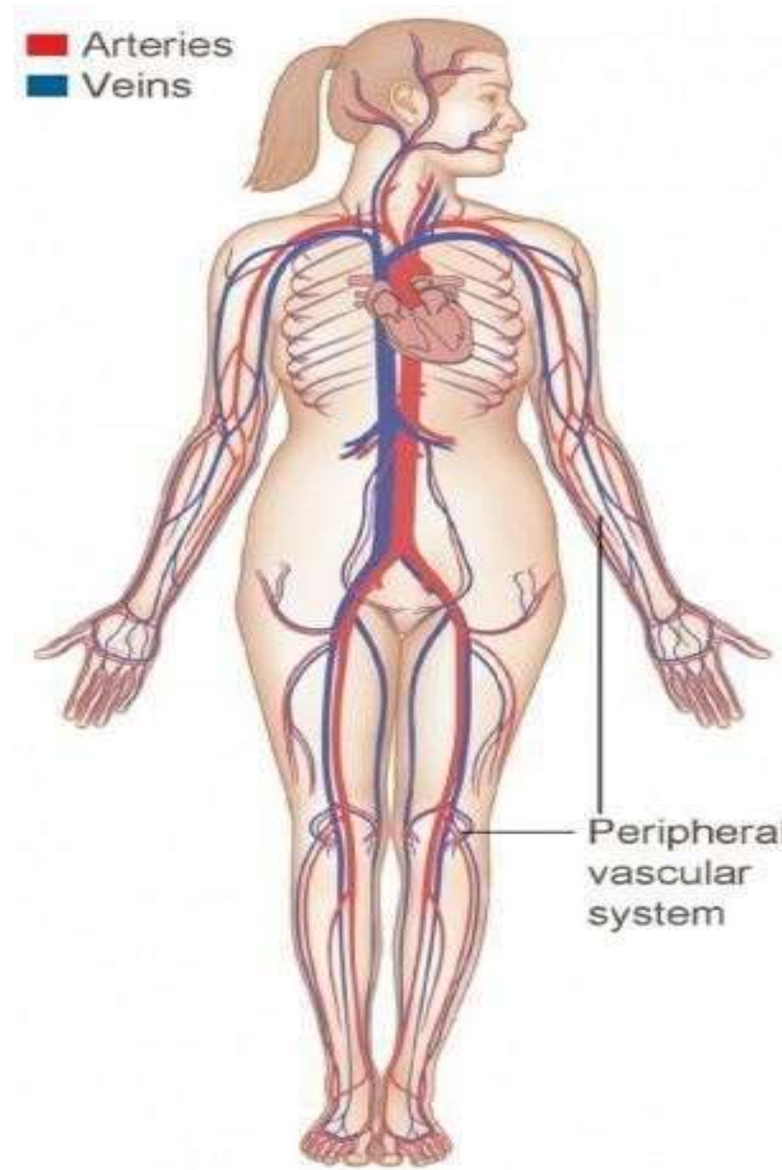
1. Arteries

2. Veins

3. Capillaries

Arteries & Veins

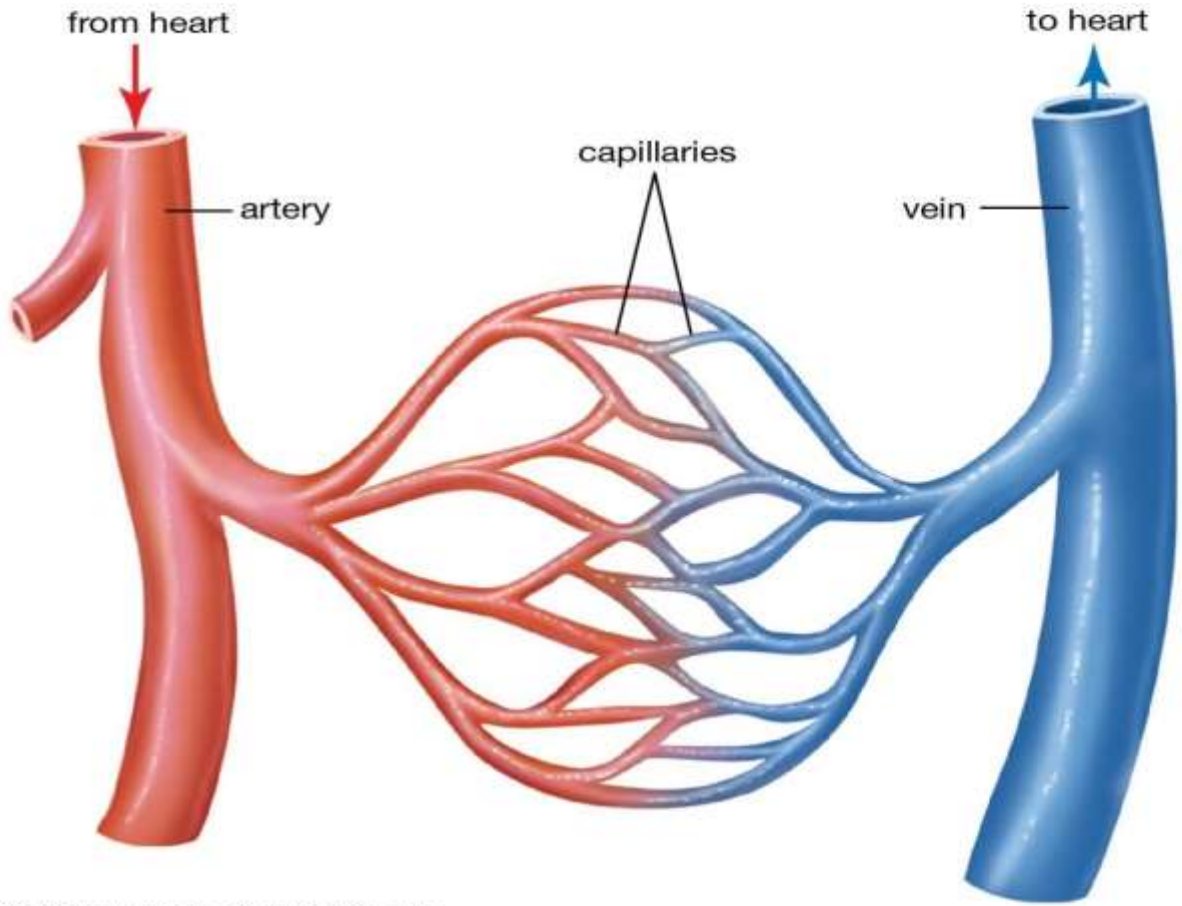
- larger near the heart
- smaller near tissues



ARTERIES, VEINS, AND CAPILLARIES

Arteries	**Veins**
Thicker wall/ smaller diameter	Thinner wall/ larger diameter
Carry blood away from heart	Carry blood toward the heart
Blood pressure is higher	Blood pressure is lower
Remain open when cut	Collapse when cut
Give branches	Receive Tributaries
Have no valves	Valves prevent backflow

- Arterioles (smallest arteries)
- Venules (smallest veins)
- Capillaries (microscopic vessels connect the arteriols and venules

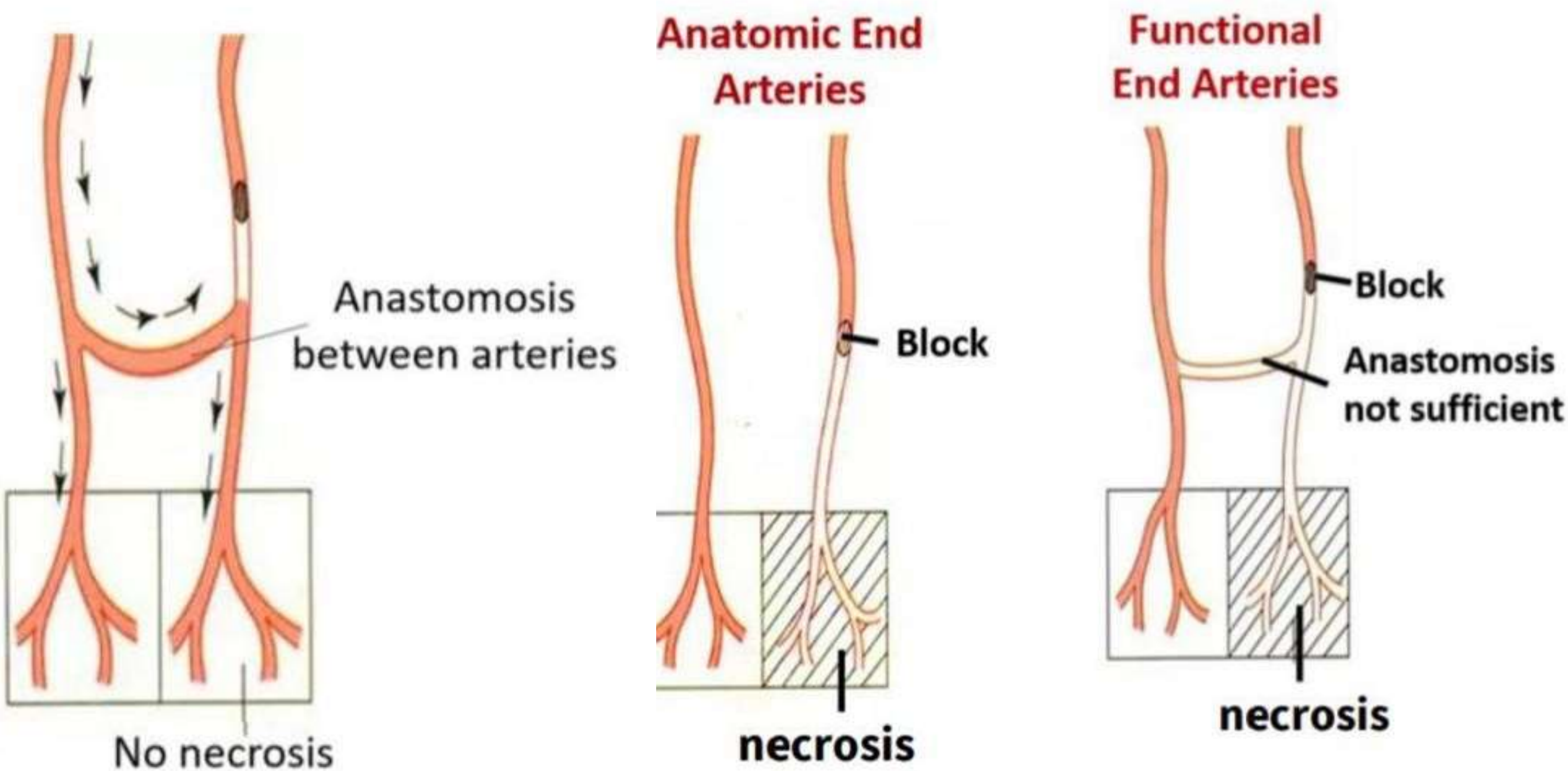


- **Arterial anastomosis**

  Small arteries join each other around main arteries

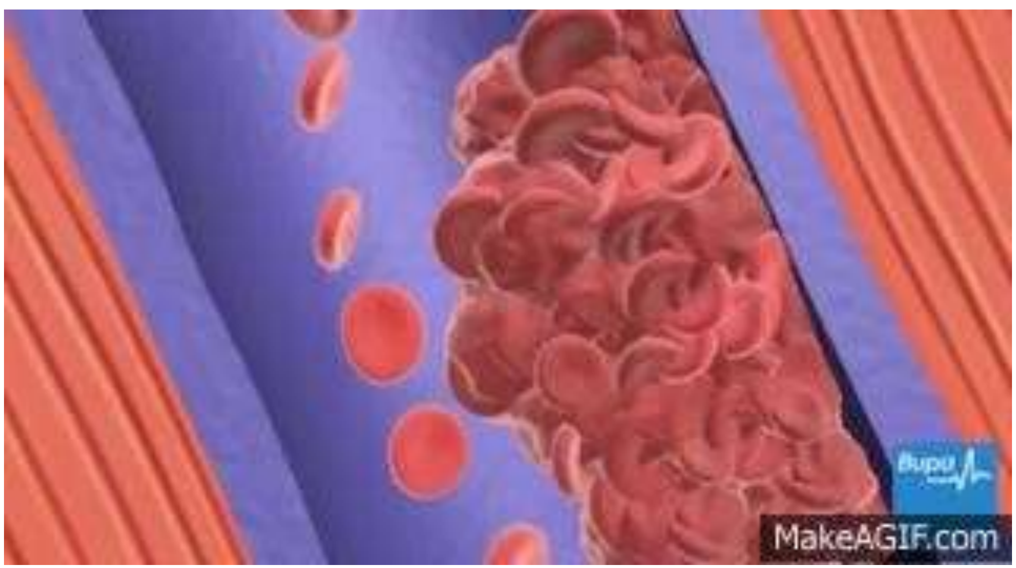
- **Collateral circulation:** circulation through anastomosing vessels when main artery is blocked but insufficient to compensate for sudden occlusion or ligation

- **Anatomical end arteries**: provide the sole source supply to a specific region (are vessels whose terminal branches do not anastomosis with other arteries)
- **Functional end arteries anastomose** : are vessels whose terminal branches do anastomosis with those of adjacent arteries but insufficient to keep the target tissue alive if one artery blocked ex. Coronary arteries .


Anastomosis
between arteries
No necrosis
Anatomic End
Arteries
Block
necrosis
Functional
End Arteries
Block
Anastomosis
not sufficient
necrosis

Thrombosis, infarction & aneurysm

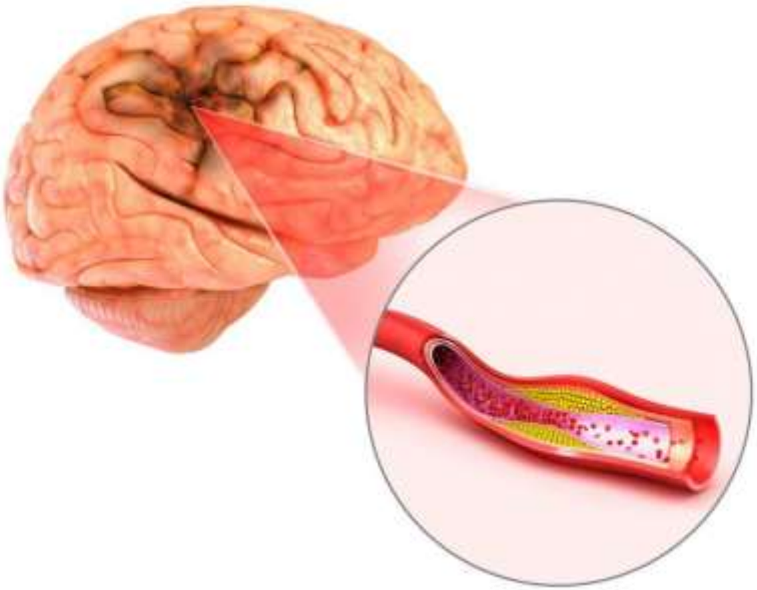
- Thrombosis (thrombus) Embolism (embolus)
- Infarction = tissue death from reduced blood supply Video
- Video

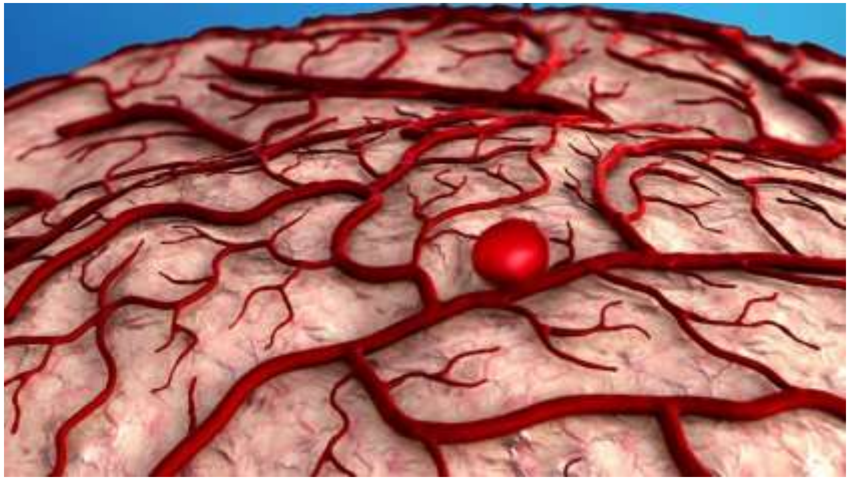


Thrombosis, infarction & aneurysm

Infarction

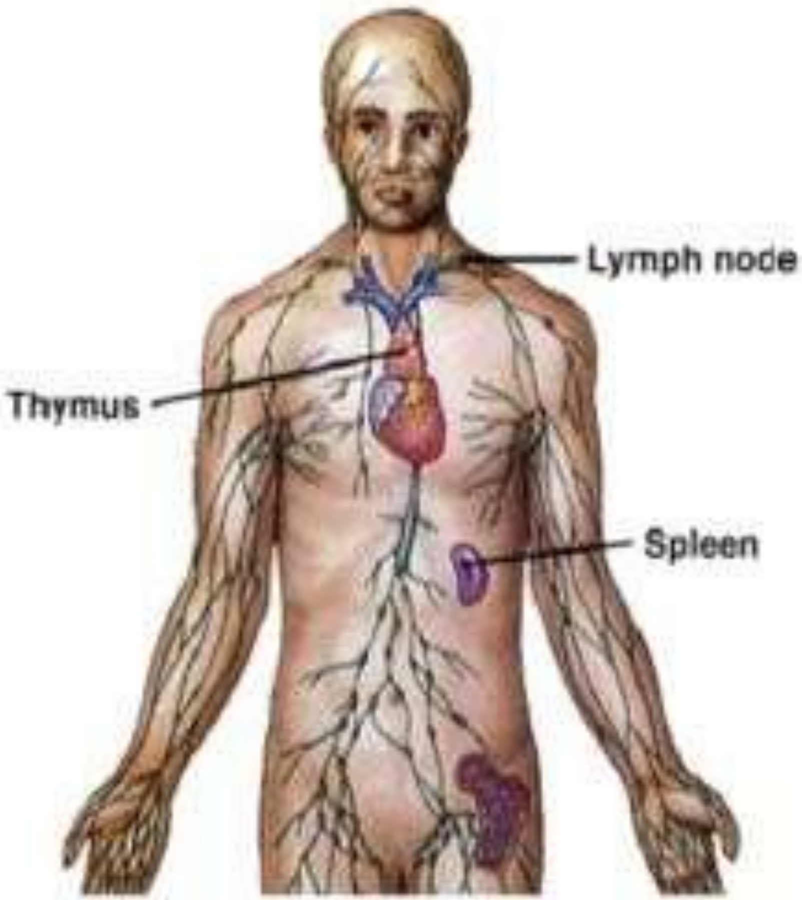
Aneurysm





An **aneurysm** is an abnormal bulge or ballooning in the wall of a blood vessel,

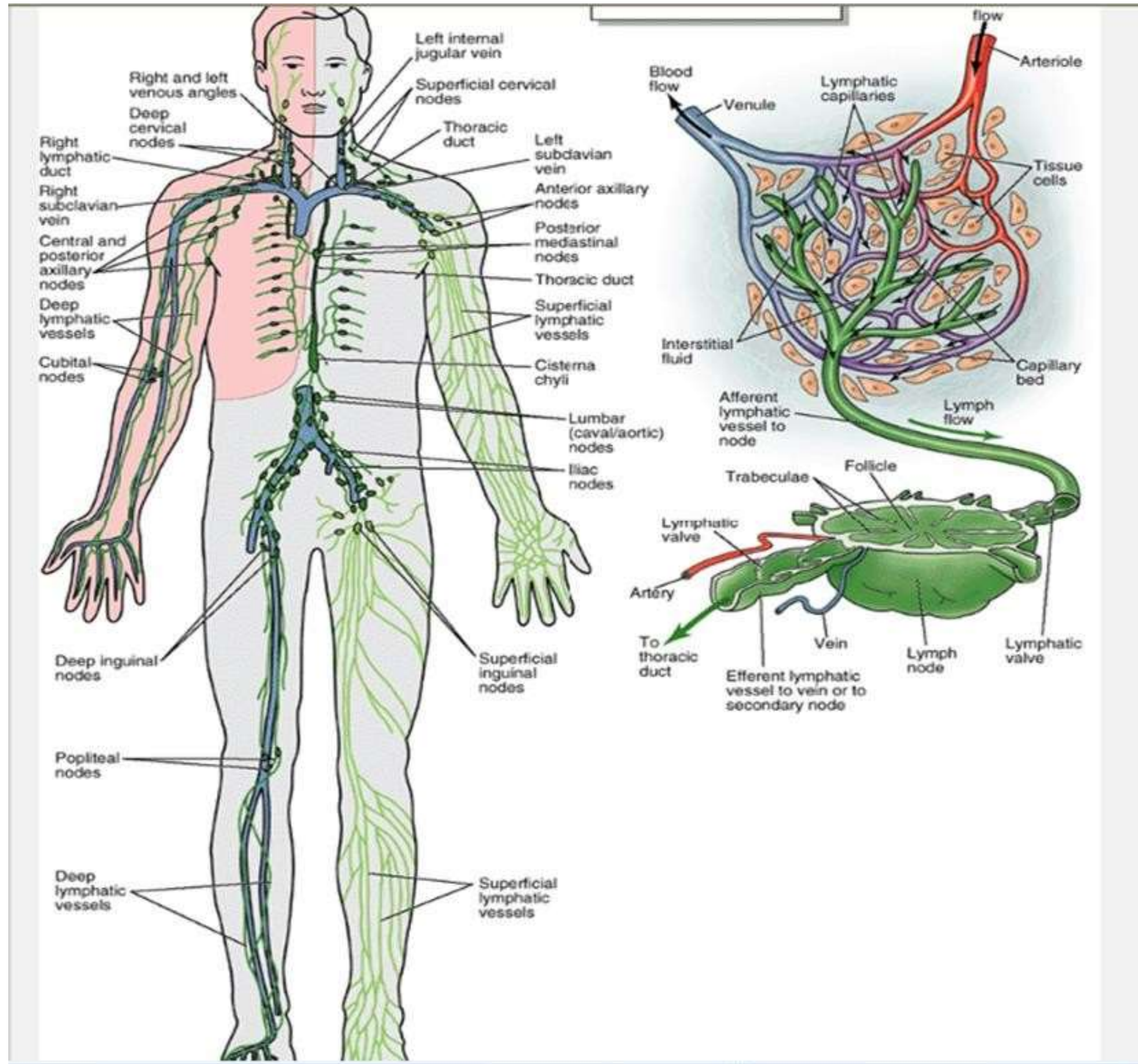
Components of Lymphatic System



- Lymphatic fluid
- Lymphatic vessels
- Lymphocytes
- Lymphoid tissues, organs

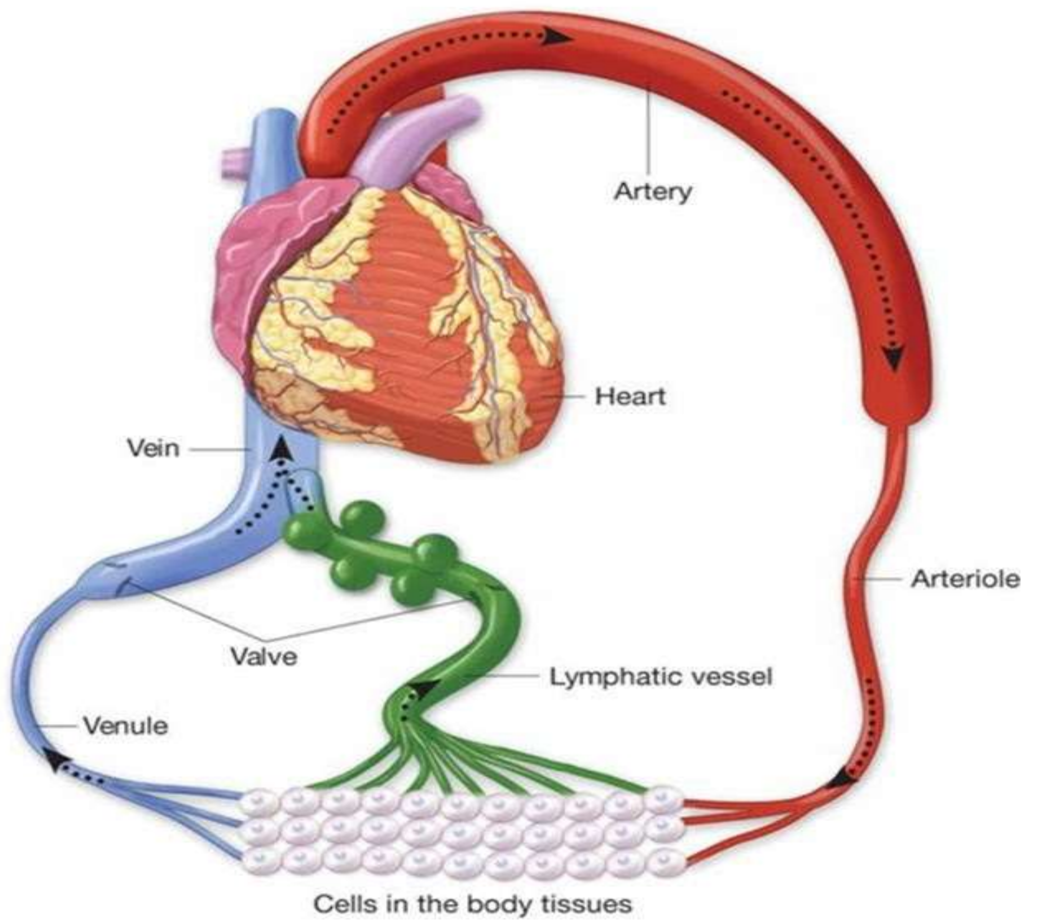
Lymphatic system (structure and function)

- Lymphatic tissue: defend the body against microbes
- Lymph vessels: drain lymph from body tissues to venous blood



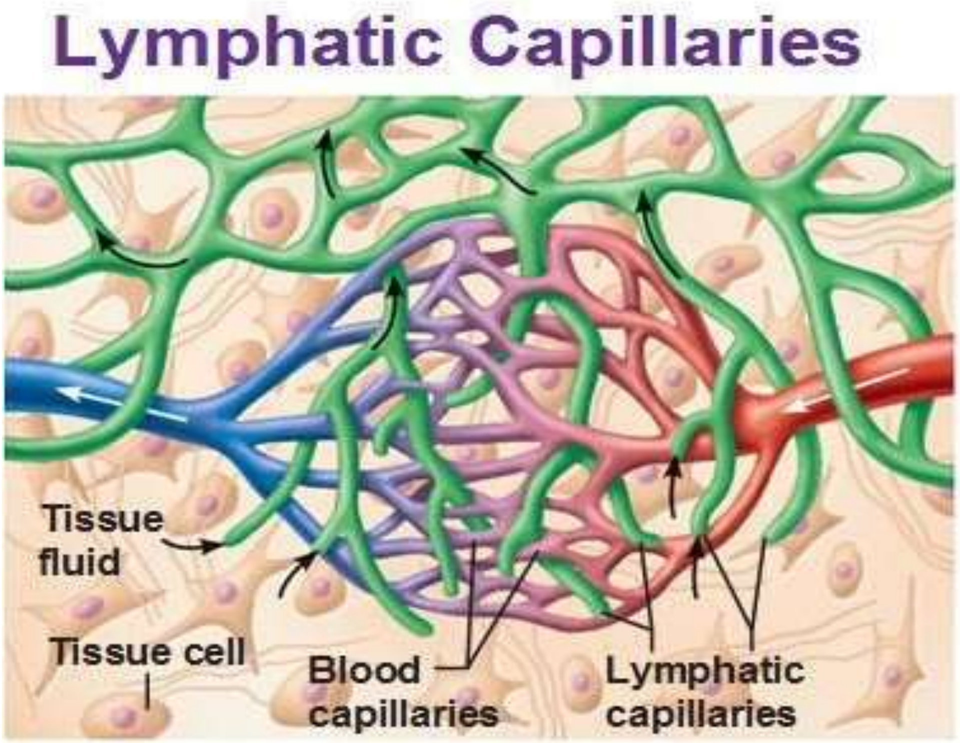
Lymphatic vessels

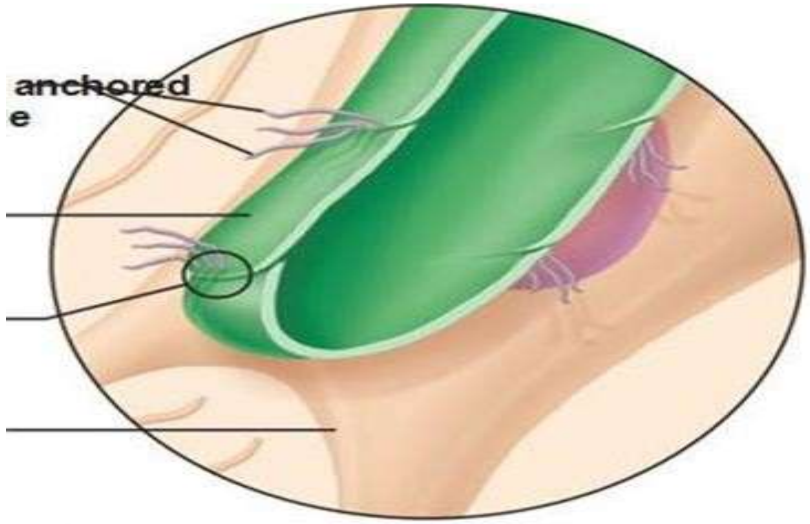
- **Drain** tissue fluid back to venous blood
- **Not** present in cartilage, bone, CNS, etc
- More **valves** than veins (Beaded)
- They **follow** veins usua



Lymph capillaries

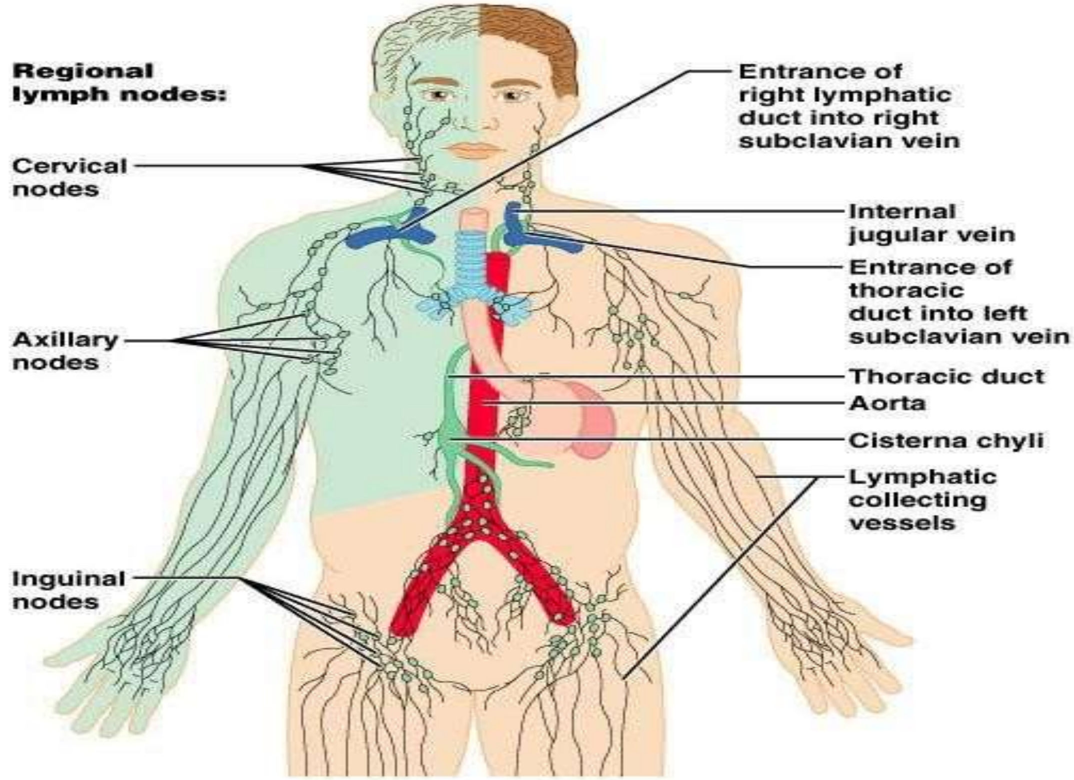
- blind-ended
- few valves
- complex networks
- larger diameters than blood capillaries





Thoracic duct and right lymphatic duct

- Drain at the junction of the internal jugular and subclavian veins
- Right lymphatic duct drain from ?
- Thoracic duct drain from ?



(a)

Lymphedema

- Accumulation of fluid in the tissues with subsequent swelling


Thank you