

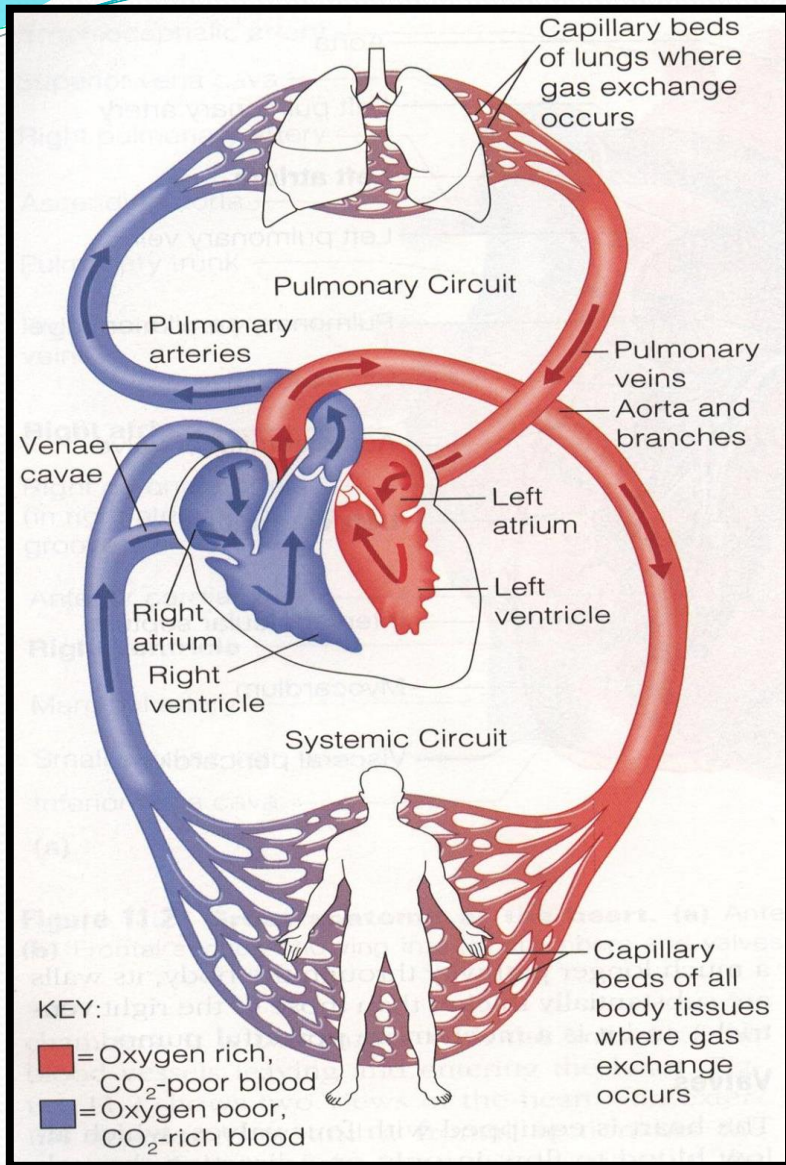
# ***CARDIOVASCULAR SYSTEM***

**DR JAMILA EL MEDANY**

# OBJECTIVES

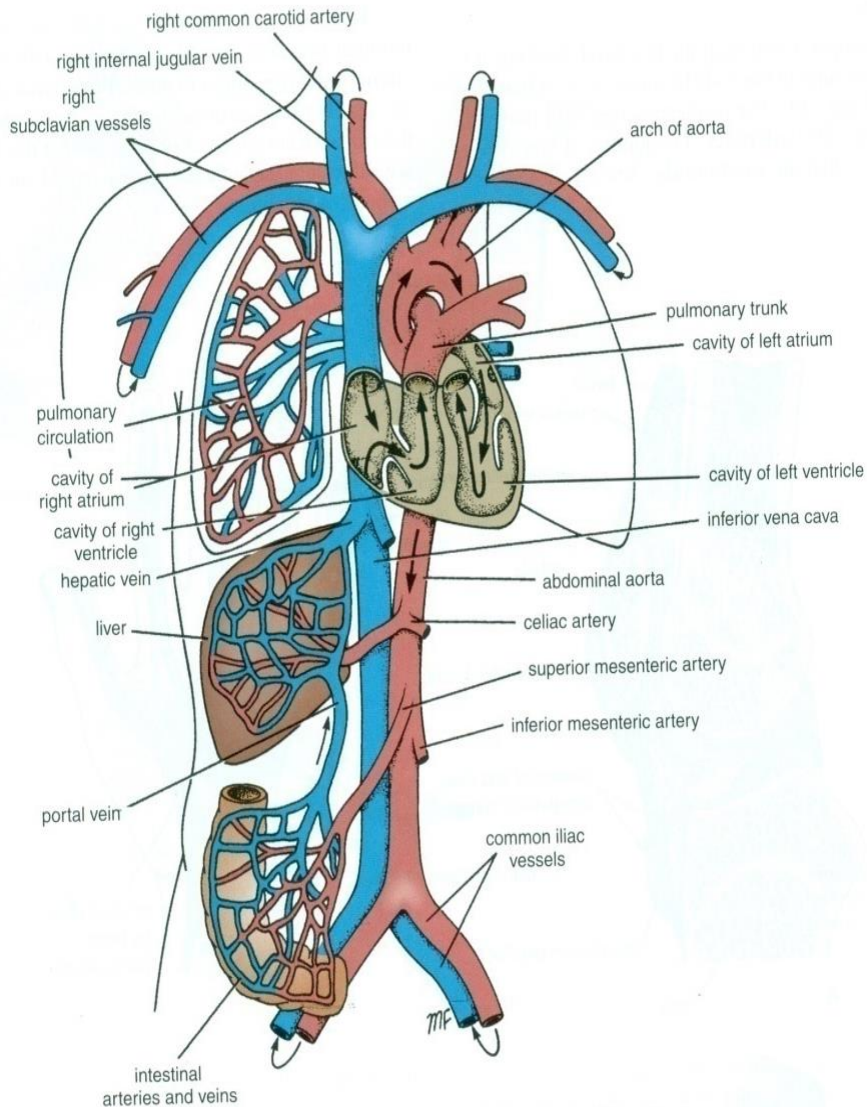
○ At the end of the lecture, students should be able to:

- *Identify the components of the cardiovascular system.*
- *Describe the Heart as regards (position, chambers and valves).*
- *Describe the Blood vessels (Arteries, Veins and Capillaries).*
- *Describe the Portal System.*
- *Describe the Sinusoids.*
- *Describe the Functional and Anatomical end arteries.*
- *Describe the Arteriovenous Anastomosis.*



- **CVS** is composed of :
- **Pump** : Heart.
- **Network of Tubes**: Blood Vessels.

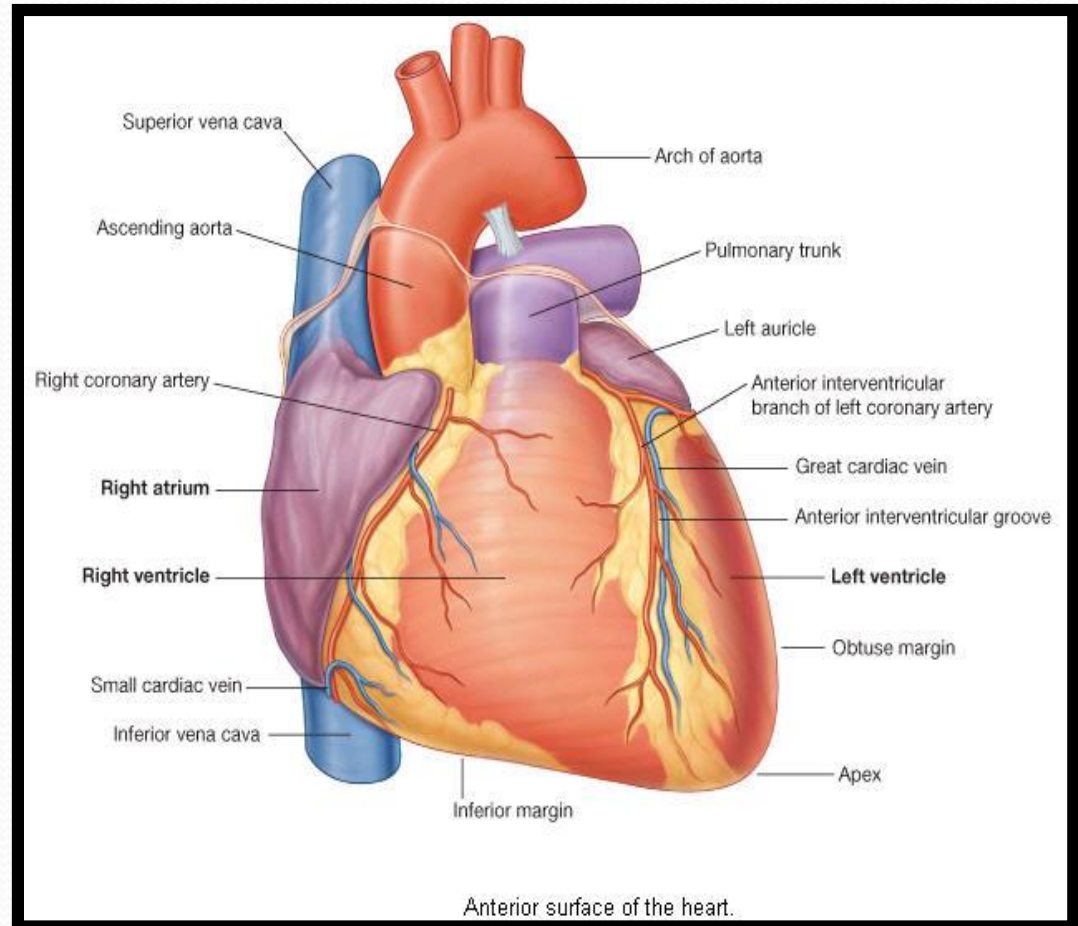
# ***FUNCTIONS OF CVS***

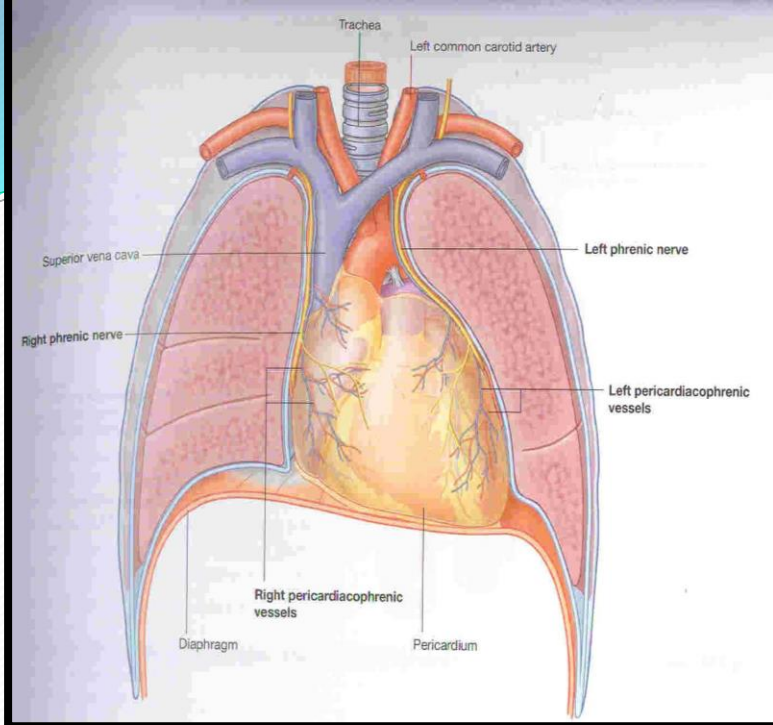


- *It is a transportation system which uses the blood as the transport vehicle.*
- *It carries oxygen, nutrients, cell wastes, hormones and many other substances vital for body homeostasis.*
- *The force to move the blood around the body is provided by the beating **Heart**.*

# HEART

- *Is a hollow, cone shaped muscular pump that keeps circulation going on.*
- *It is the size of hand's fist of the same person.*
- It has:
  - **Apex,**
  - **Base.**
  - **Two Surfaces:**  
Diaphragmatic & Sternocostal.
  - **Borders:** Right, Left, Inferior.



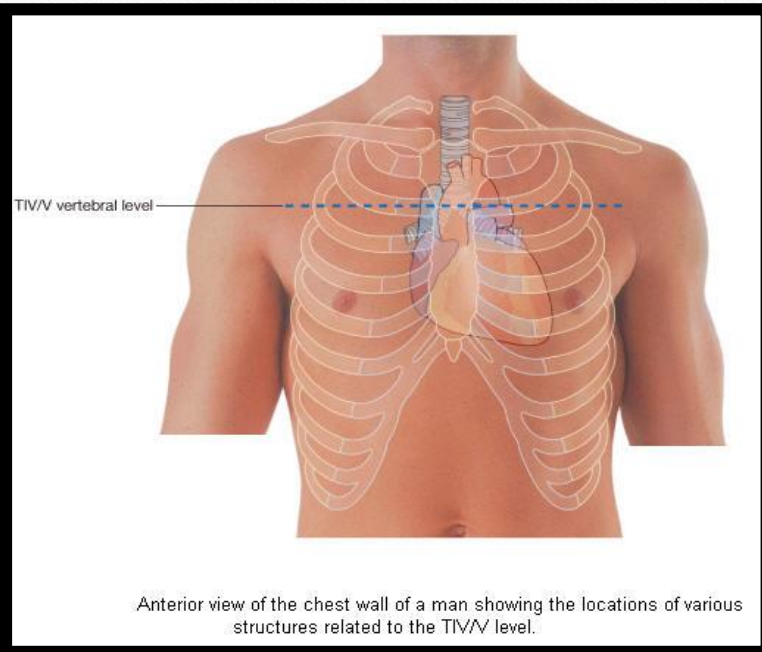


# ***LOCATION OF THE HEART***

It lies in a centrally located partition in the thoracic cavity known as the ***Middle Mediastinum*** between the two pleural sacs.

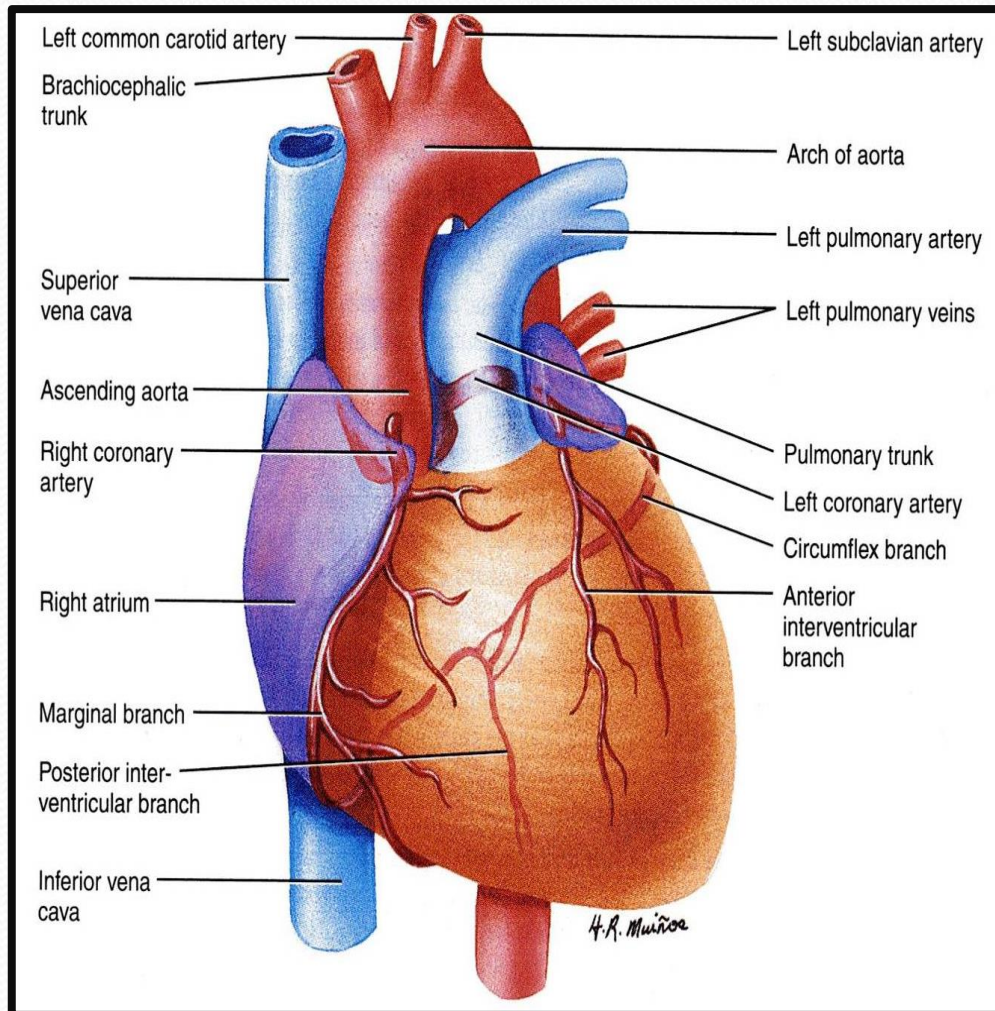
2/3 of the heart lies to the left of median plane.

Enclosed by a double sac of serous membrane (***Pericardium***).

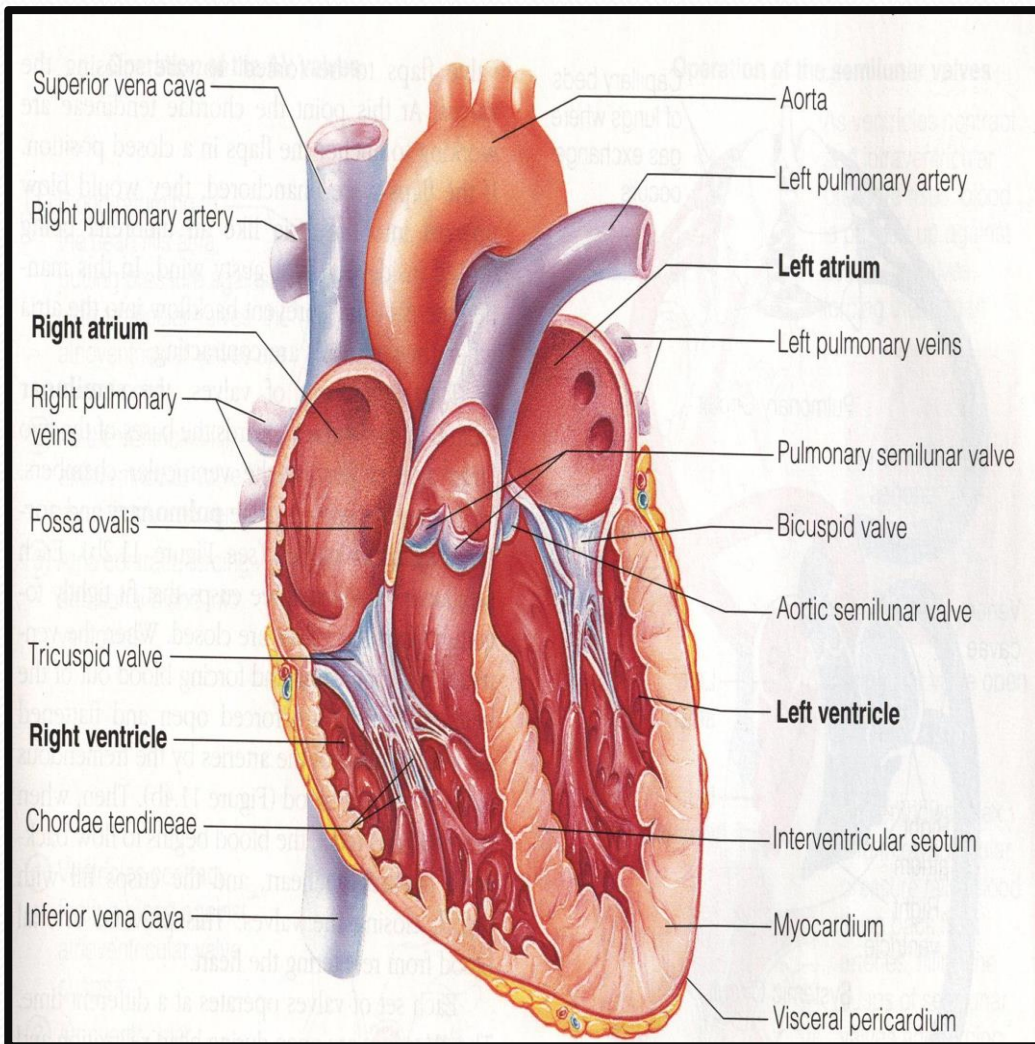


Anterior view of the chest wall of a man showing the locations of various structures related to the T4/V4 level.

# CHAMBERS OF THE HEART



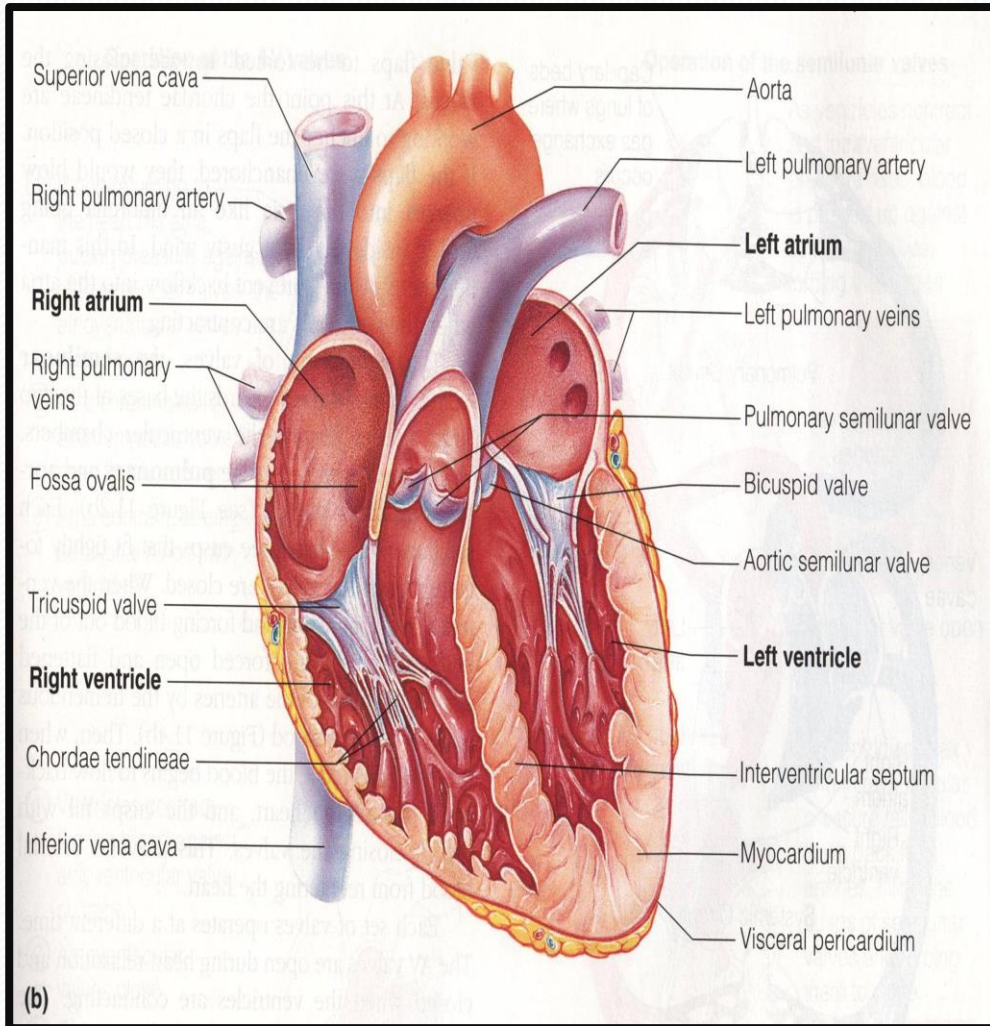
- **ATRIA** :
- **Two (Right & Left)**
- *Superior in position.*
- *They are the receiving chambers.*
- *They have thin walls.*
- *The upper part of each atrium is the **Auricle**.*
- *The **Right Atrium** is the first chamber that receives the venous blood entering to the heart.*
- ***Left Atrium** receives arterial blood coming from the lungs.*



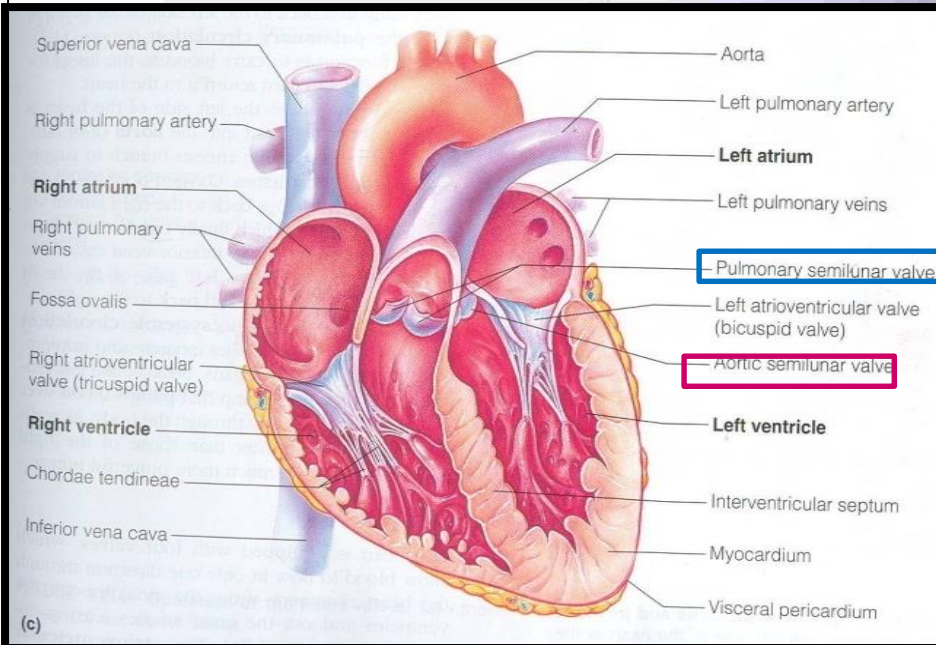
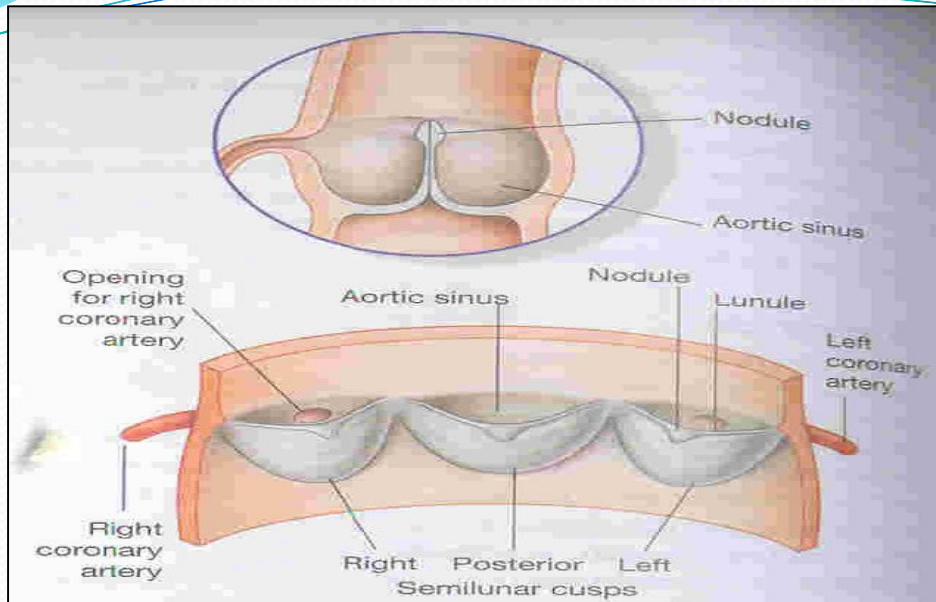
- **Ventricles** Inferior chambers.
- Have thick walls.
- They are the discharging chambers (actual pumps).
- Their contraction propels blood out of the heart into the circulation.
- **The left ventricle forms the apex of the heart.**



# VALVES OF THE HEART

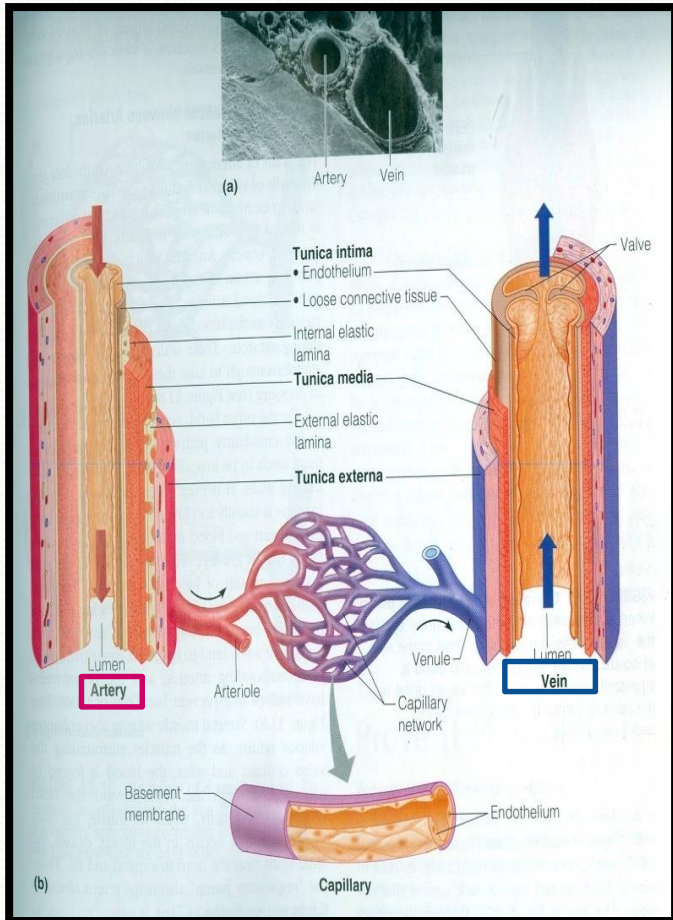


- The heart has **Four Valves**:
- **Two Atrioventricular:** between atria & ventricles.
- They allow the blood to flow in one direction from the atria to the ventricles.
- **Right AVV (Tricuspid)**
- **Left AVV: Bicuspid (Mitral)**



- **Two Semilunar (Pulmonary & Aortic) VAVES**
- Found between the right and left ventricles and the great arteries leaving the heart (**Aorta & Pulmonary trunk** respectively).
- They allow the flow of blood from the ventricles to these arteries.

# BLOOD VESSELS



## ARTERIES

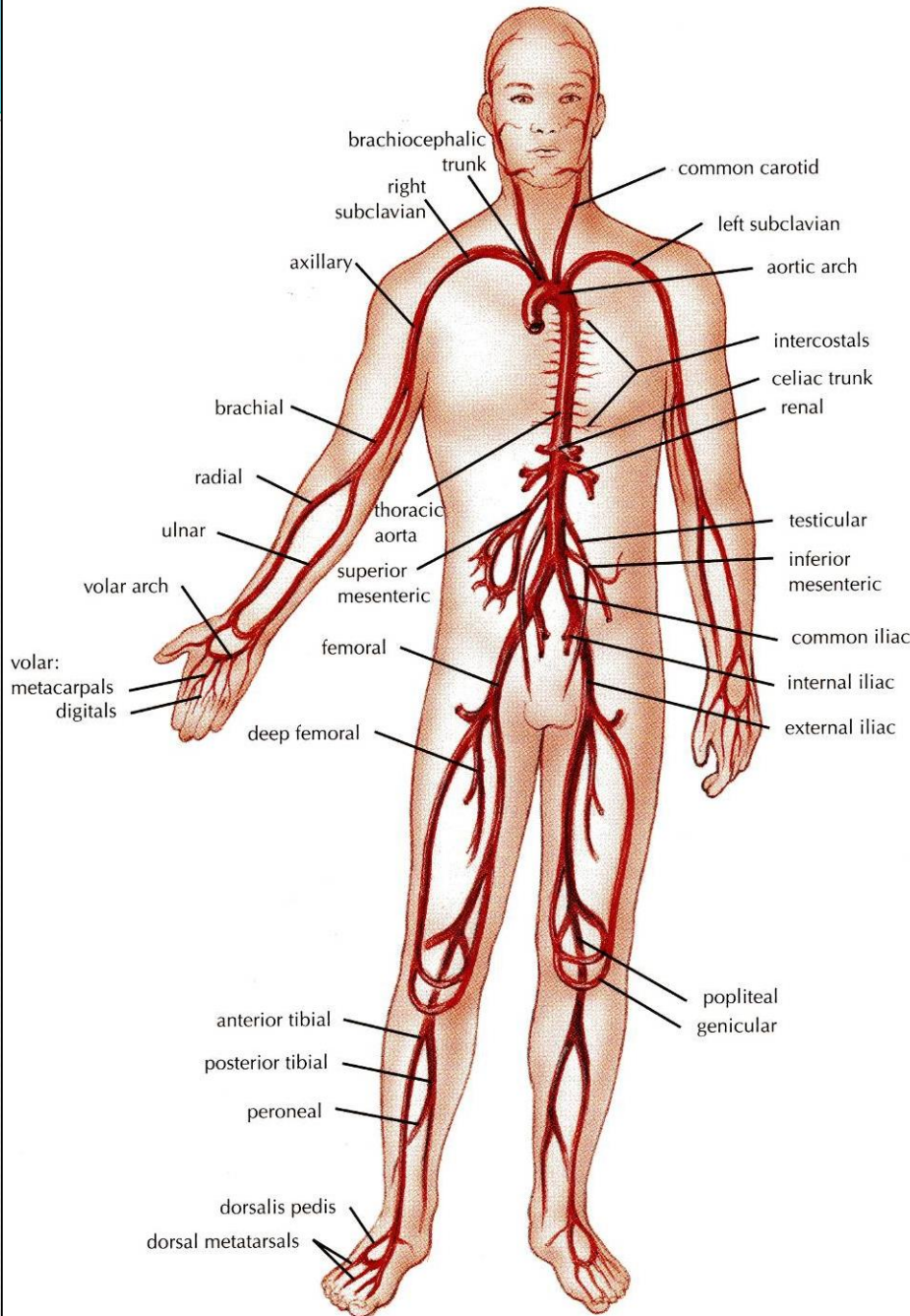
- **Thick walled, do not have valves.**
- **The smallest arteries are arterioles.**

## VEINS

- **Thin walled.**
- **Many of them possess valves.**
- **The smallest veins are venules.**

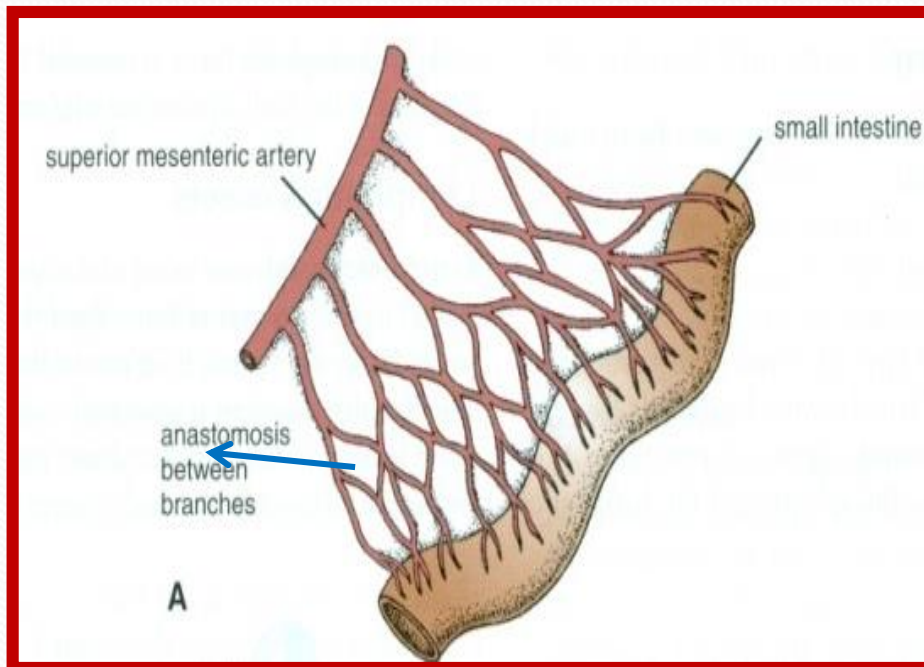
**CAPILLARIES.**

# ARTERIES



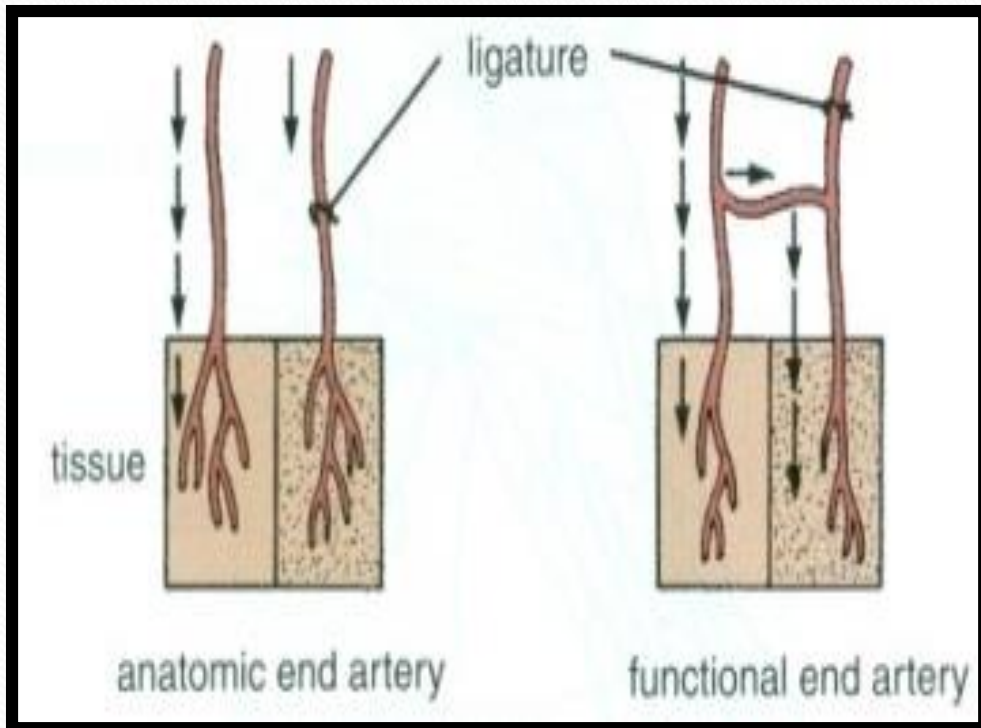
- *They transport blood from the **heart** and distribute it to the various tissues of the body through their branches.*

# ARTERIAL ANASTOMOSIS



- It is the joining of terminal branches of the arteries.
- (**Intestinal arteries**)

# END ARTERIES



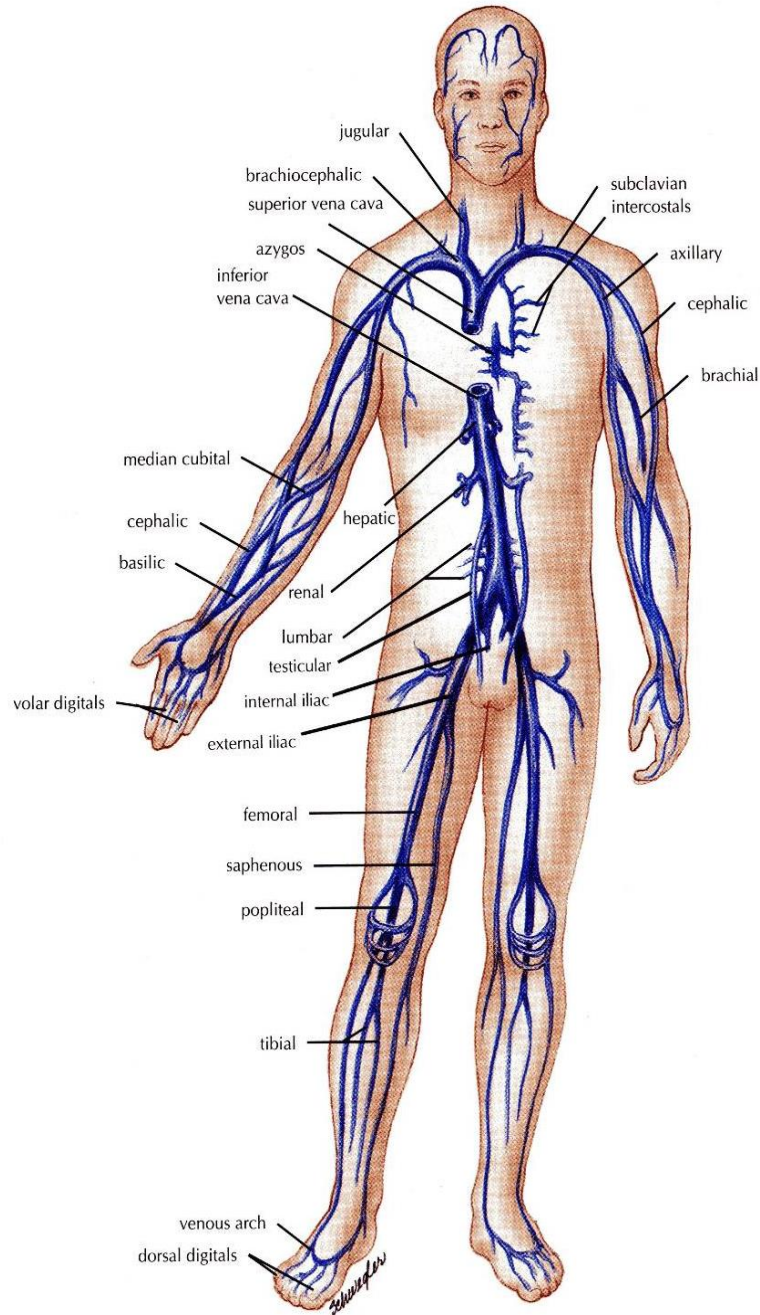
## Anatomic End arteries:

- ⦿ Vessels whose terminal branches **do not anastomose** with branches of arteries supplying adjacent areas (**Central artery of Retina**).

## Functional End arteries:

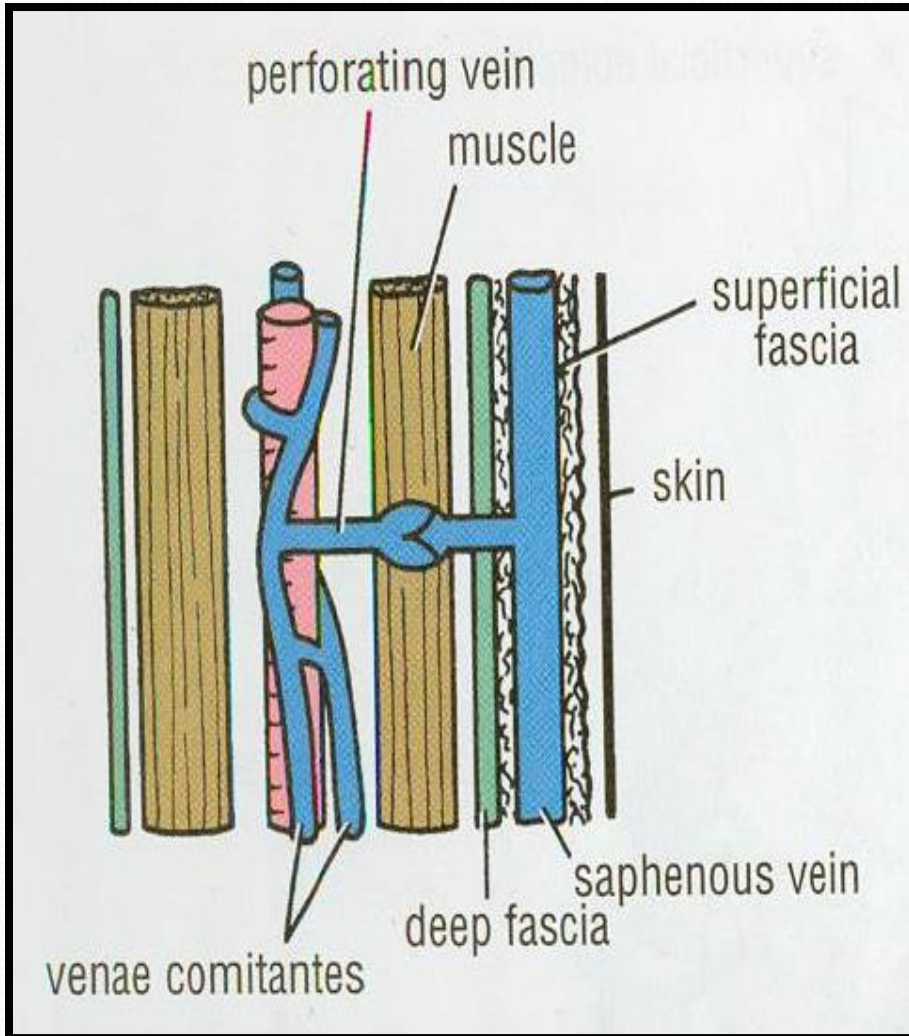
- ⦿ The terminal branches do anastomose with those of adjacent arteries but the **anastomosis is insufficient** to keep the tissue alive if one of the arteries is occluded.

# VEINS



- They transport blood back to the heart.
- The smaller venules (**Tributries**) unite to form larger veins which commonly join with one another to form Venous Plexuses.

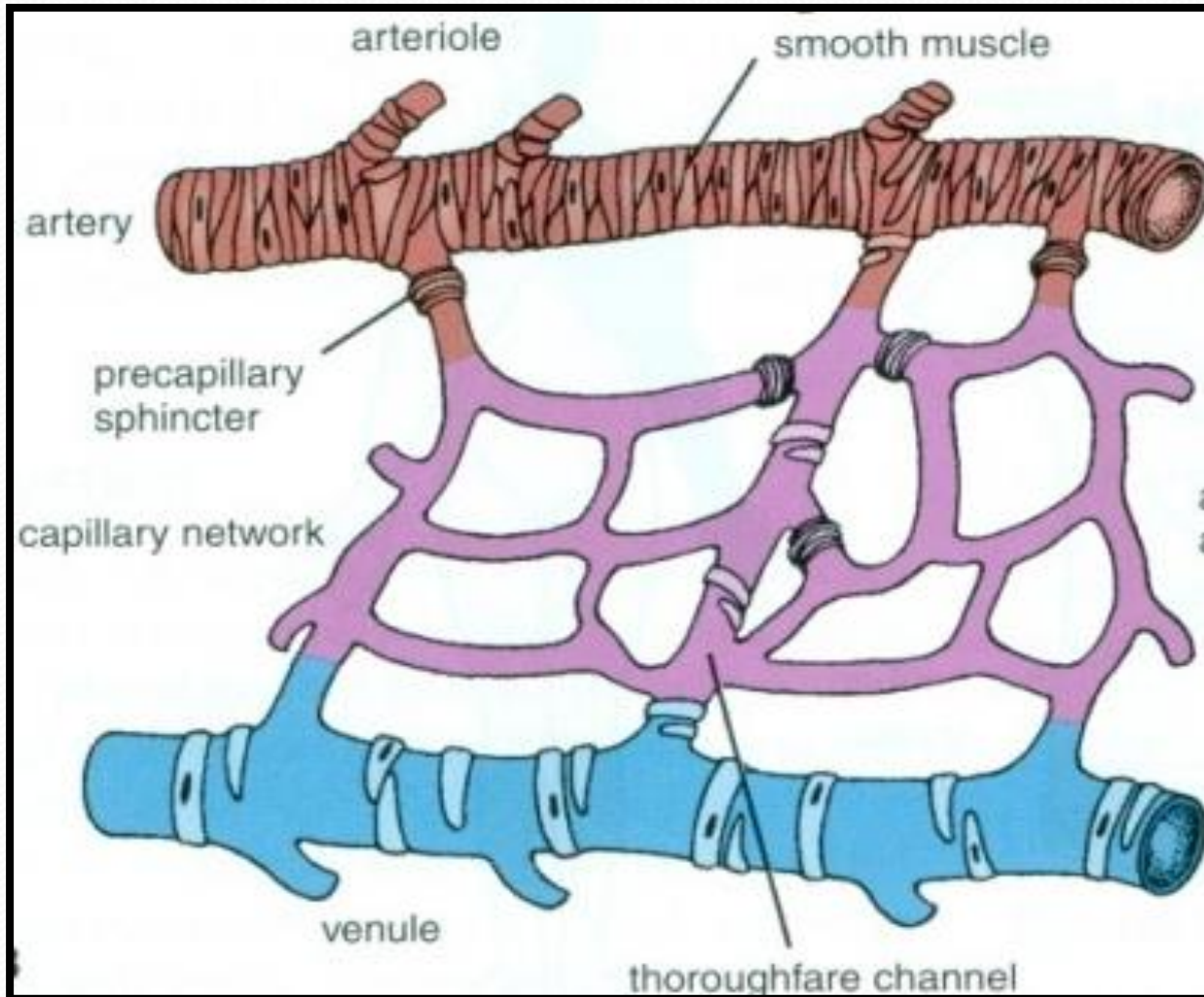
# **DEEP VEINS (VENAE COMITANTES)**



- *They are two veins that accompany medium sized deep arteries*

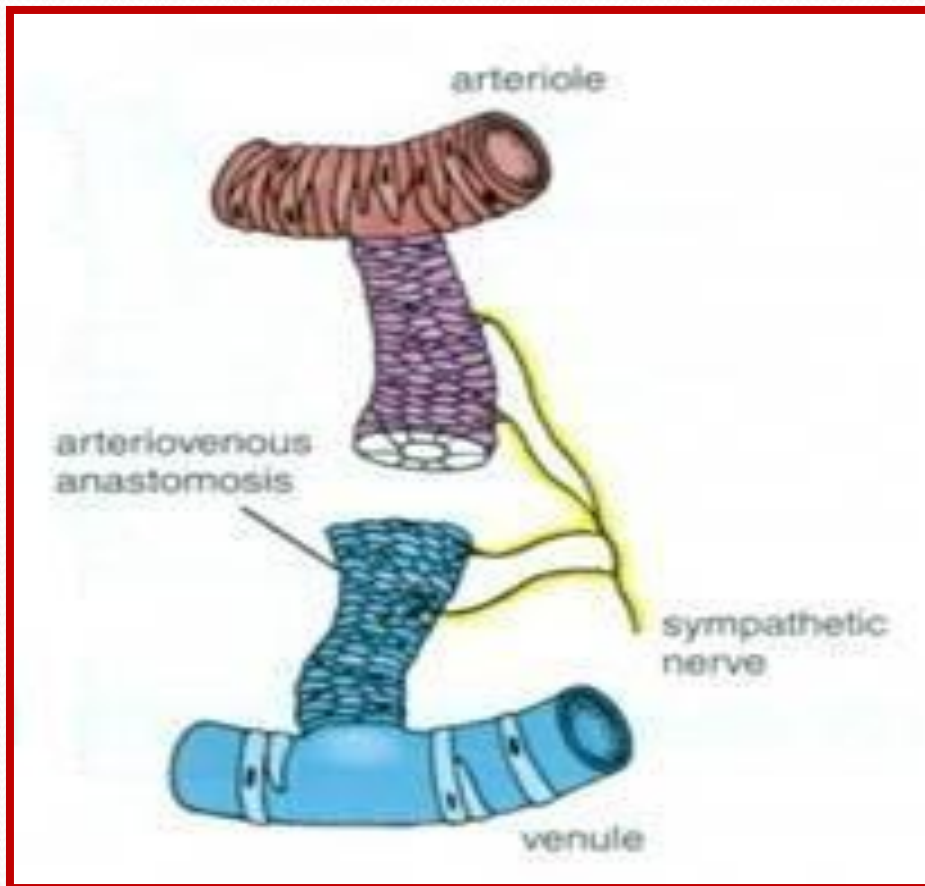


# CAPILLARIES



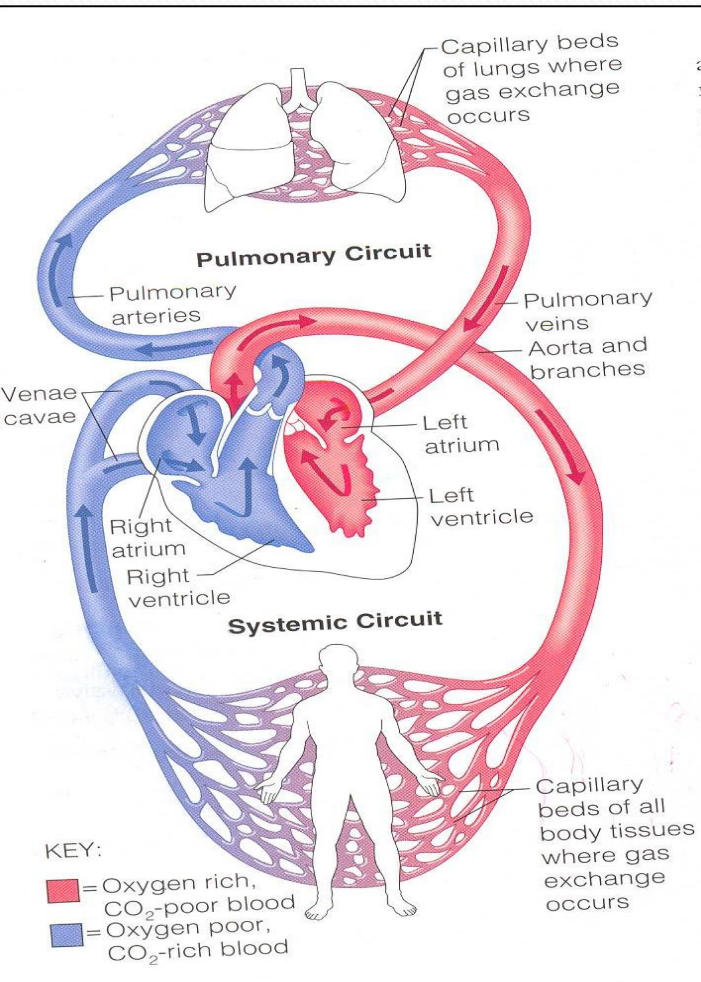
- Microscopic vessels in the form of a network.
- They **connect the Arterioles to the Venules.**

# ***ARTERIOVENOUS ANASTOMOSIS***

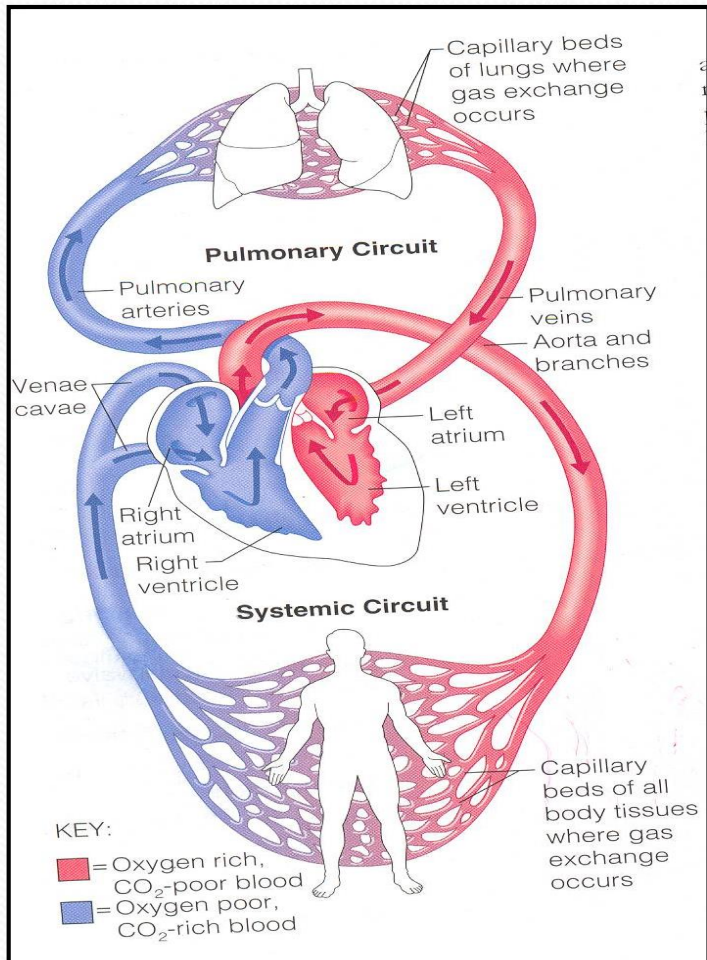


- *Direct connections between the arteries and veins **without the intervention of capillaries.***
- **Found in:**
- ***Tips of the Fingers and Toes.***

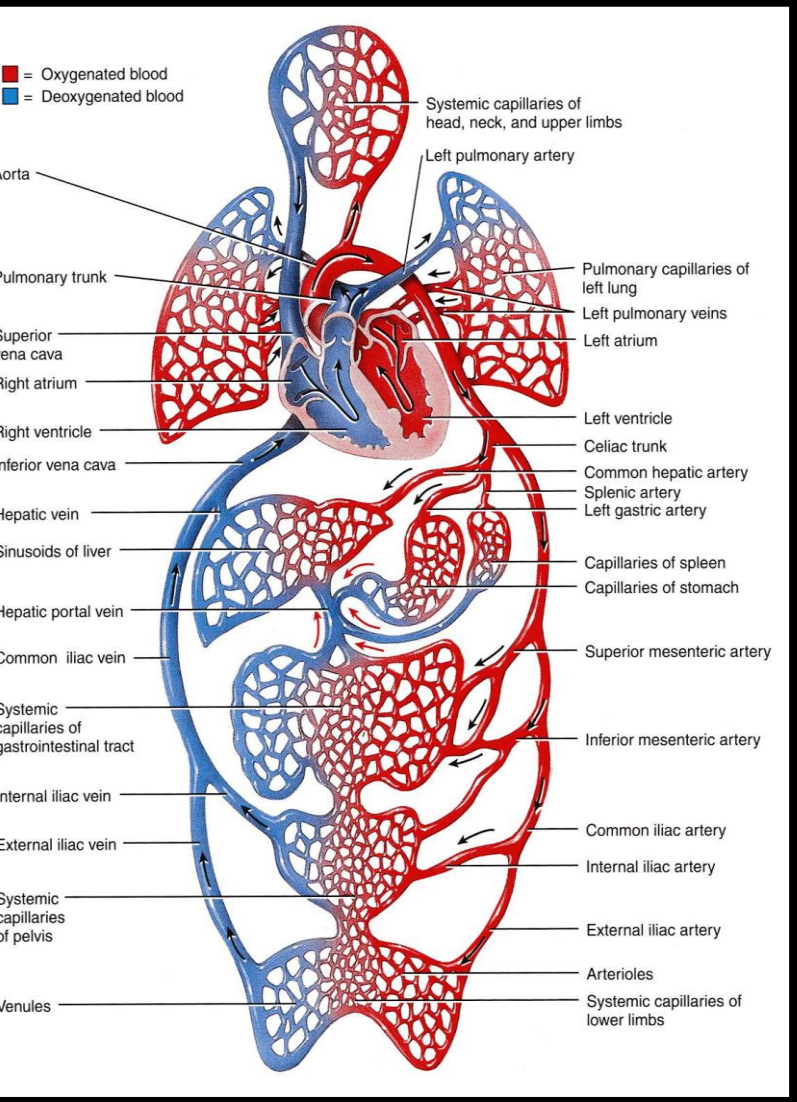
# BLOOD CIRCULATIONS



- **CARDIOPULMONARY:**
- **Takes place between the heart and lungs.**
- **The Right side of the heart (Right atrium & ventricle) receive oxygen poor blood**
- **This blood is pumped from the heart through the Pulmonary Trunk to the lungs.**
- **Gas exchange takes place in the lungs.**
- **It returned to the left side of the heart (left atrium & ventricle) through 4 Pulmonary Veins**
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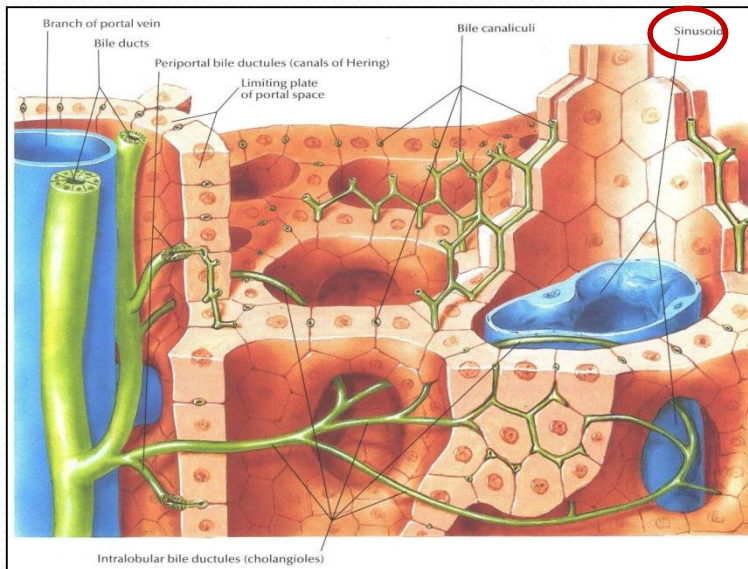
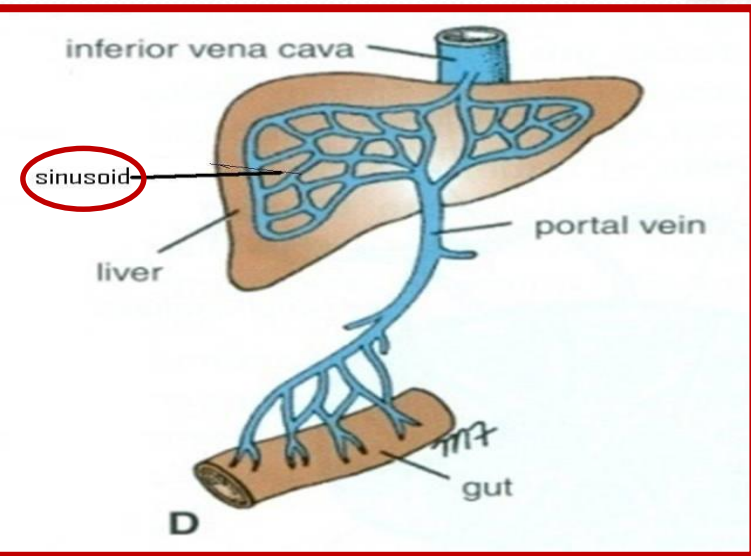
- **SYSTEMIC:**
- Takes place between the heart and each cell of the body.
- Blood is pumped from the left ventricle to all body tissues through the **Aorta and its systemic arteries** which ultimately terminates in **capillaries**.
- Oxygen poor blood circulates from the tissues to the **capillaries, venules & veins** back to the right atrium through the **Systemic Veins**.



# **PORTAL CIRCULATION**

- *It is a system of vessels interposed between **Two Capillary Beds**.*
- *It takes place in the **liver** and some endocrine glands (**Pituitary gland**).*
- *Veins leaving the gastrointestinal tract do not go direct to the heart.*
- *They pass to the **Portal Vein**.*
- *This vein enters the liver and breaks up into veins of diminishing size which ultimately join capillary like vessels (**Sinusoids**):first capillary bed.*
- **Venous blood enter 2<sup>nd</sup> capillary bed** then to smaller veins that leave the liver through hepatic veins.

# SINUSOIDS



- Thin walled blood vessels like capillaries.
- They are wider with irregular cross diameter.
- **They are found in:**
- **Liver.**
- **Spleen.**
- **Bone marrow.**
- **Pituitary gland.**

# SUMMARY

- ① *The cardiovascular system is a transporting system.*
- ① *It is composed of the heart and blood vessels.*
- ① *The heart is cone shaped, covered by pericardium and composed of four chambers.*
- ① *The blood vessels are the arteries, veins and capillaries.*
- ① *Arteries transport the blood from the heart.*
- ① *The terminal branches of the arteries can anastomose with each other freely or be anatomic or functional end arteries.*
- ① *Veins transport blood back to the heart.*
- ① *Capillaries connect the arteries to the veins.*
- ① *Sinusoids are special type of capillaries.*
- ① *The portal system is composed of two sets of capillaries.*
- ① *It is found in the liver & pituitary gland*



**THANK YOU**