

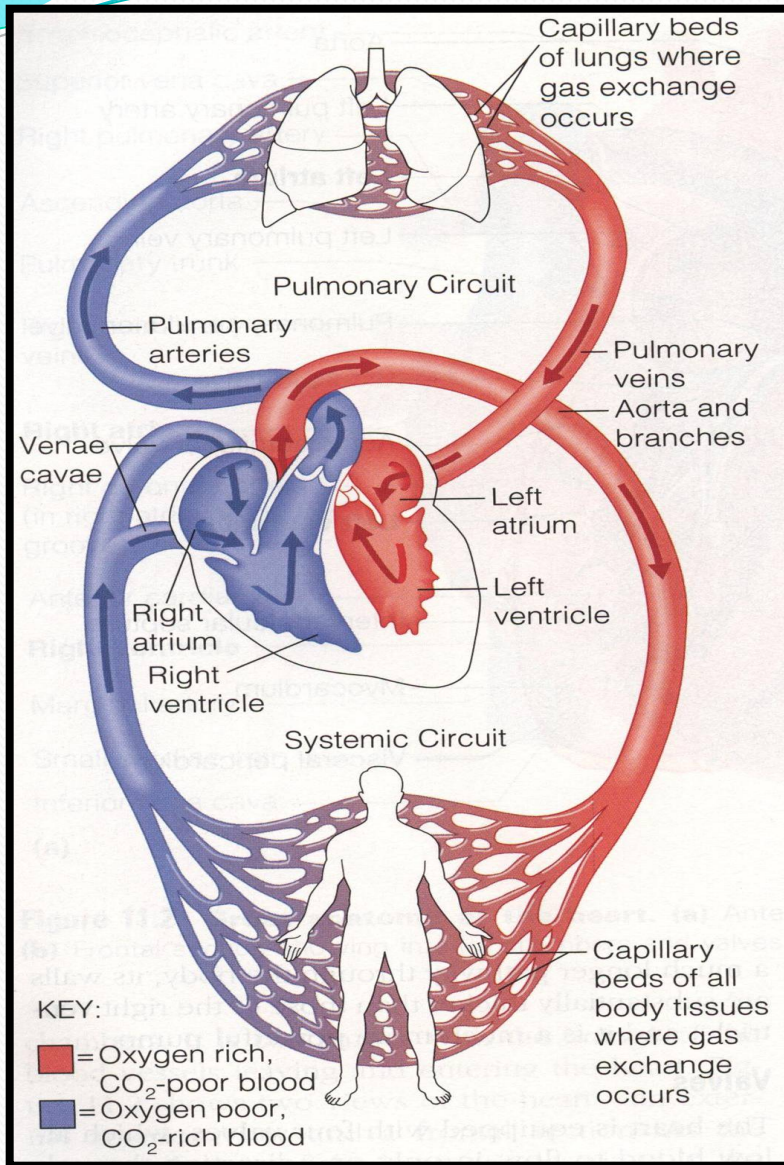
# **CARDIOVASCULAR SYSTEM**

**Dr JAMILA EL MEDANY**

# Objectives

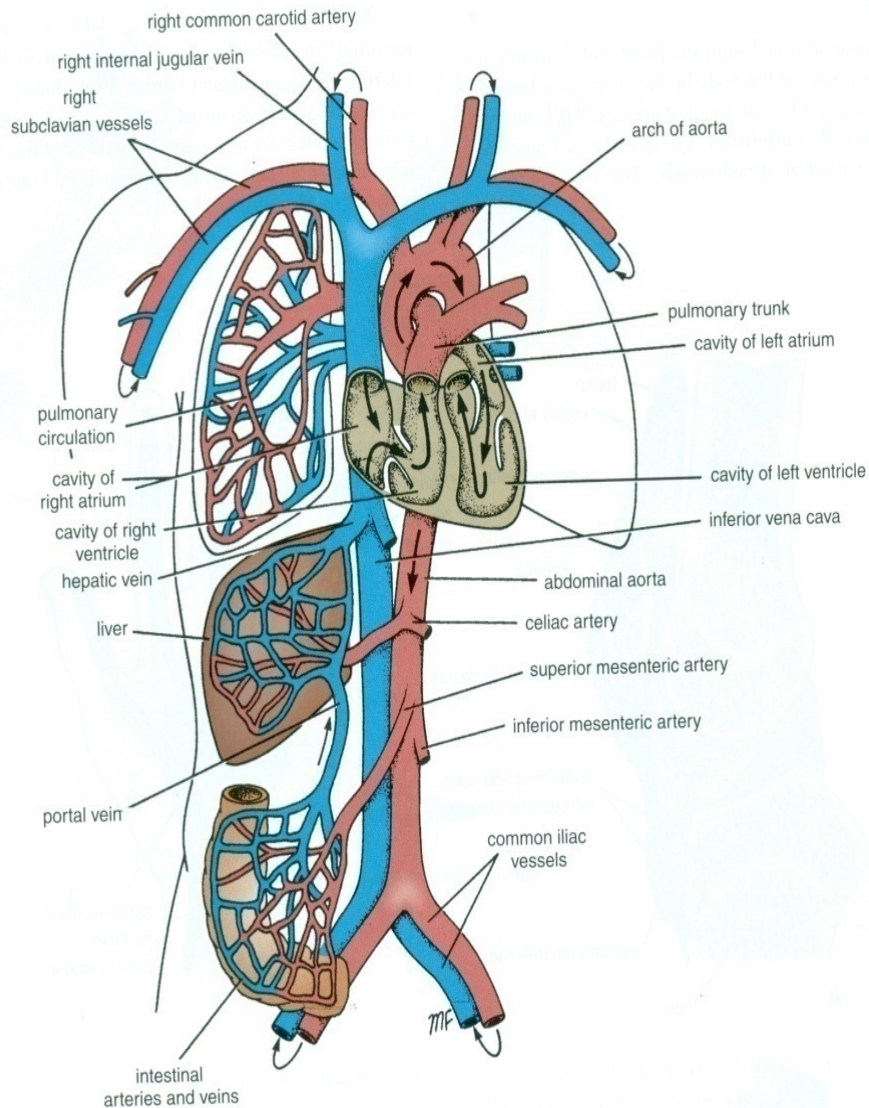
○ **At the end of the lecture, students should be able to:**

- *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.

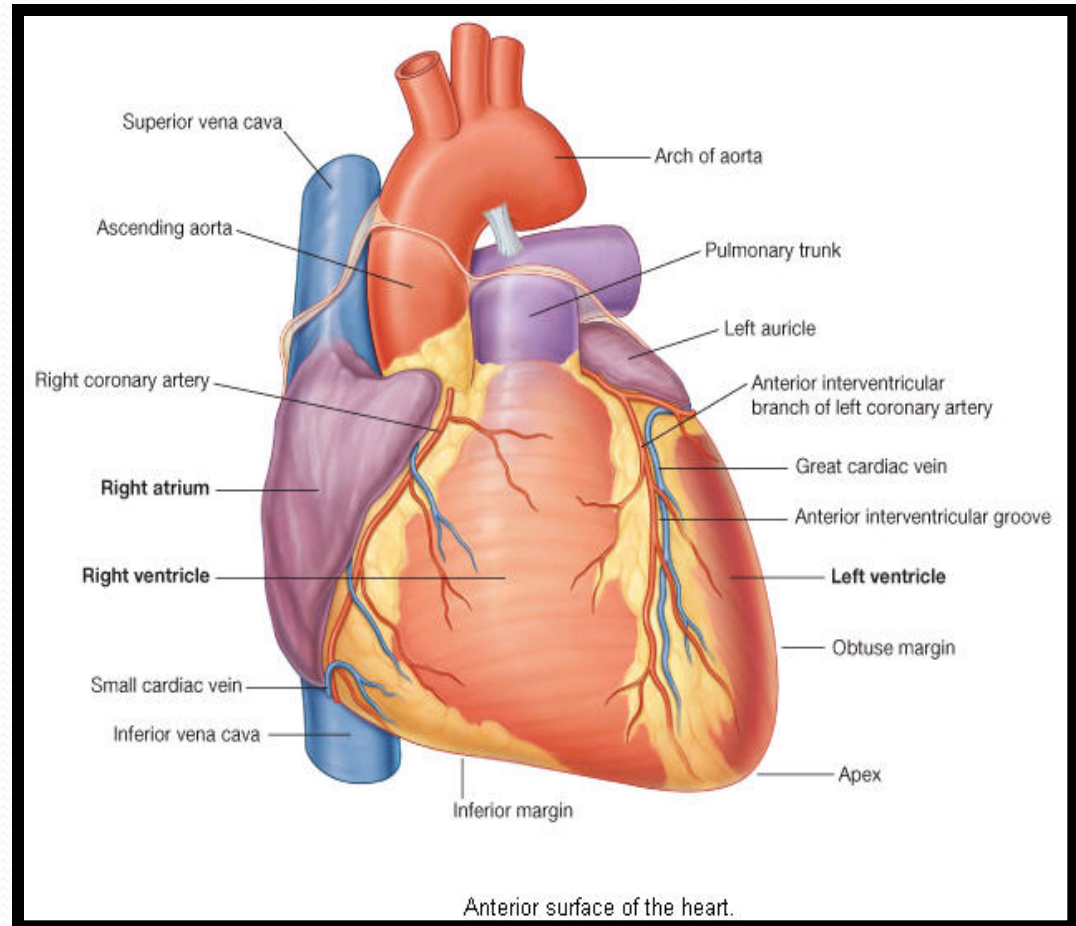
# ***FUNCTIONS of CVS***

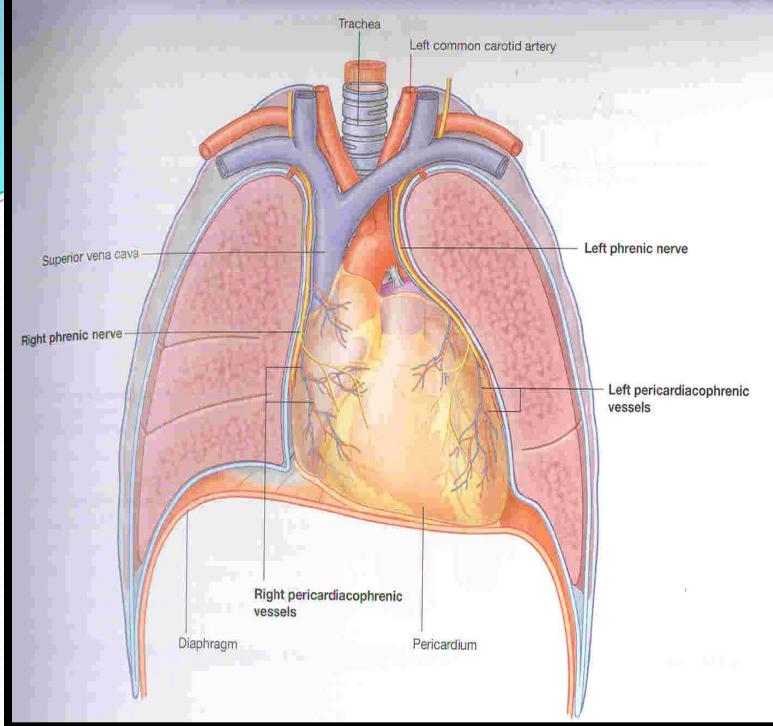


- *It is a transportation system which uses the blood as the transport vehicle.*
- *It carries oxygen, nutrients, cell wastes, hormones and many other substances vital for body homeostasis.*
- *The force to move the blood around the body is provided by the beating **Heart**.*

# 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.



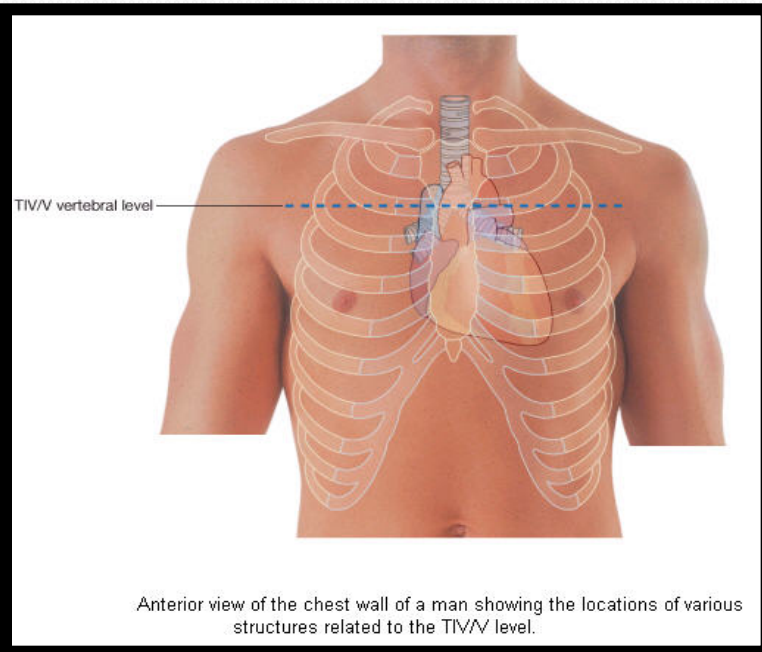


# Location of the Heart

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

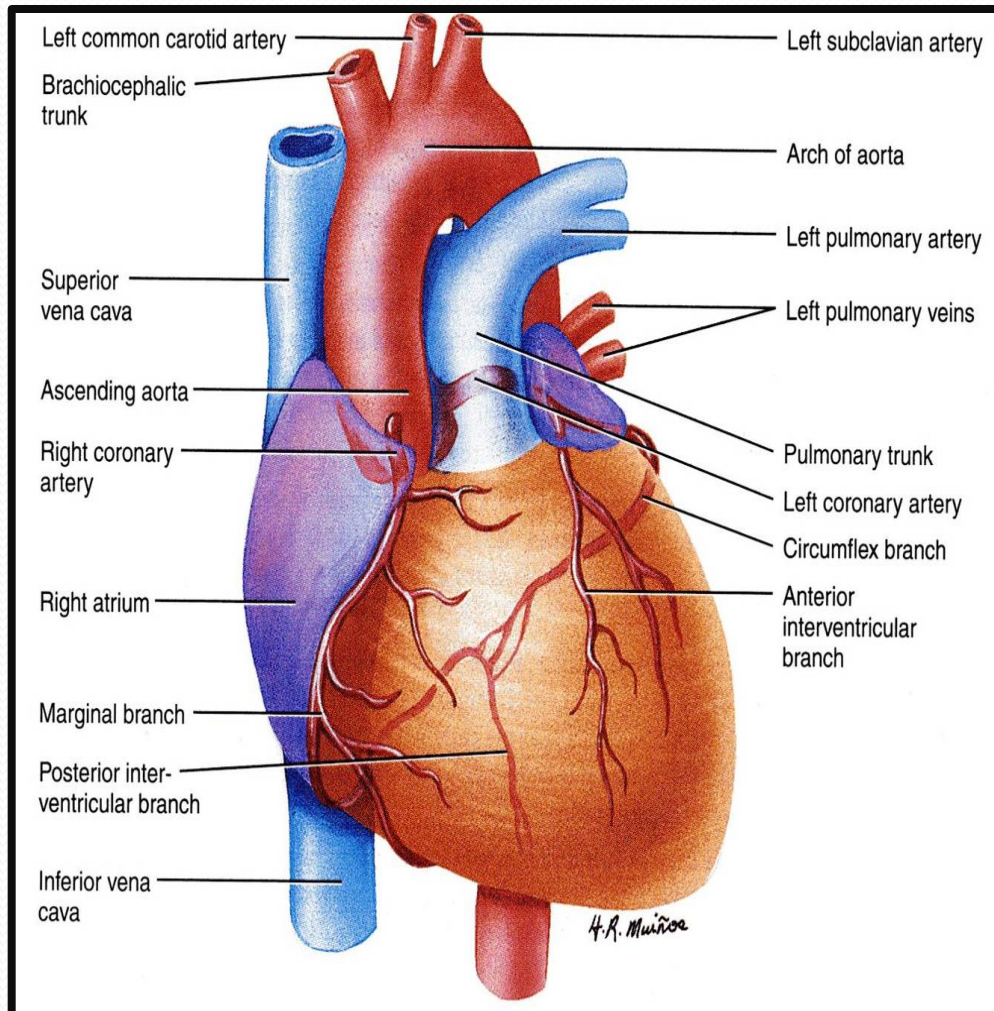
$\frac{2}{3}$  of the heart lies to the left of median plane.

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

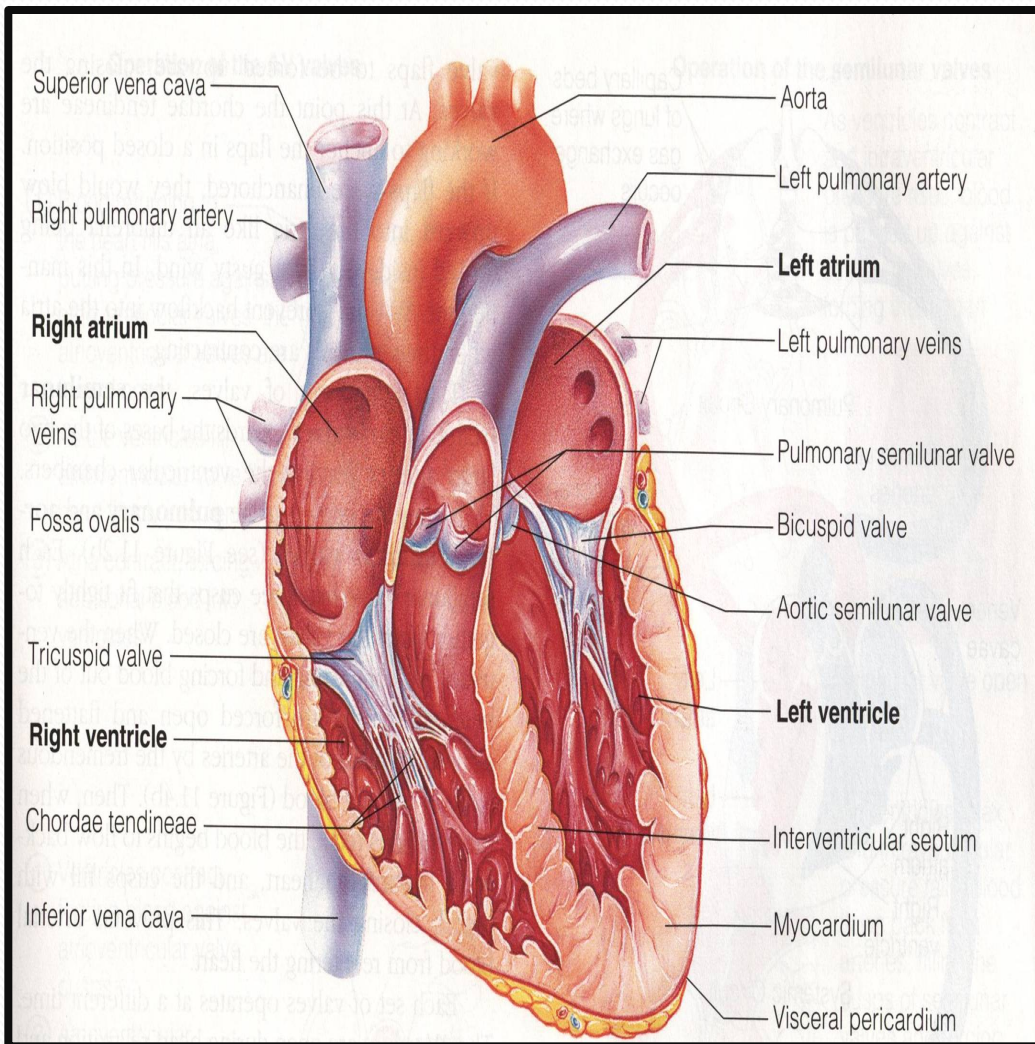


Anterior view of the chest wall of a man showing the locations of various structures related to the T4/V4 level.

# Chambers of the Heart



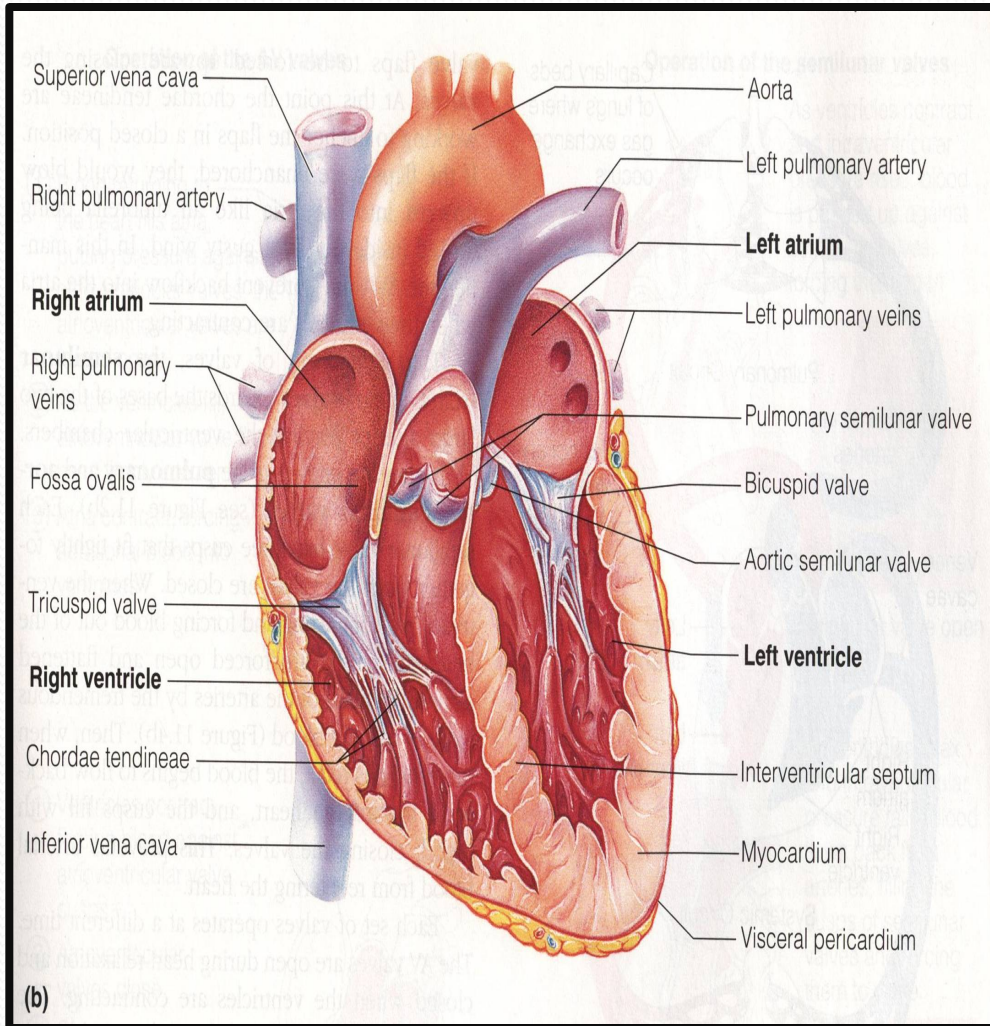
- **ATRIA** :
- **Two (Right & Left)**
- *Superior in position.*
- *They are the receiving chambers.*
- *They have thin walls.*
- *The upper part of each atrium is the **Auricle**.*
- **The Right Atrium is the first chamber that receives the venous blood entering to the heart.**
- **Left Atrium** receives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



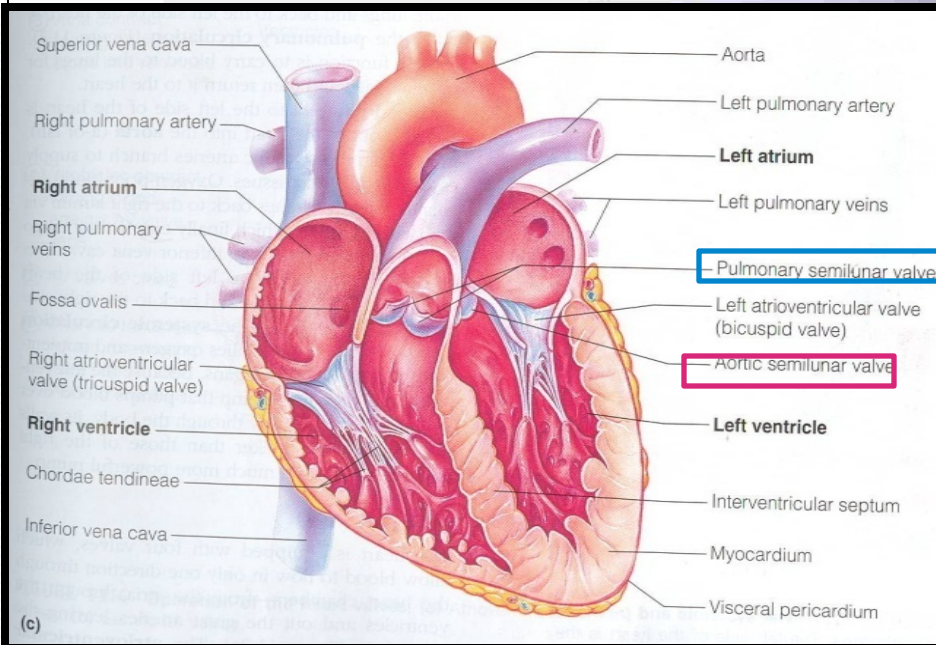
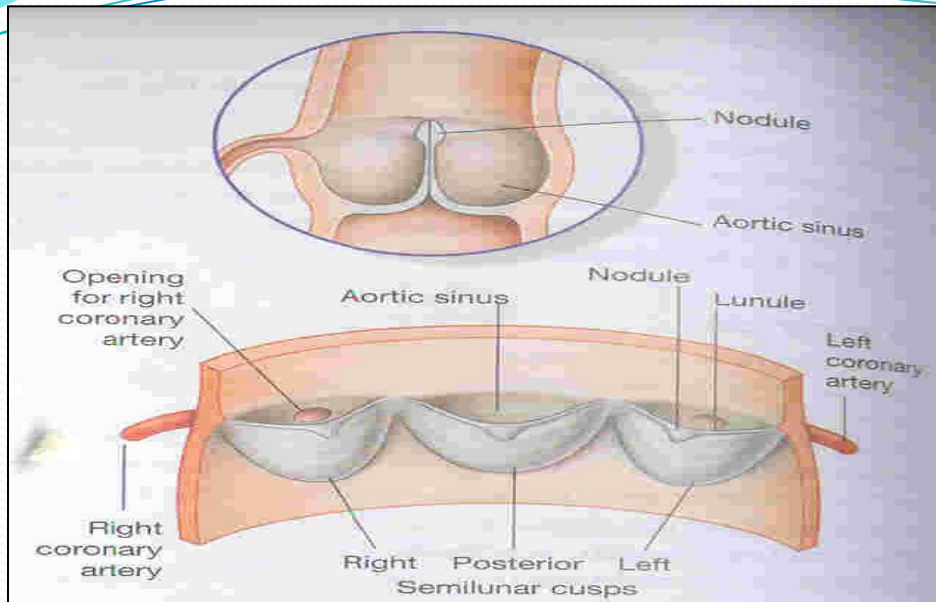
- **Ventricles** Inferior chambers.
- Have thick walls.
- They are the discharging chambers (actual pumps).
- Their contraction propels blood out of the heart into the circulation.
- **The left ventricle forms the apex of the heart.**



# VALVES OF THE HEART

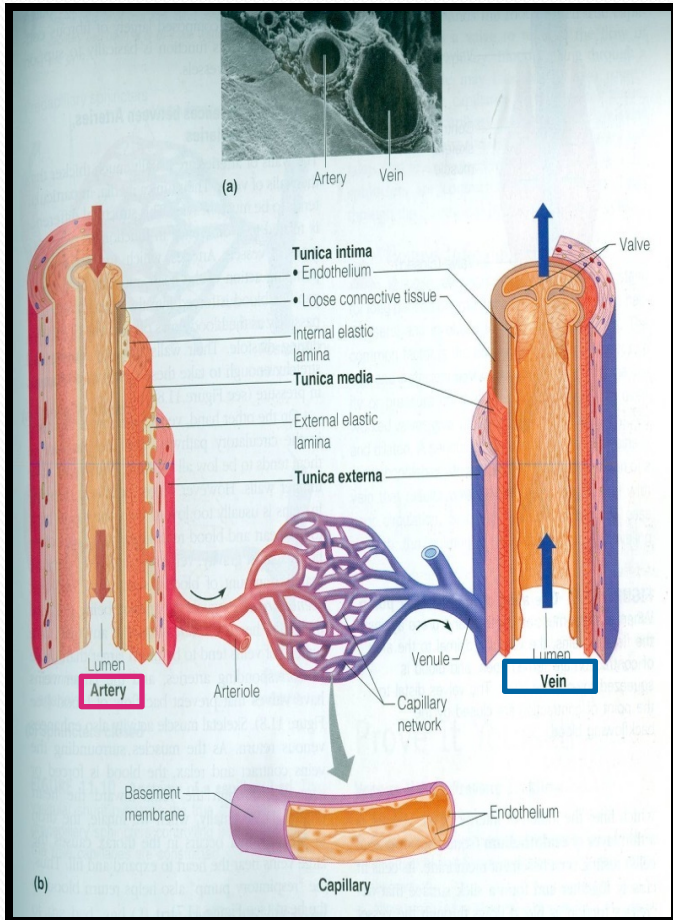


- The heart has **Four Valves**:
- **Two Atrioventricular:** *between atria & ventricles.*
- *They allow the blood to flow in one direction from the atria to the ventricles.*
- **Right AVV (Tricuspid)**
- **Left AVV: Bicuspid (Mitral)**



- **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.**

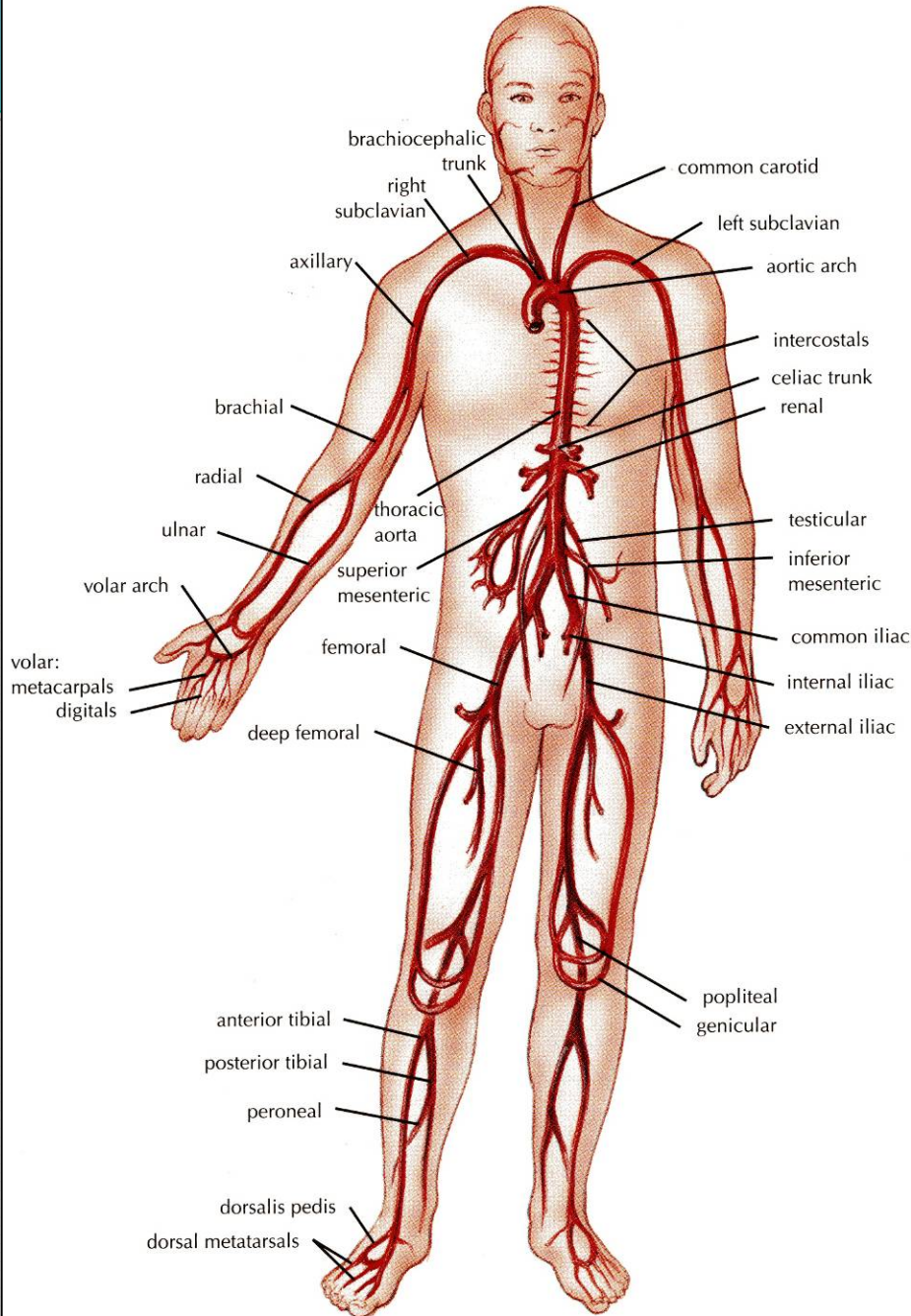
## Veins

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

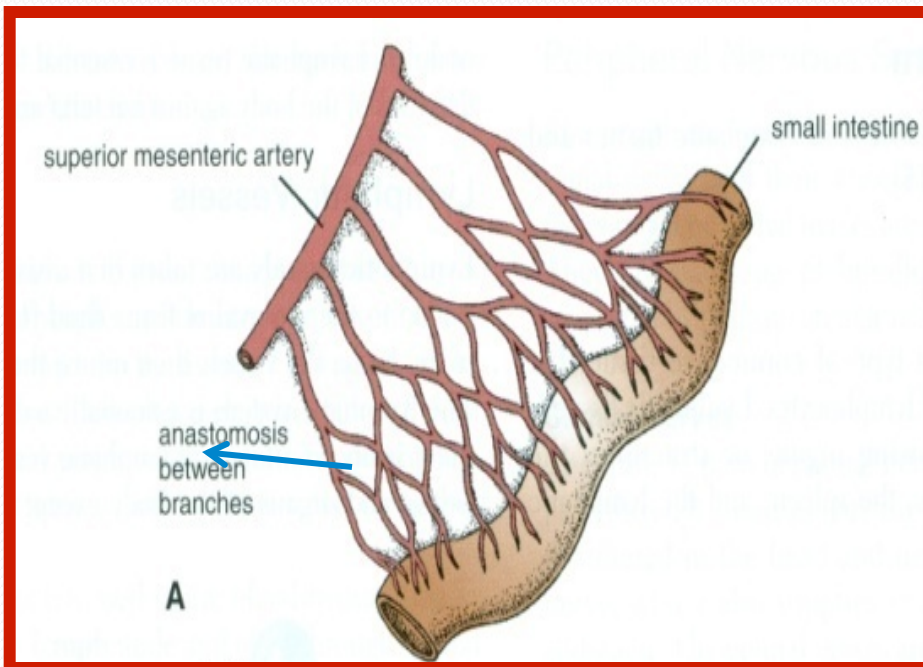
**Capillaries.**

# ARTERIES

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

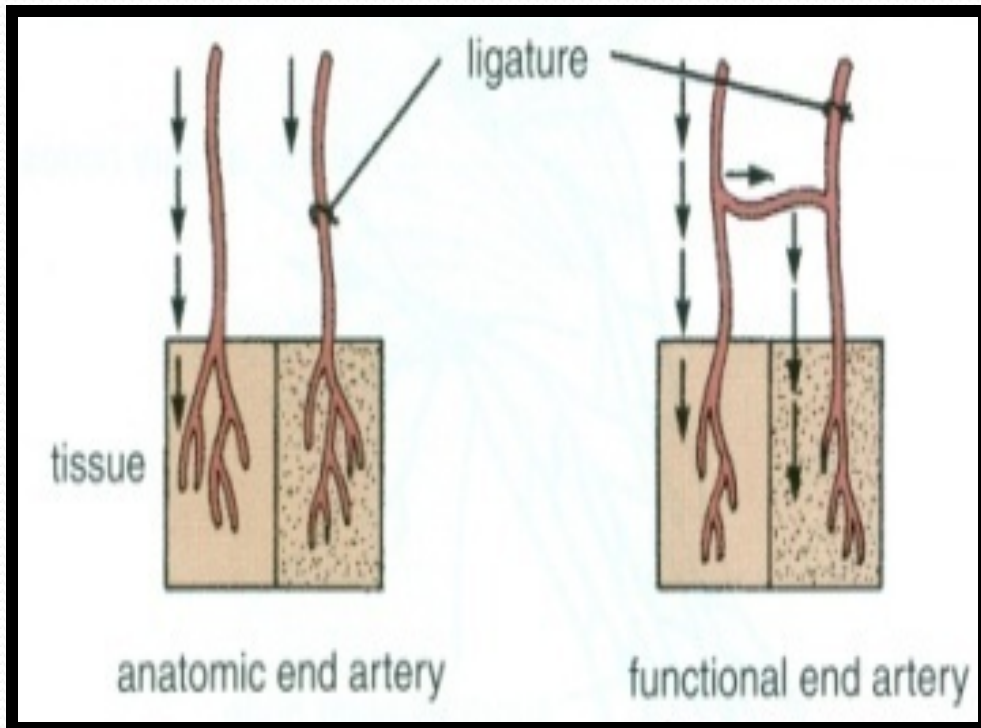


# ARTERIAL ANASTOMOSIS



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

# END ARTERIES



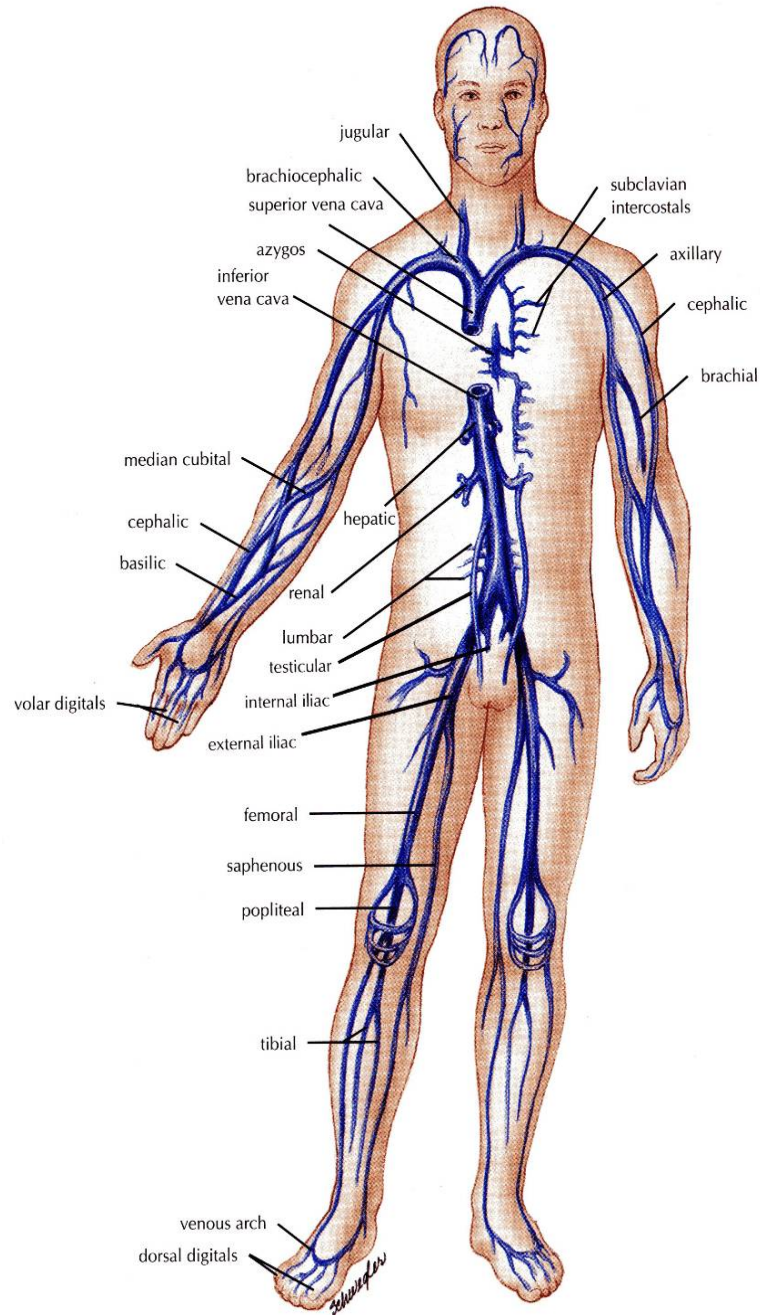
## Anatomic End arteries:

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

## Functional End arteries:

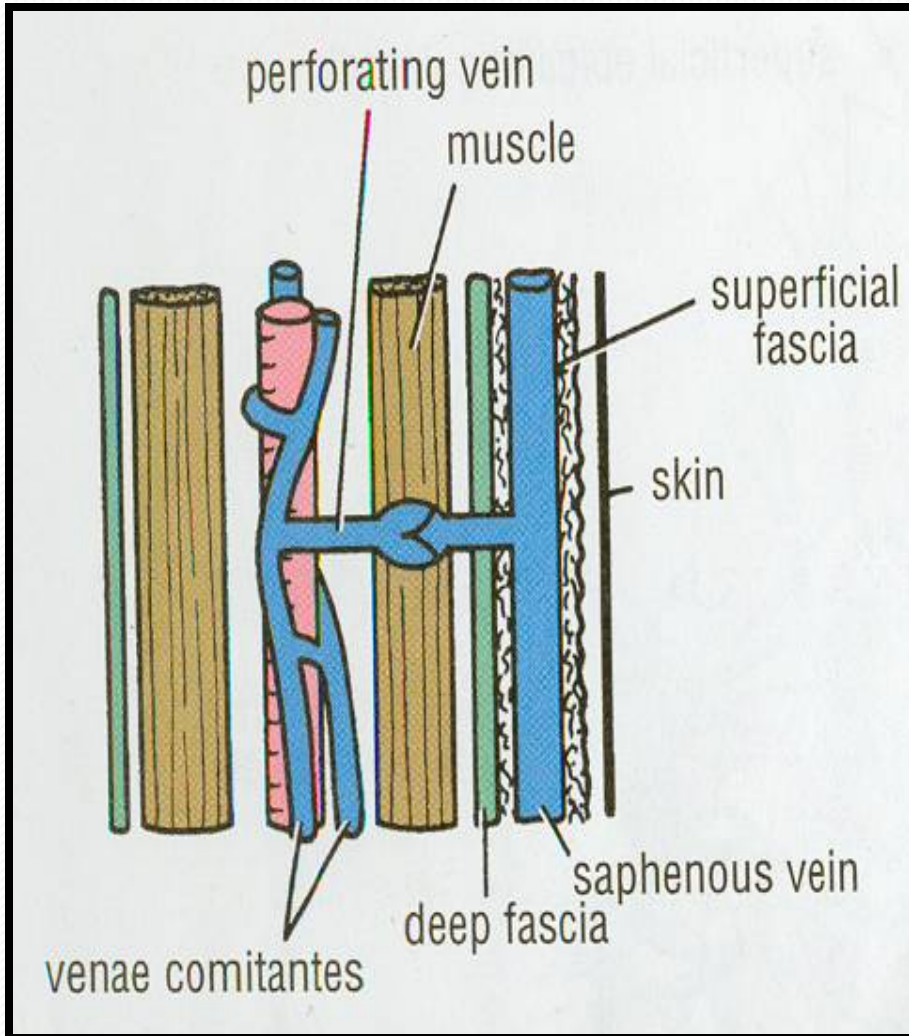
- ⦿ The terminal branches do anastomose with those of adjacent arteries but the **anastomosis is insufficient** to keep the tissue alive if one of the arteries is occluded.

# VEINS



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

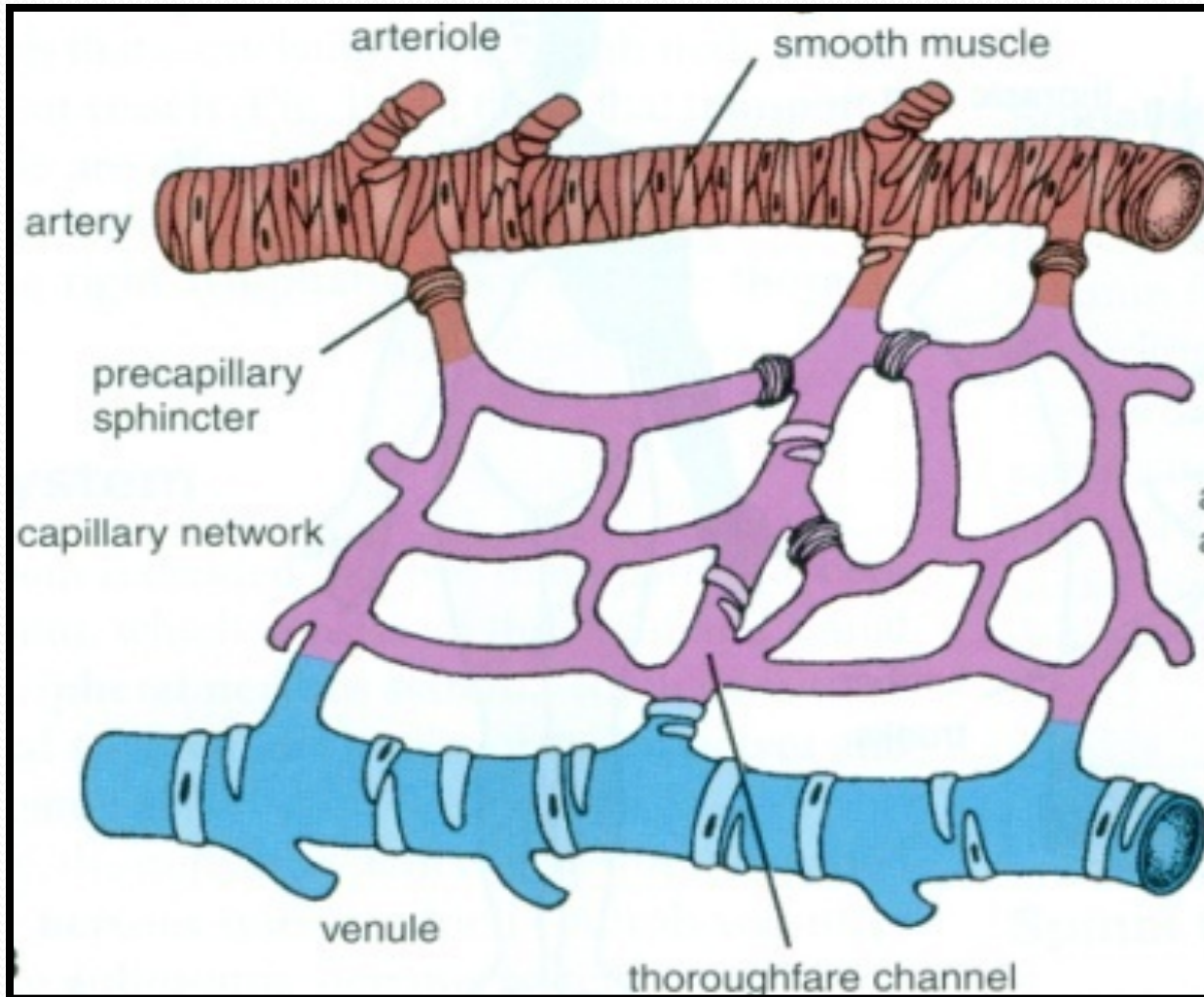
# DEEP VEINS (VENAE COMITANTES)



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

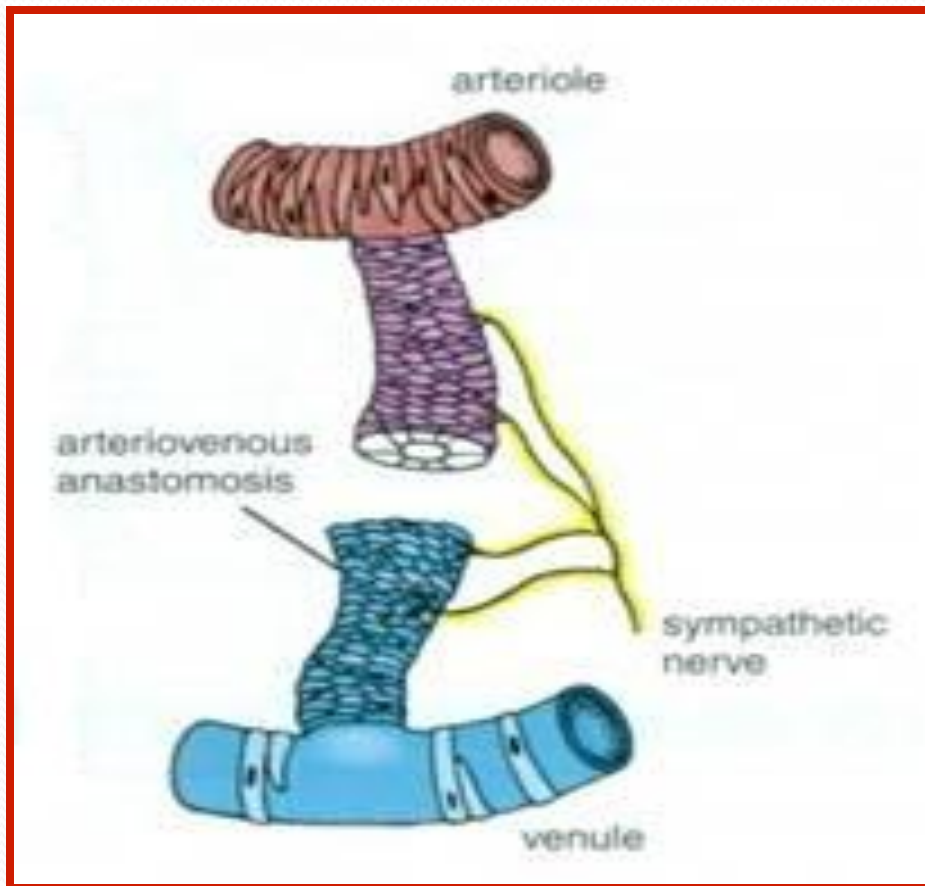


# CAPILLARIES



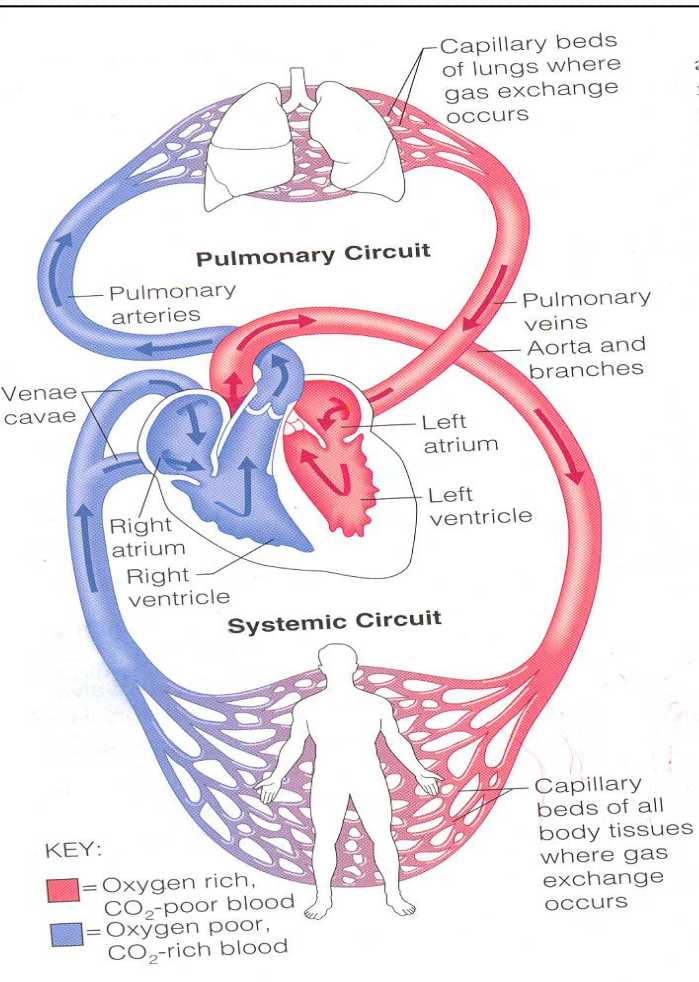
- Microscopic vessels in the form of a network.
- They **connect the Arterioles to the Venules.**

# ARTERIOVENOUS ANASTOMOSIS

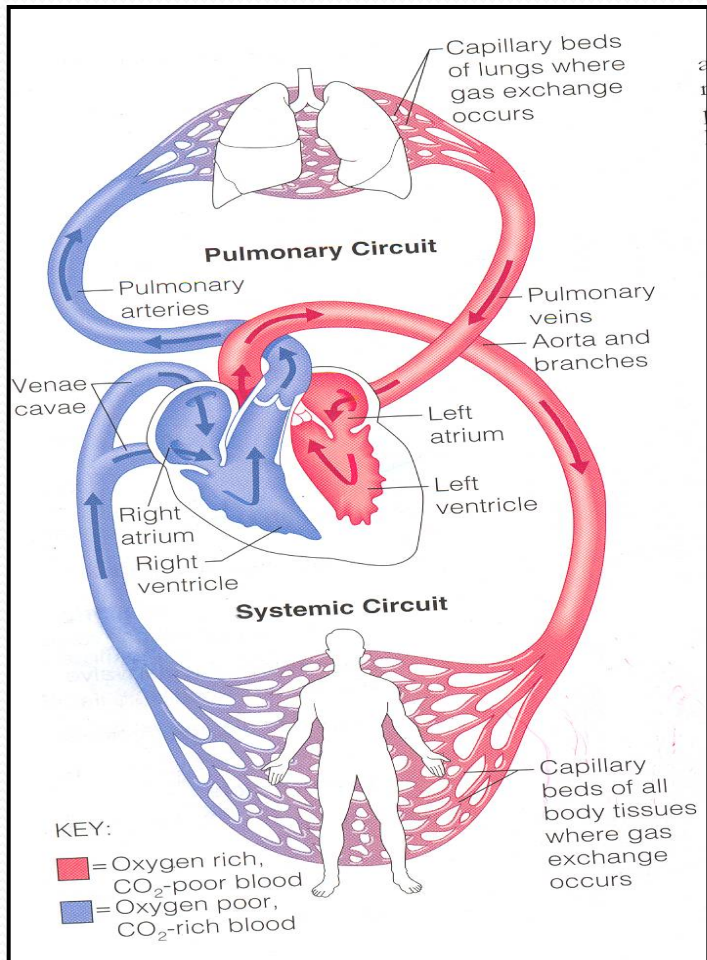


- Direct connections between the arteries and veins **without the intervention of capillaries.**
- **Found in:**
- **Tips of the Fingers and Toes.**

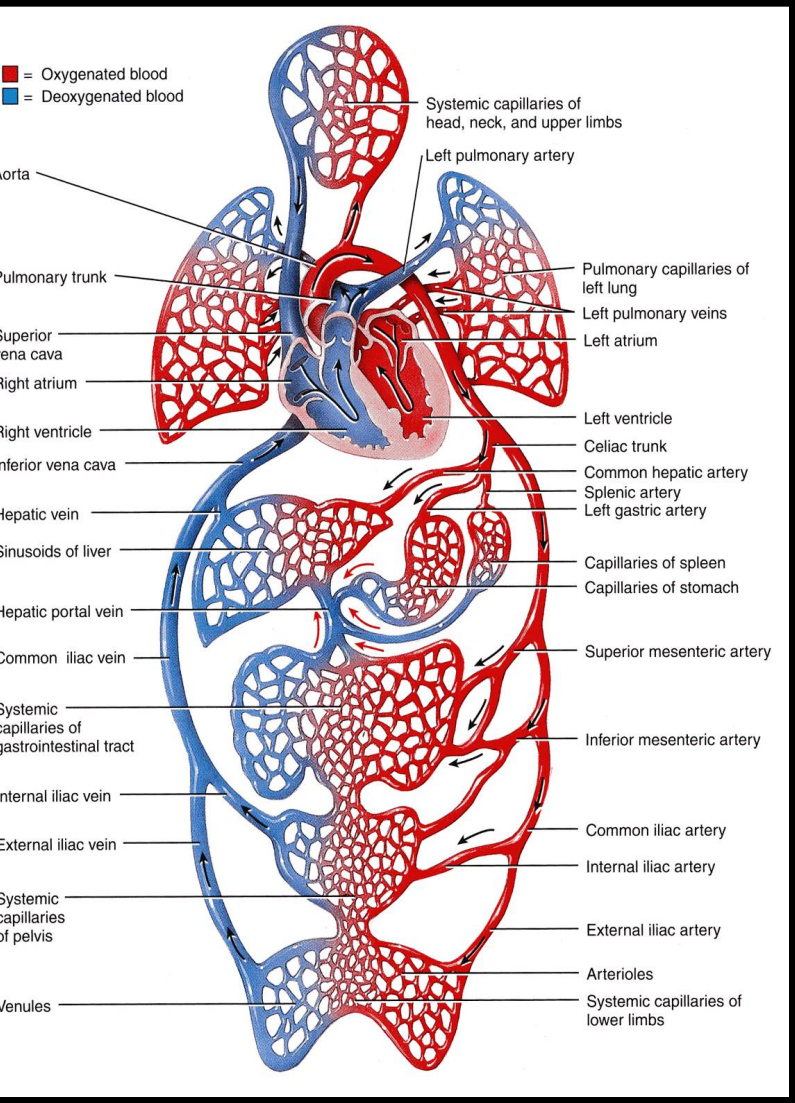
# BLOOD CIRCULATIONS



- **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***
- .



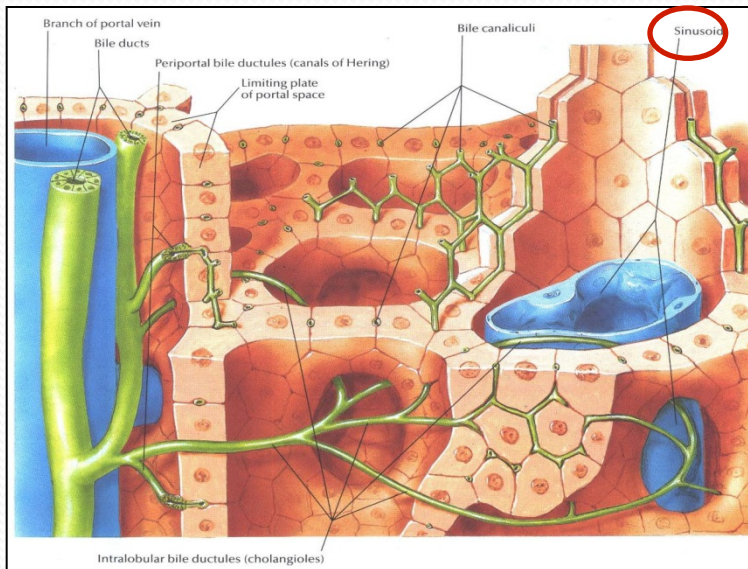
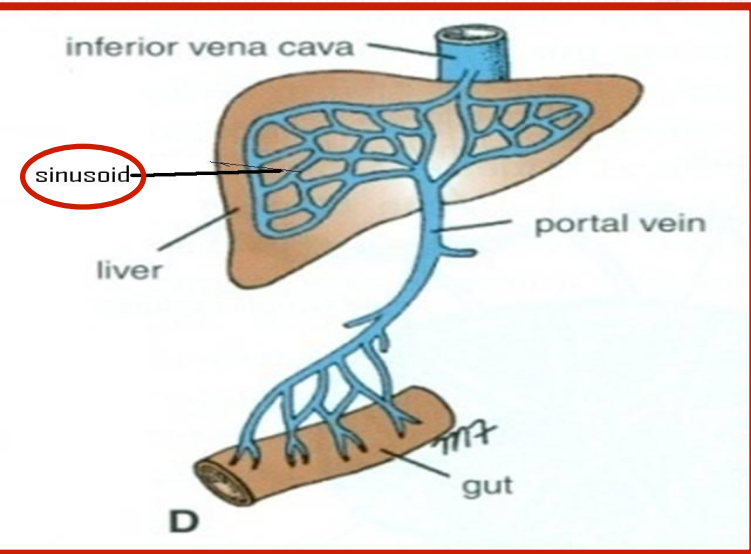
- **SYSTEMIC:**
- **Takes place between the heart and each cell of the body.**
- **Blood is pumped from the left ventricle to all body tissues through the **Aorta and its systemic arteries** which ultimately terminates in **capillaries**.**
- **Oxygen poor blood circulates from the tissues to the **capillaries, 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*

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



**THANK YOU**