CARDIOVASCULAR SYSTEM

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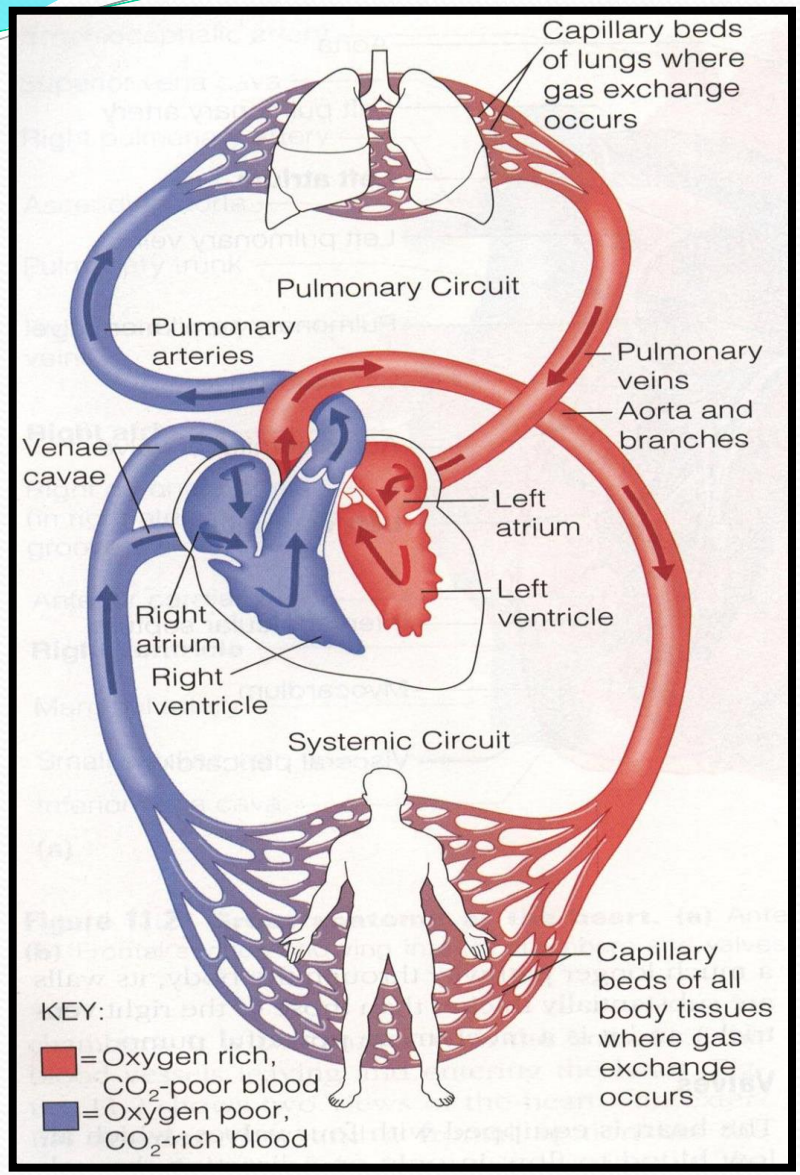
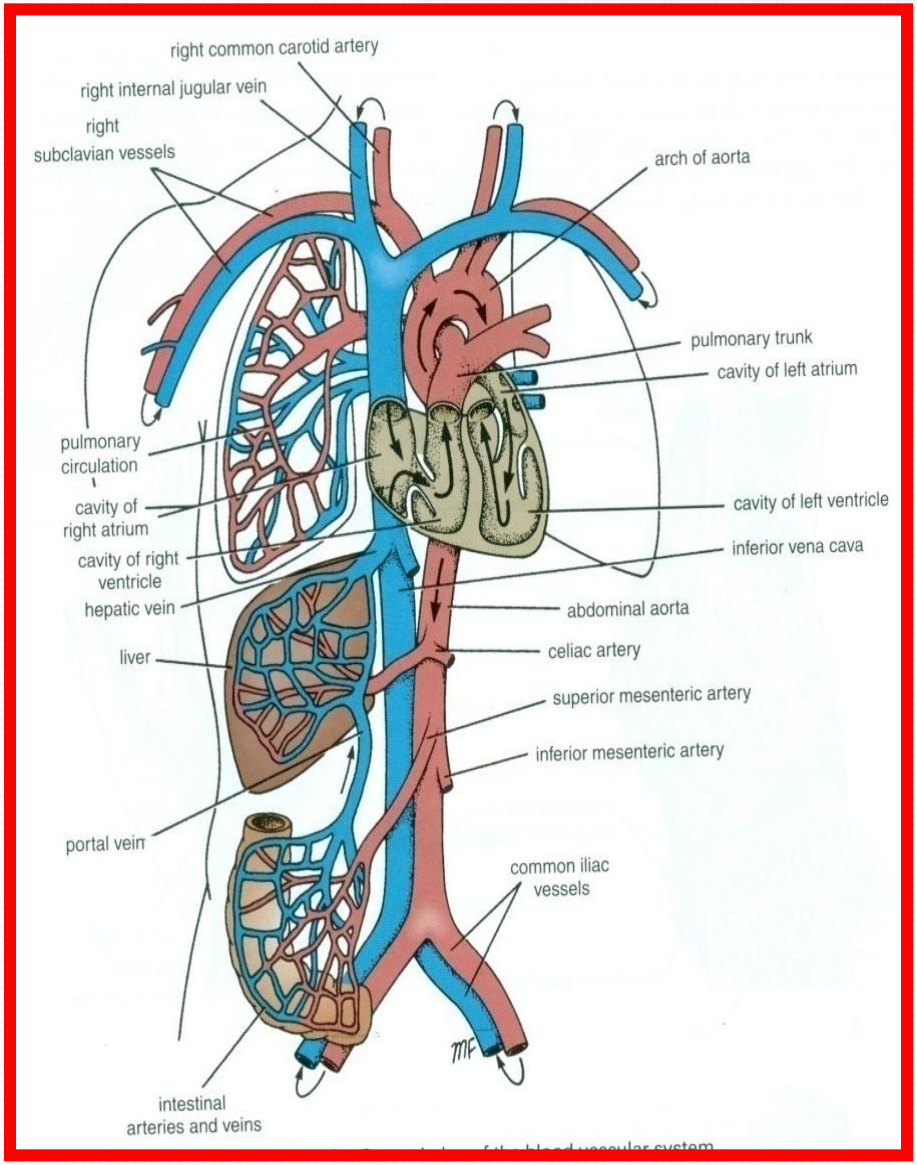
Objectives

- **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.***

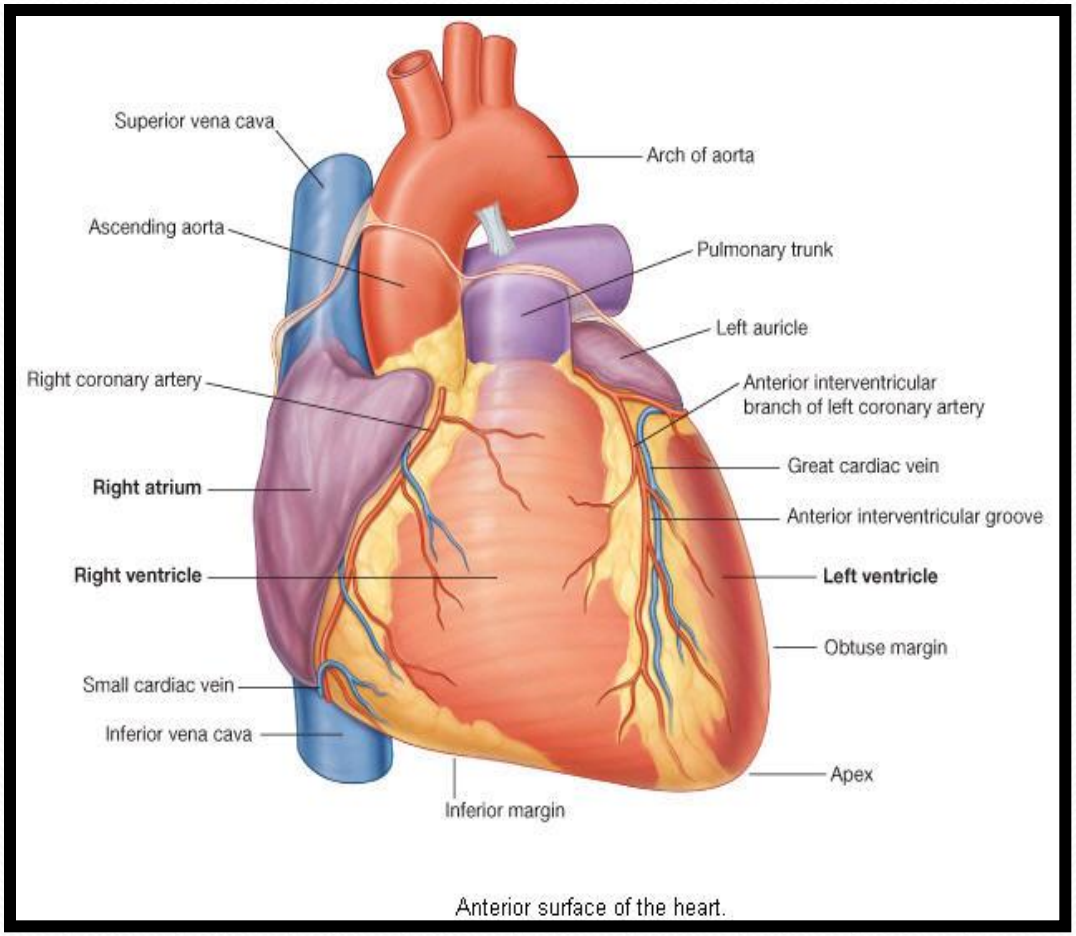
FUNCTIONS of CVS



- *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*****.**

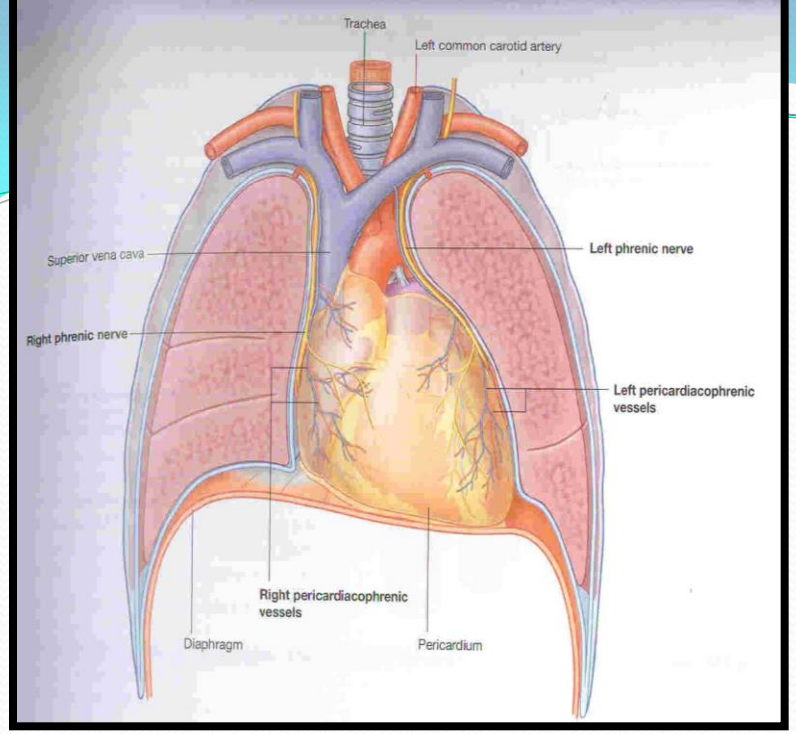
Heart

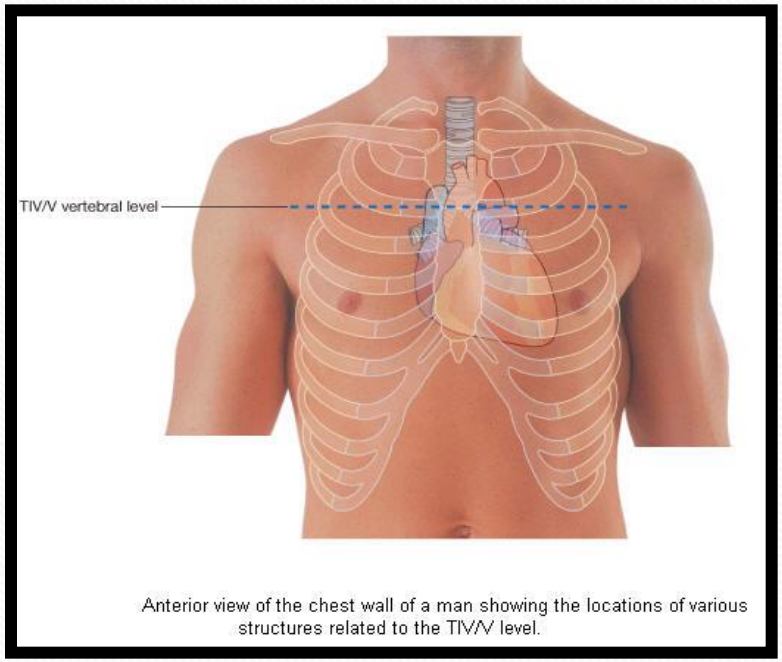
- *Is a hollow, cone shaped muscular* pump that keeps circulation going on.
- It is the size of hand's fist of the same person.
- <u>It has:</u>
- **Apex,**
- **Base.**
- **Two Surfaces:** Diaphragmatic &Sternocostal.
- **Borders:** Right, Left, Inferior.



Anterior surface of the heart.

Location of the Heart





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

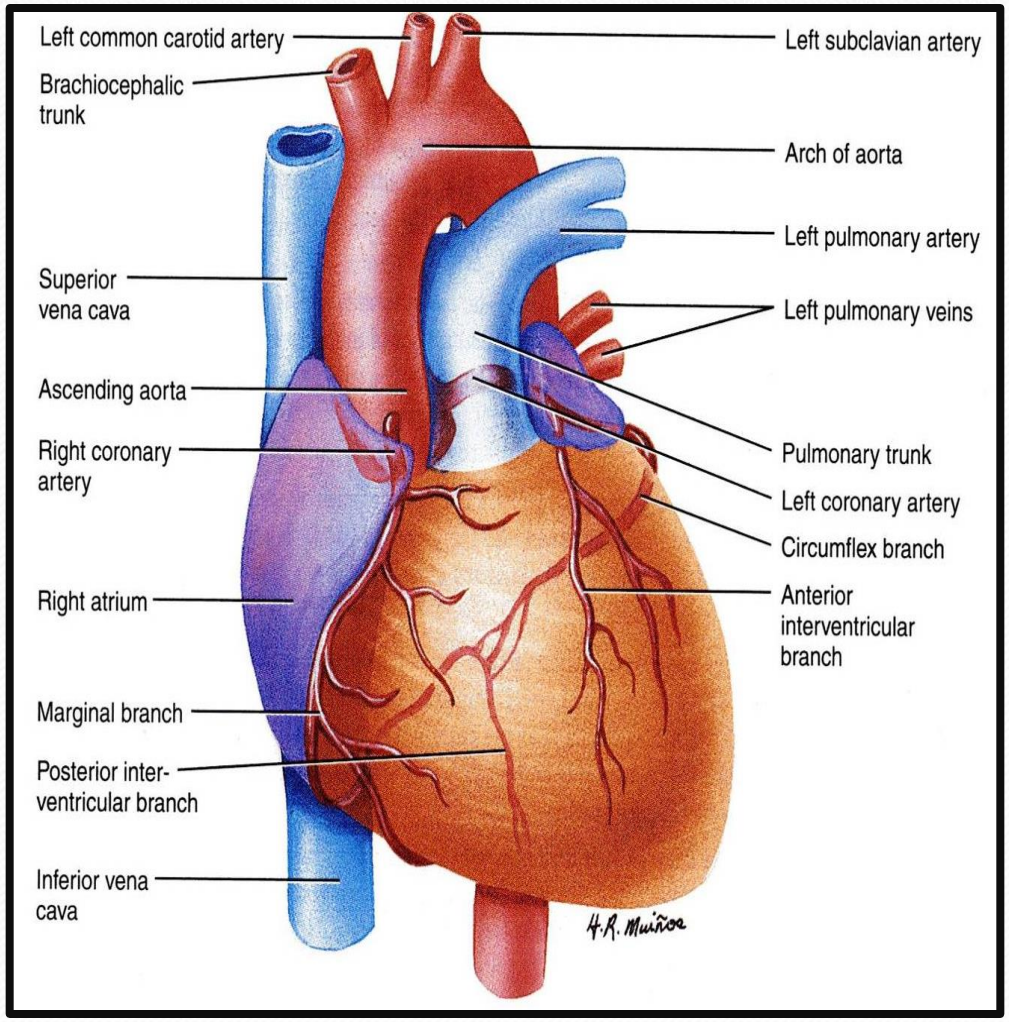
It lies in a centrally located partition in the thoracic cavity Known as *the* ***Middle Mediastinum*** between the two

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

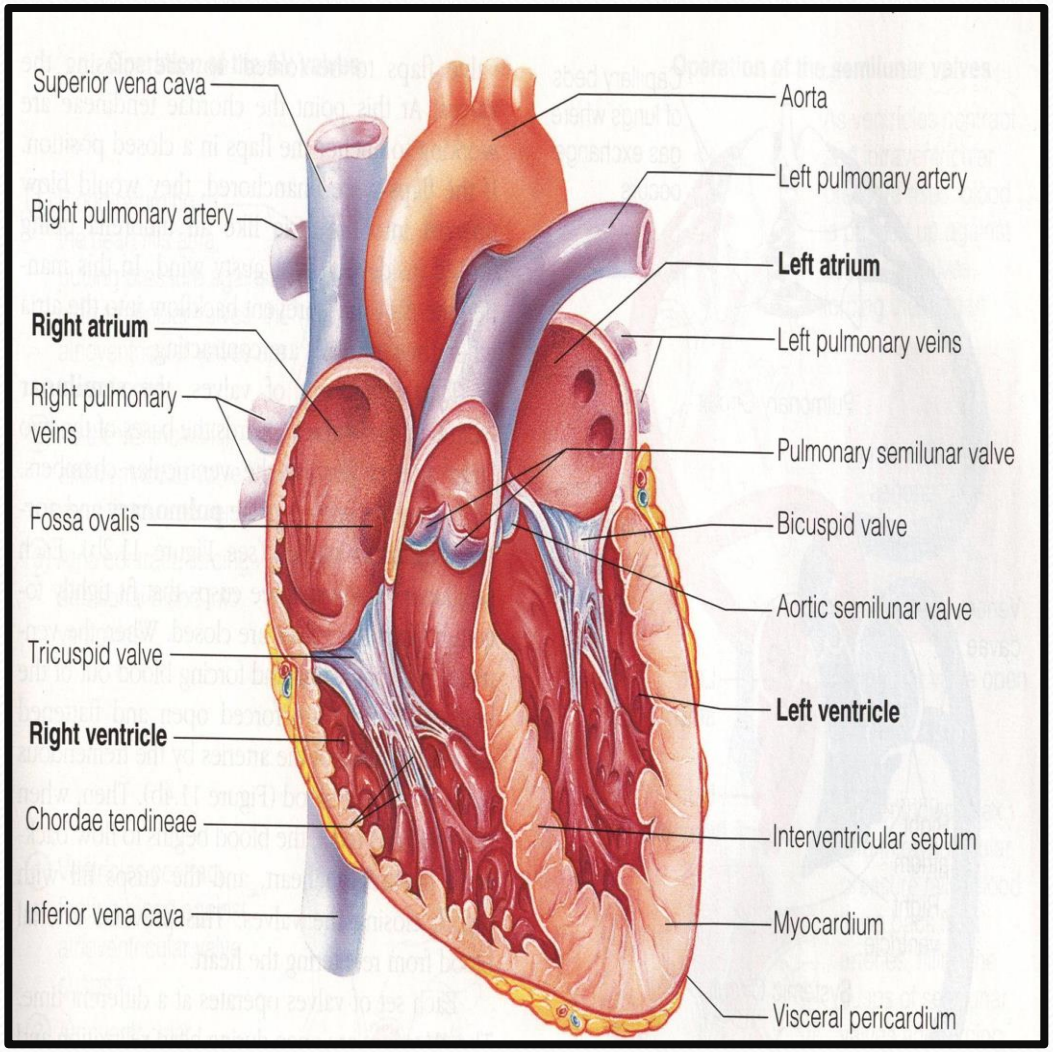
pleural sacs.

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

Chambers of the Heart

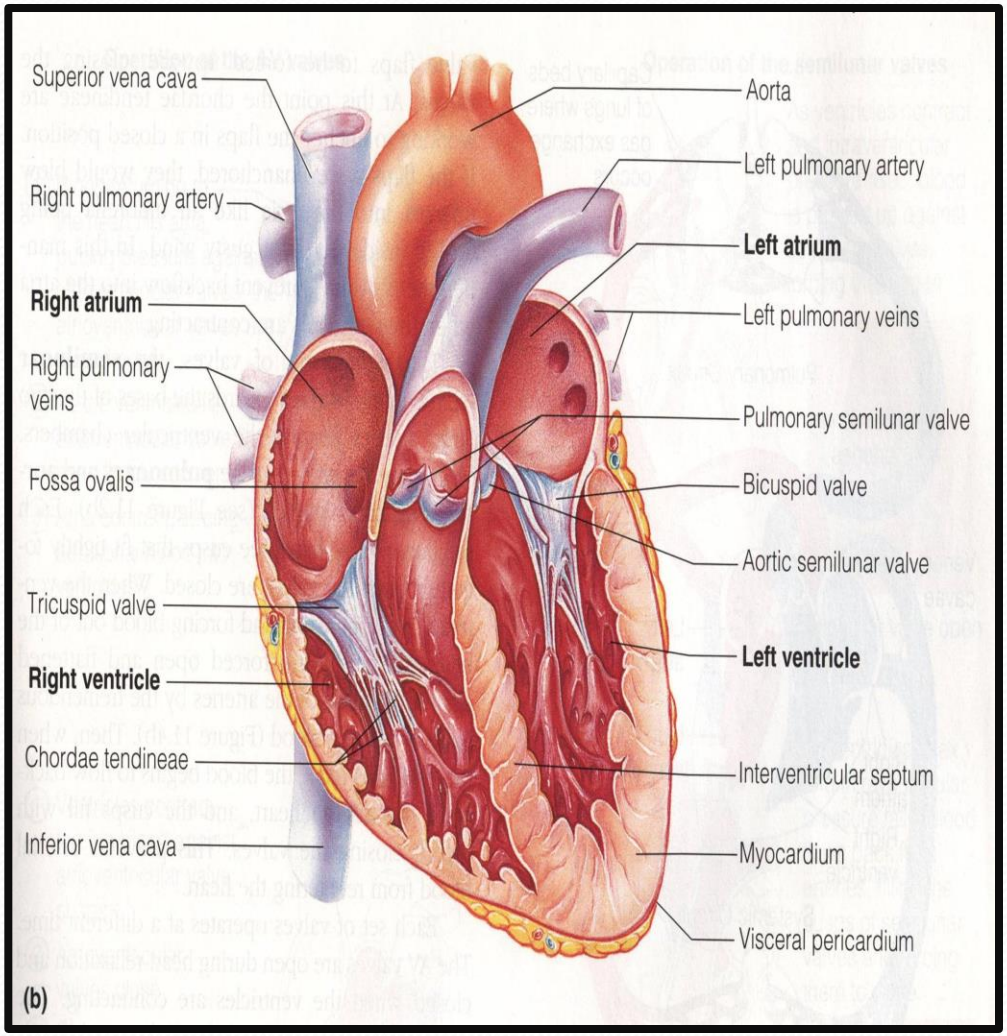


- ***ATRIA*** **:**
- *Two* ***(Right & Left)***
- *Superior in position.*
- *They are the receiving chambers.*
- *They have thin walls.*
- *The upper part of each atrium is the* ***Auricle.***
- ***The Right Atrium is the first chamber that receives the venous blood entering to the heart.***
- ***Left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



- ***Ventricles*** *are the inferior chambers.*
- *They 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.***

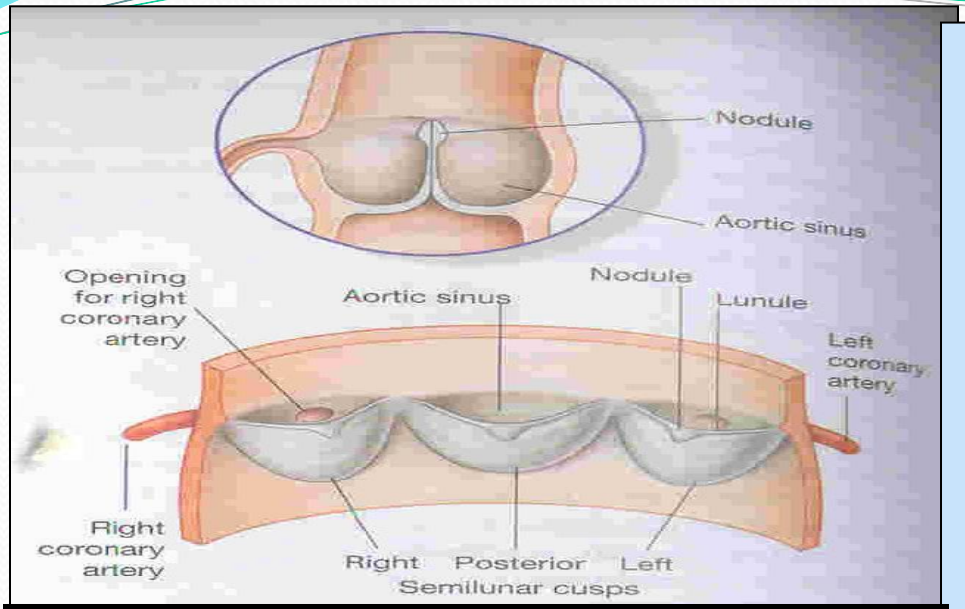
VALVES OF THE HEART

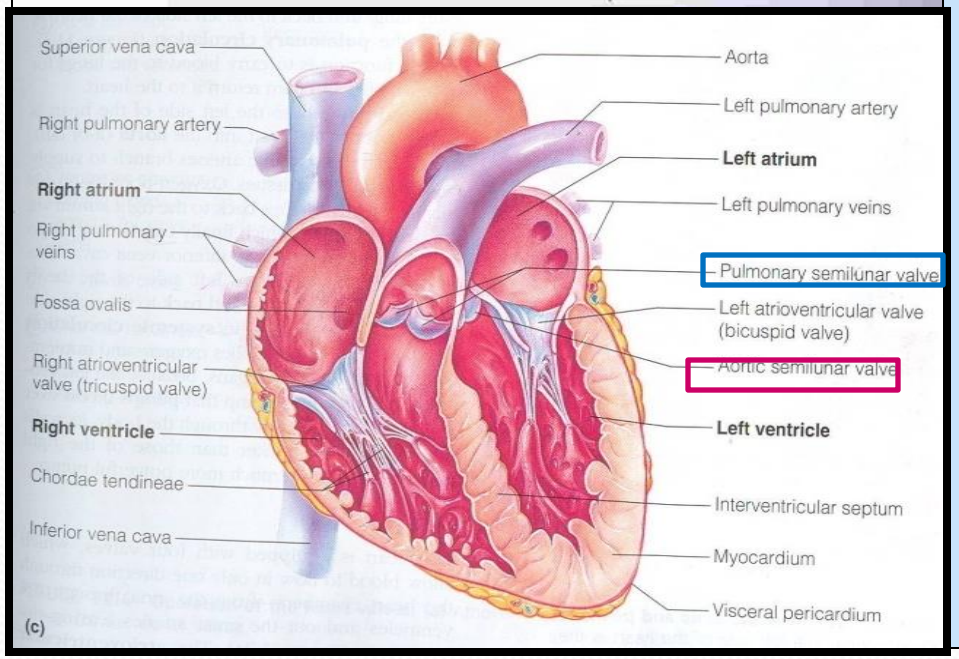


- *The heart has **Four** Valves:*
- *Two **Atrioventricular***

Valves between atria & ventricles.

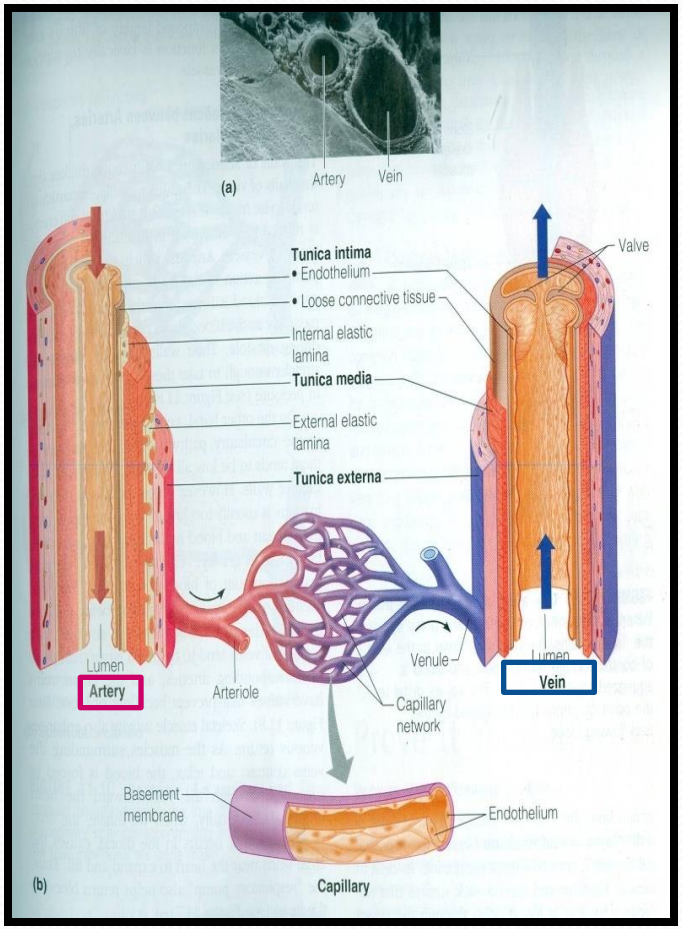
- *They allow the blood to flow in one direction from the atria to the ventricles.*
- ***Right AVV (Tricuspid)***
- ***Left AVV: Bicuspid***
- ***(Mitral)***





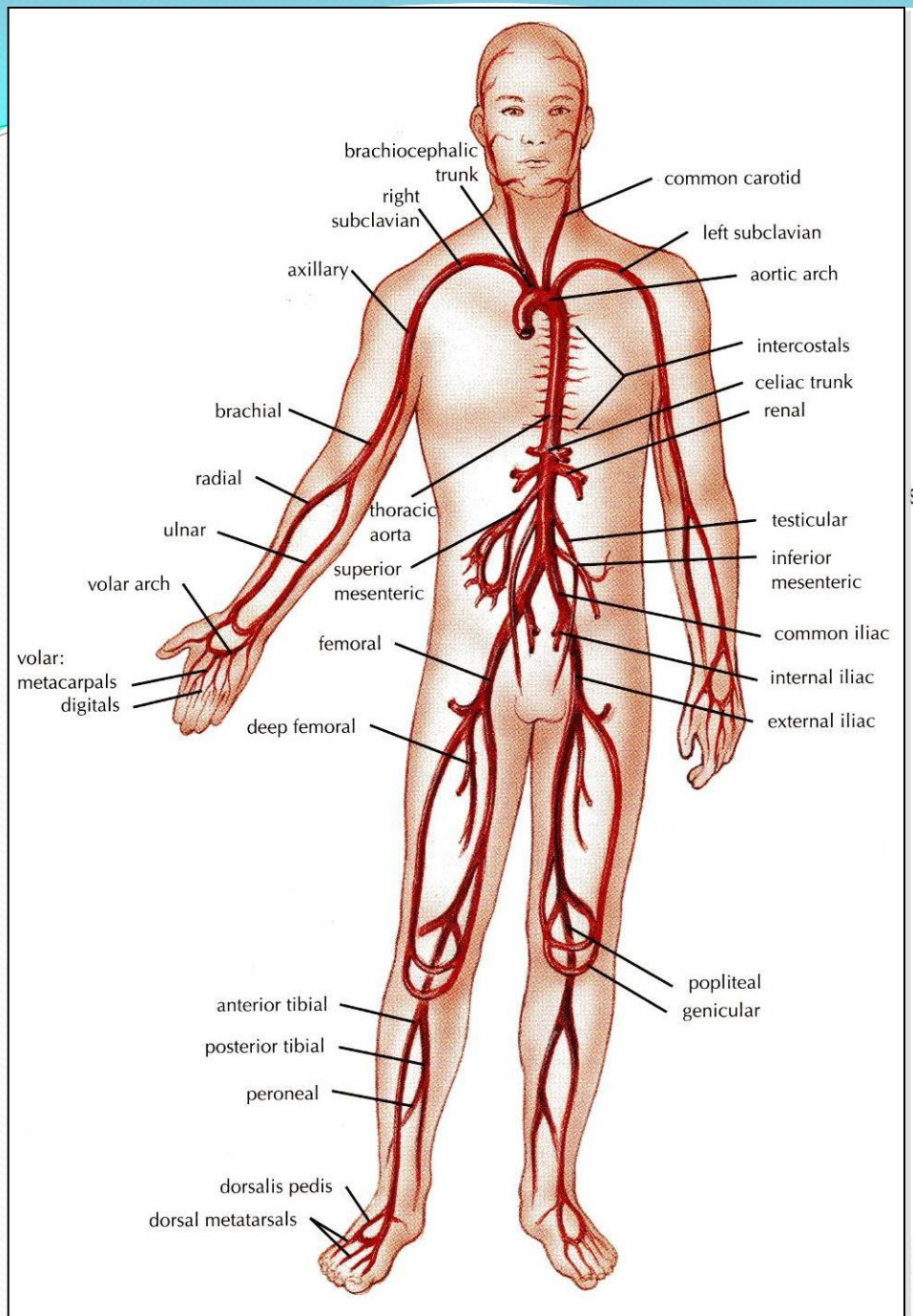
- *Two **Semilunar (Pulmonary & Aortic) VAVES***
- *Are found between the right and left ventricles respectively and the great arteries leaving the heart (aorta& pulmonary trunk).*
- *They allow the flow of blood from the ventricles to these arteries.*

BLOOD VESSELS



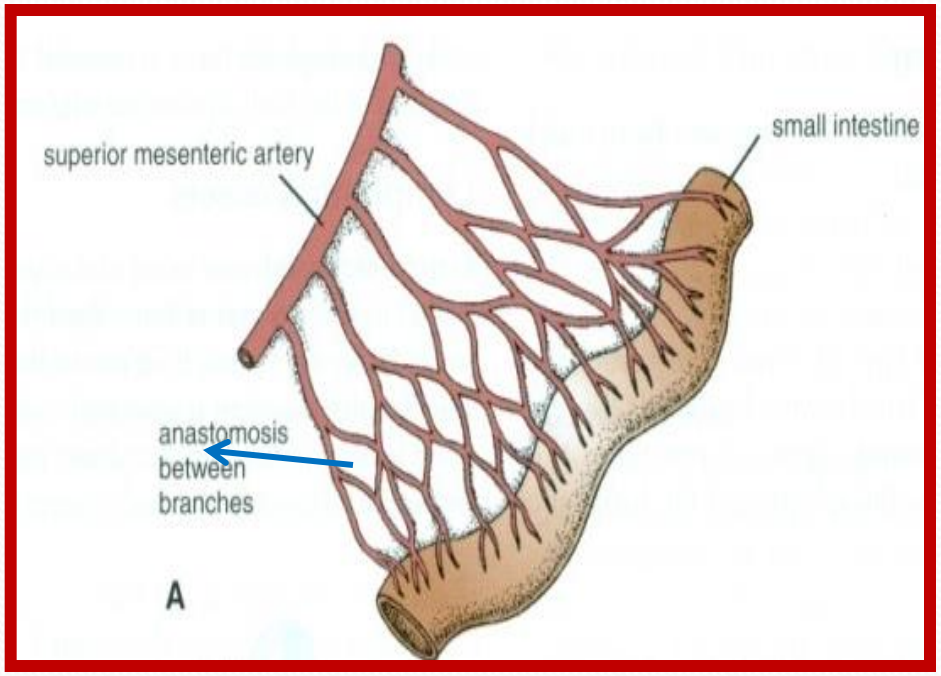
Arteries	Veins
• ***Thick walled, do not have valves.***	• ***Thin walled.***
• *The smallest arteries are* ***arterioles.***	• *Many of them* ***possess valves.***
	• *The smallest veins are* ***venules.***
	Capillaries.

ARTERIES



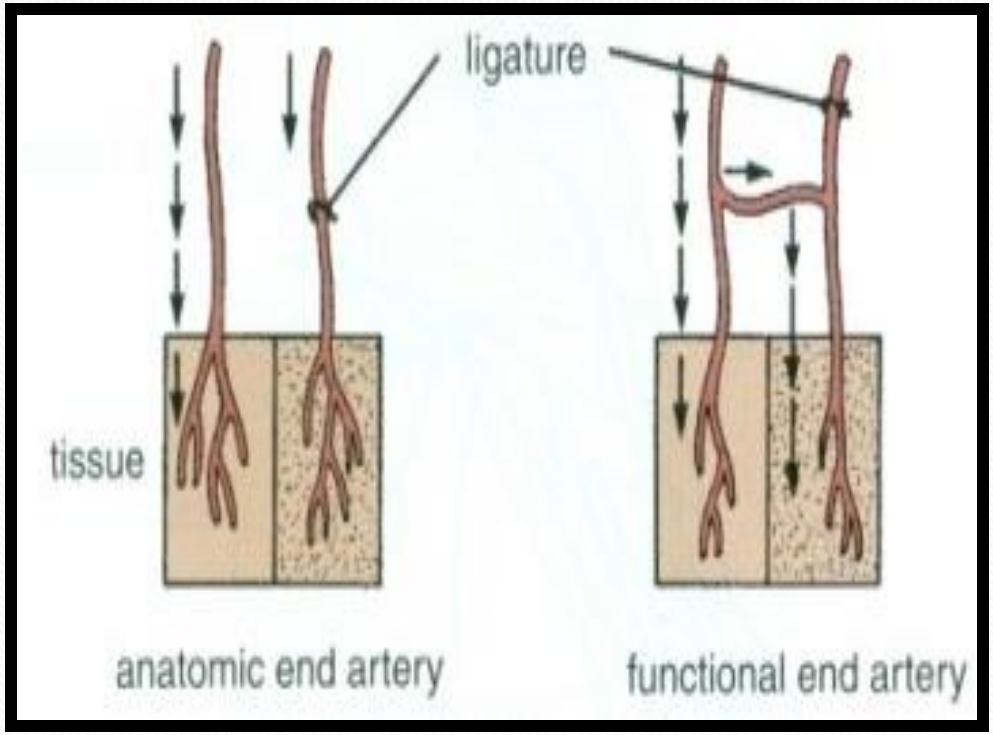
- *They transport blood from the **heart** and distribute it to the various tissues of the body through their branches.*

ARTERIAL ANASTOMOSIS



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

END ARTERIES

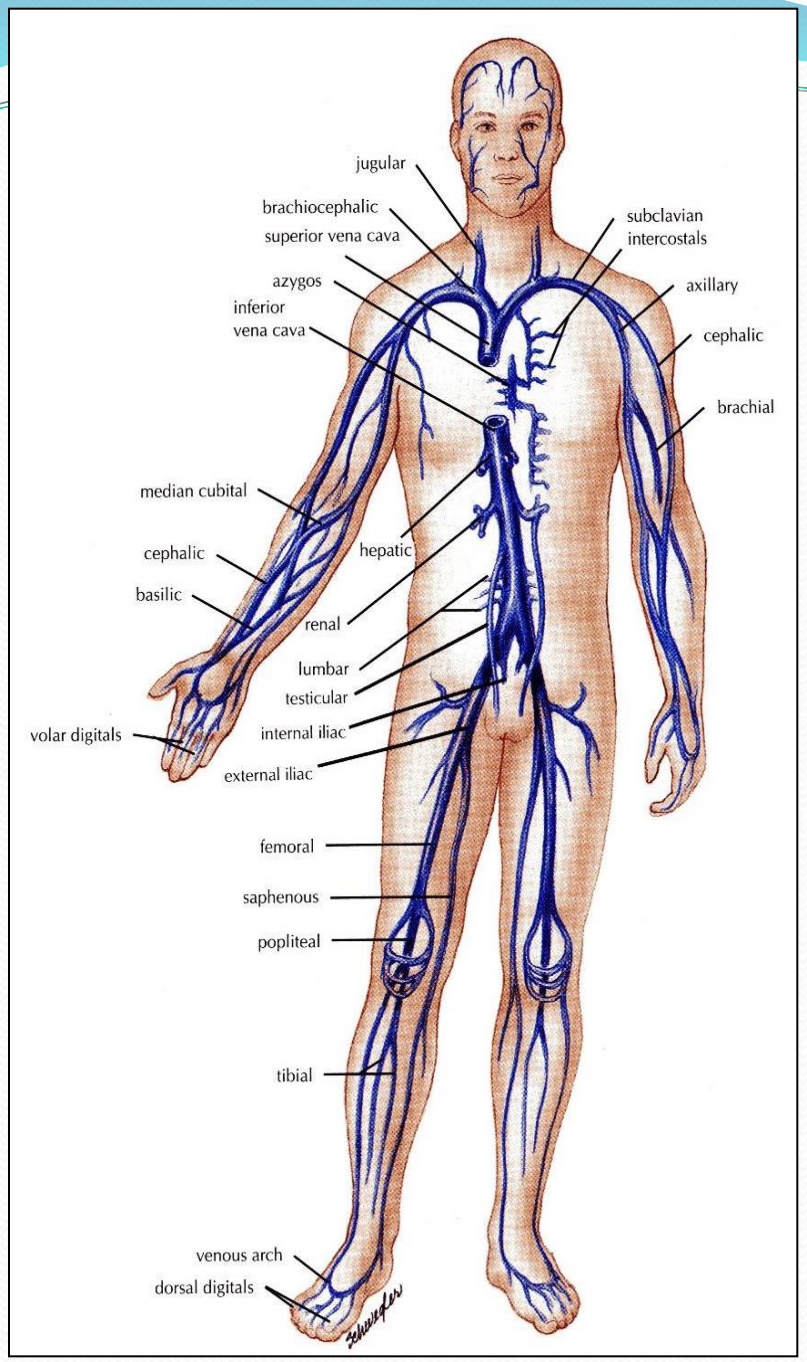


Anatomic End arteries:

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

Functional End arteries:

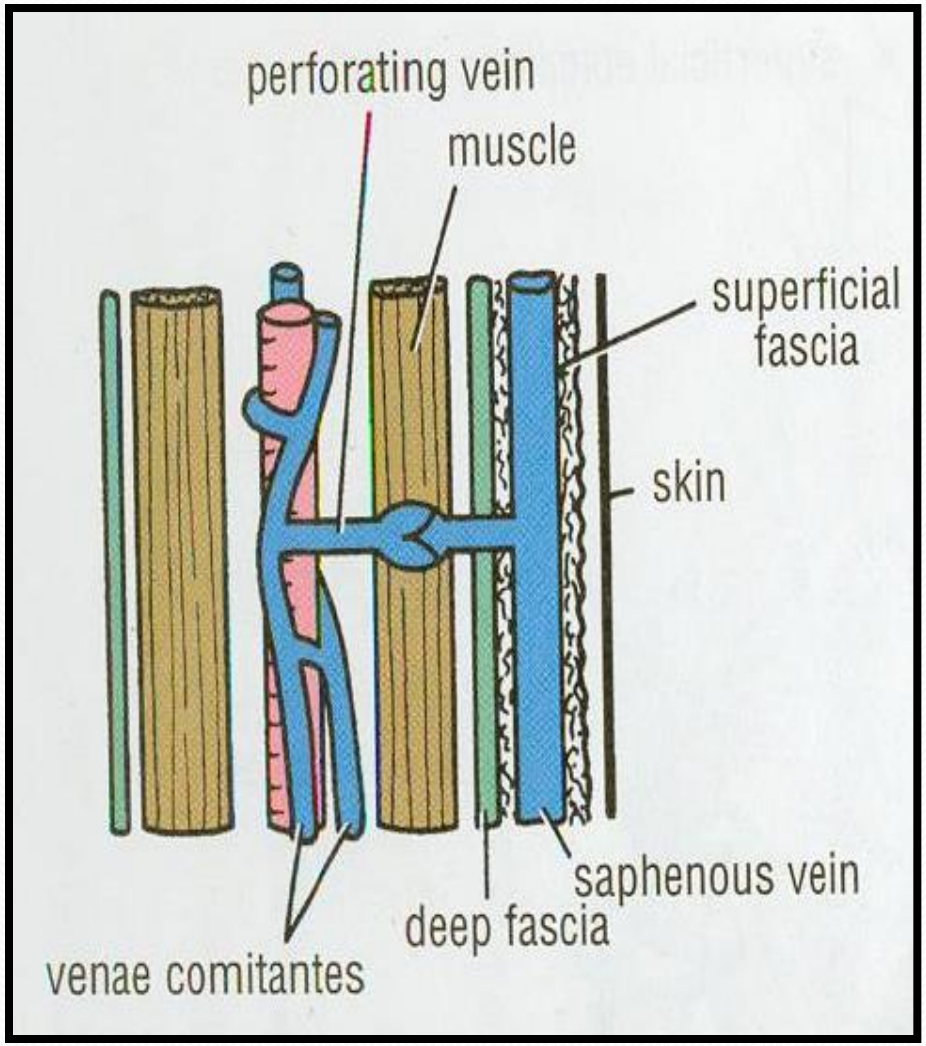
- *The terminal branches do anastomose with those of adjacent arteries but the **anastomosis is insufficient** to keep the tissue alive if one of the arteries is occluded.*



VEINS

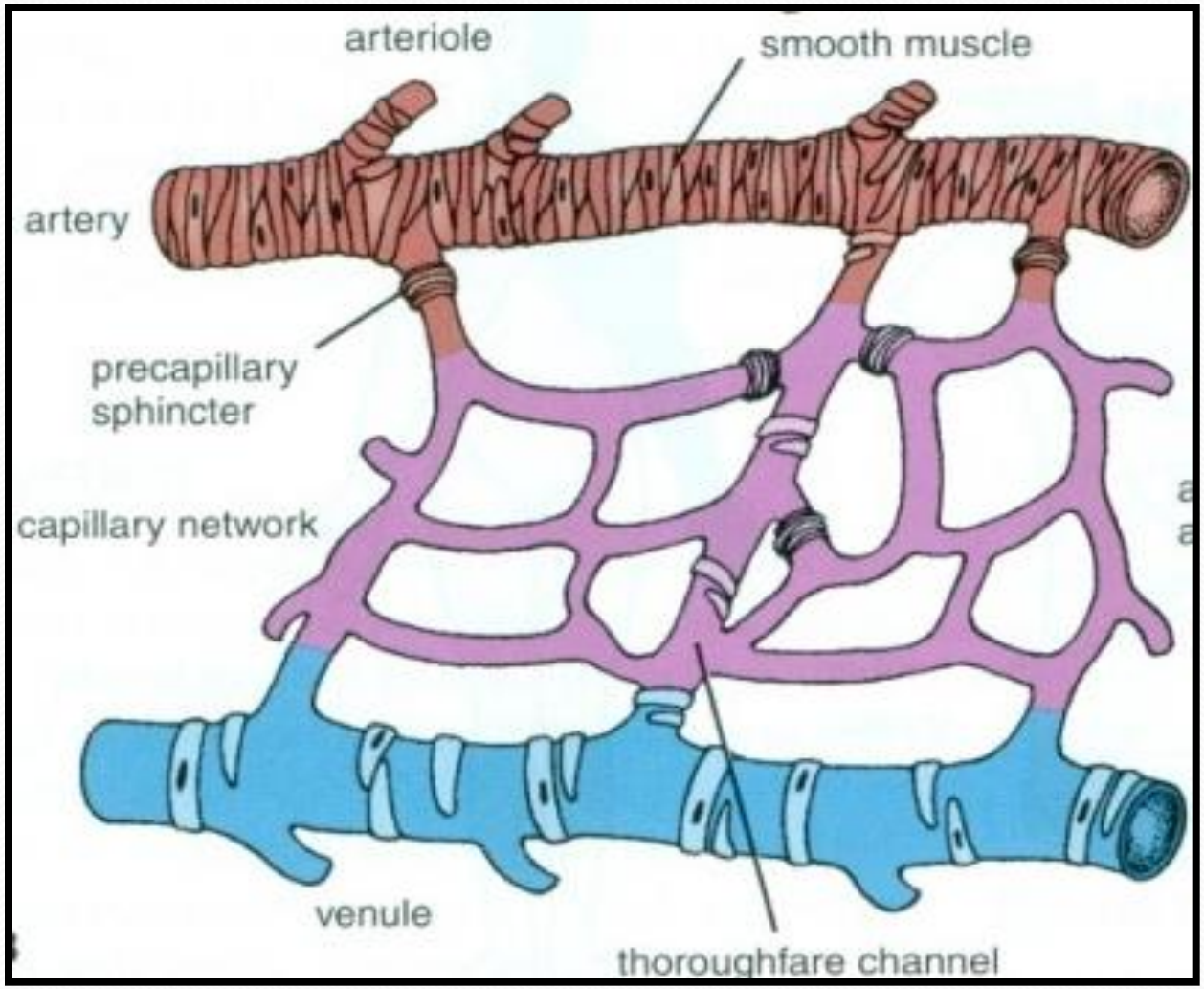
- *They transport blood back to the heart.*
- *The smaller venules (**Tributries**) unite to form larger veins which commonly join with one another to form Venous Plexuses.*

DEEP VEINS (VENAE COMITANTES)



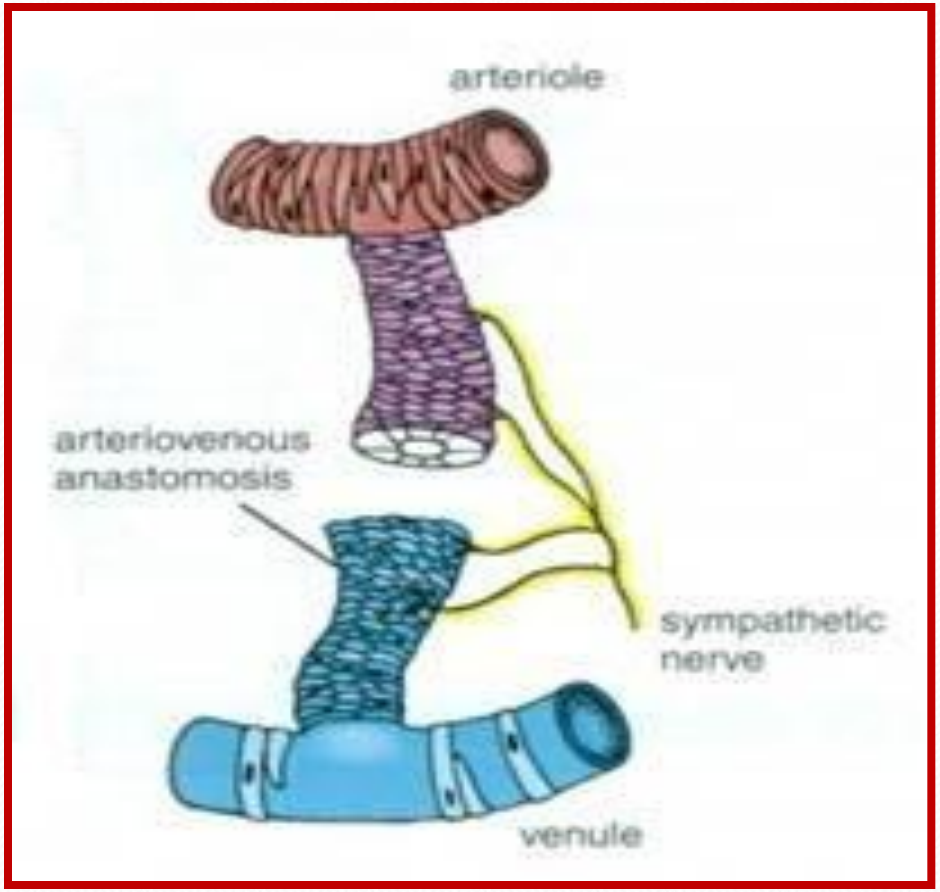
- *They are two veins that accompany medium sized deep arteries*

CAPILLARIES



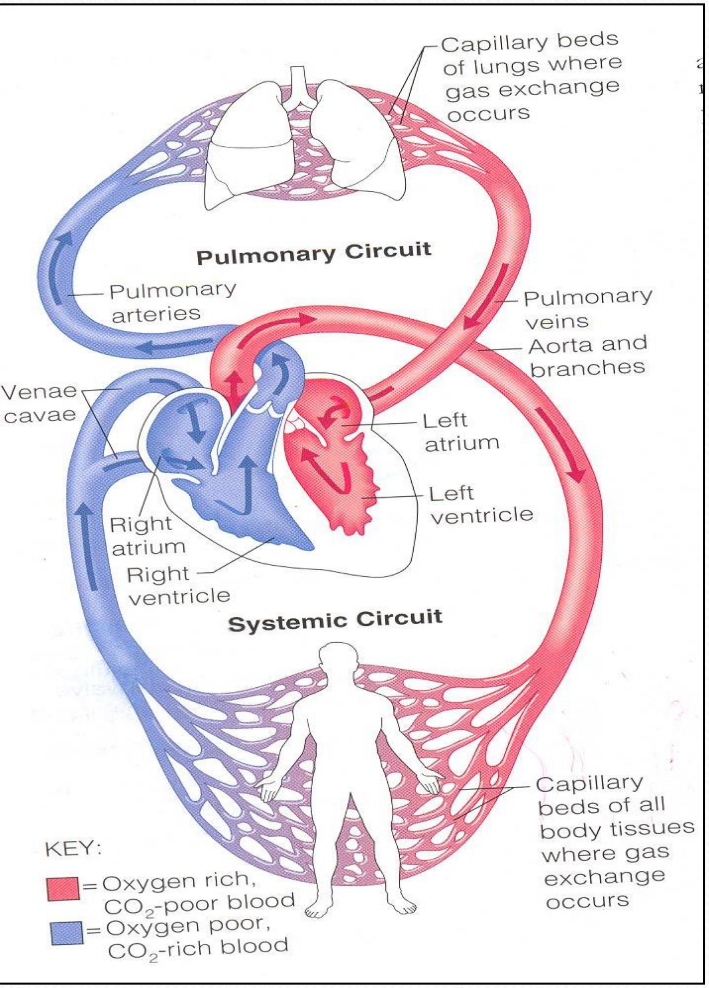
- *Microscopic vessels in the form of a network.*
- *They* ***connect the Arterioles to the Venules.***

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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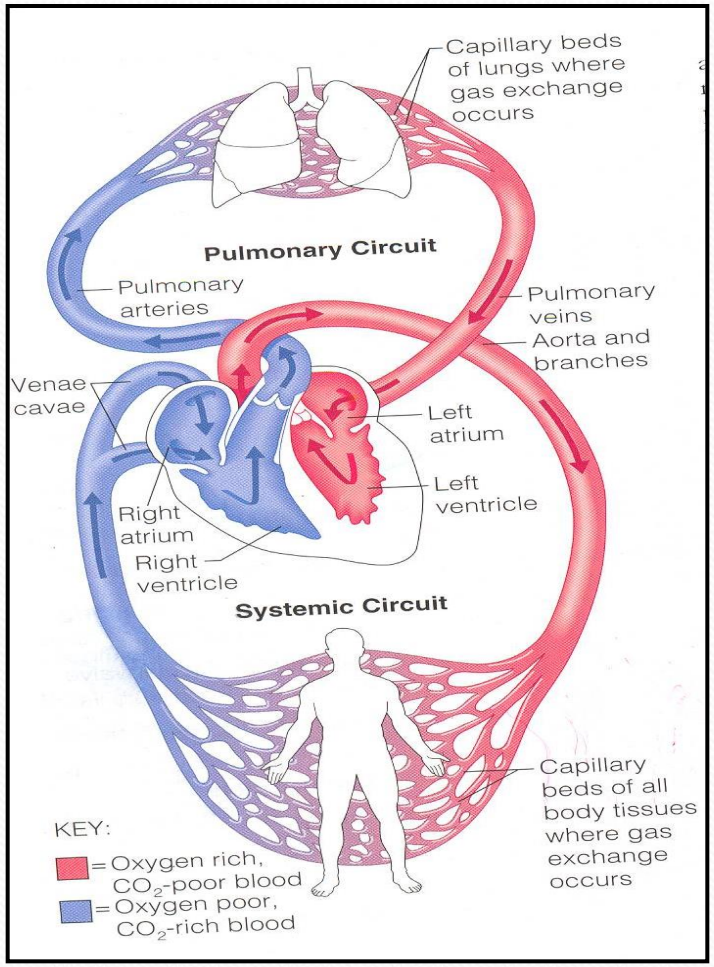
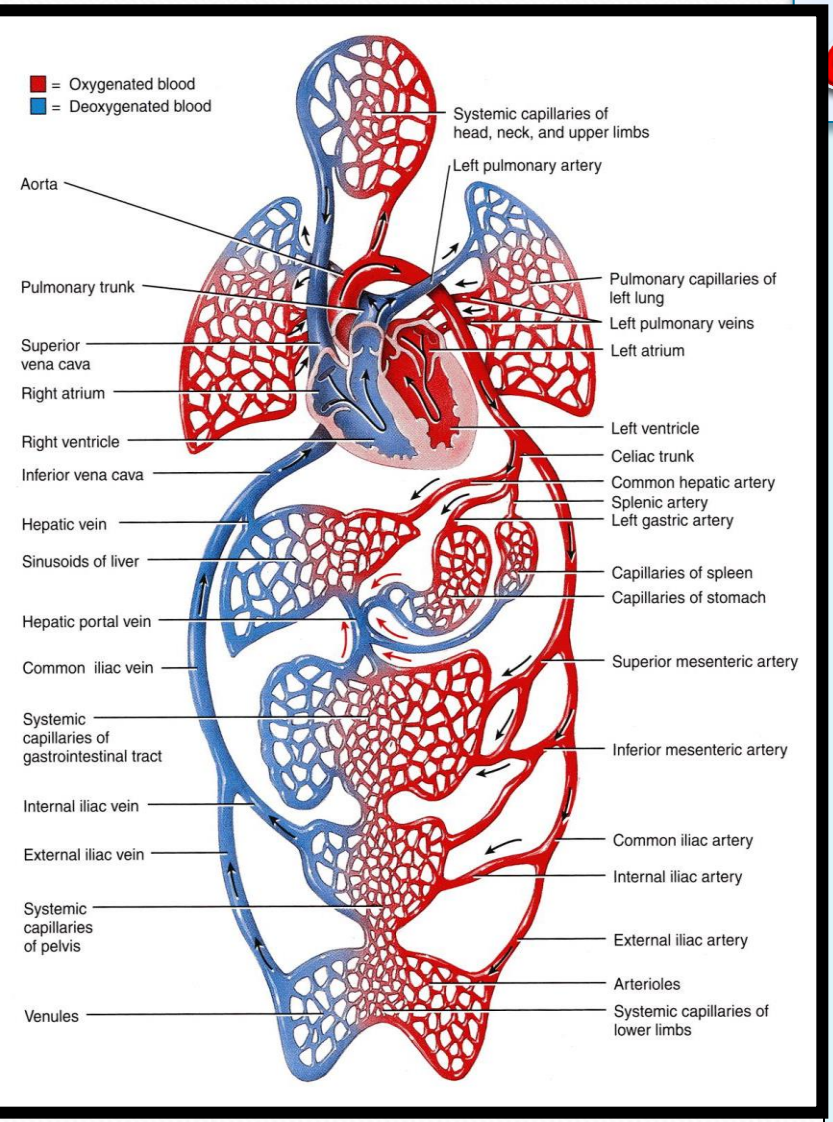


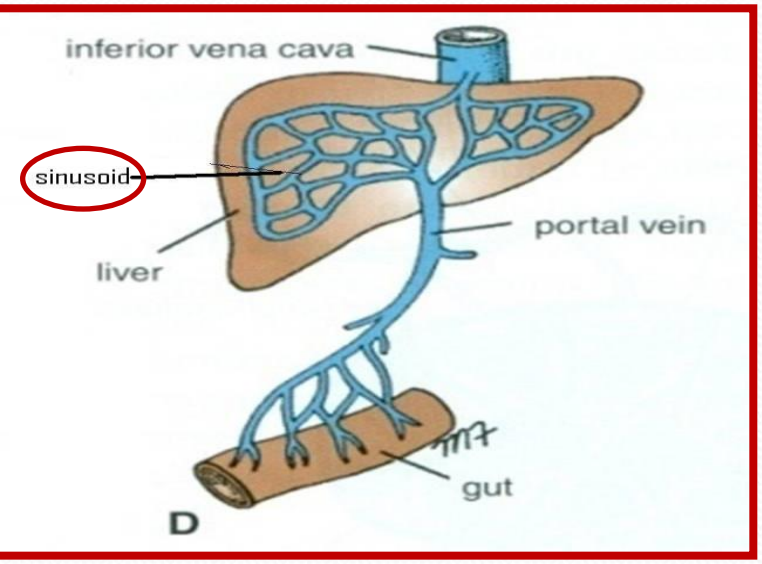
- ***SYSTEMIC:***
- ***Takes place between the heart and each cell of the body.***
- ***Blood is pumped from the left ventricle to all body tissues through the Aorta and its systemic arteries which ultimately terminates in capillaries.***
- ***Oxygen poor blood circulates from the tissues to the capillaries,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

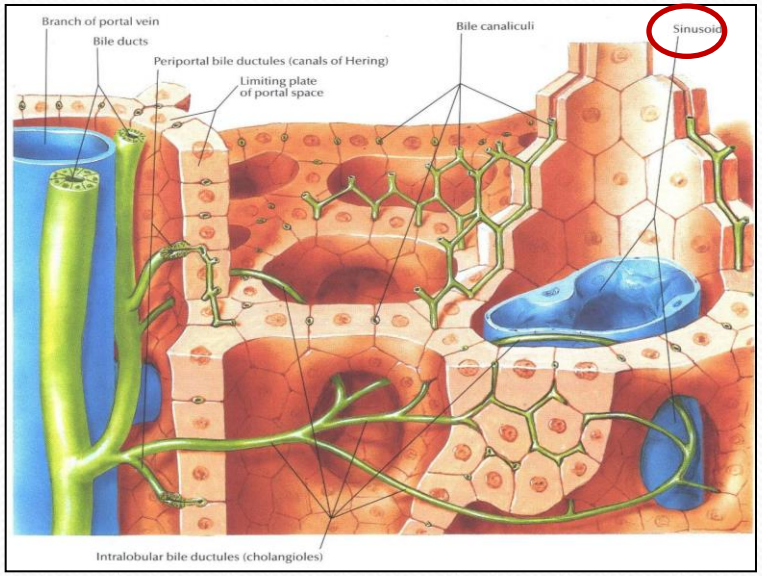
PORTAL Circulation



- *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 2nd 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