

Cardiovascular System



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Tweet of the Day



Khaleel Alyahya @khaleelya · Sep 4



#أحياناً .. لا يكون الجمال في #الصورة ، بل في الإطار الذي يحيط بها..!!

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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 in regard to (position, chambers and valves).**
- **Describe the Blood vessels (Arteries, Veins and Capillaries).**
- **Describe the Portal System.**
- **Describe the Functional and Anatomical end arteries.**
- **Describe the Arteriovenous Anastomosis.**

RESOURCES

❖ *Human Anatomy & Physiology*

➤ *Elaine Marieb*

❖ *Introduction to Human Body*

➤ *Gerard Tortora*

❖ *Google*

Describe the Picture..!!



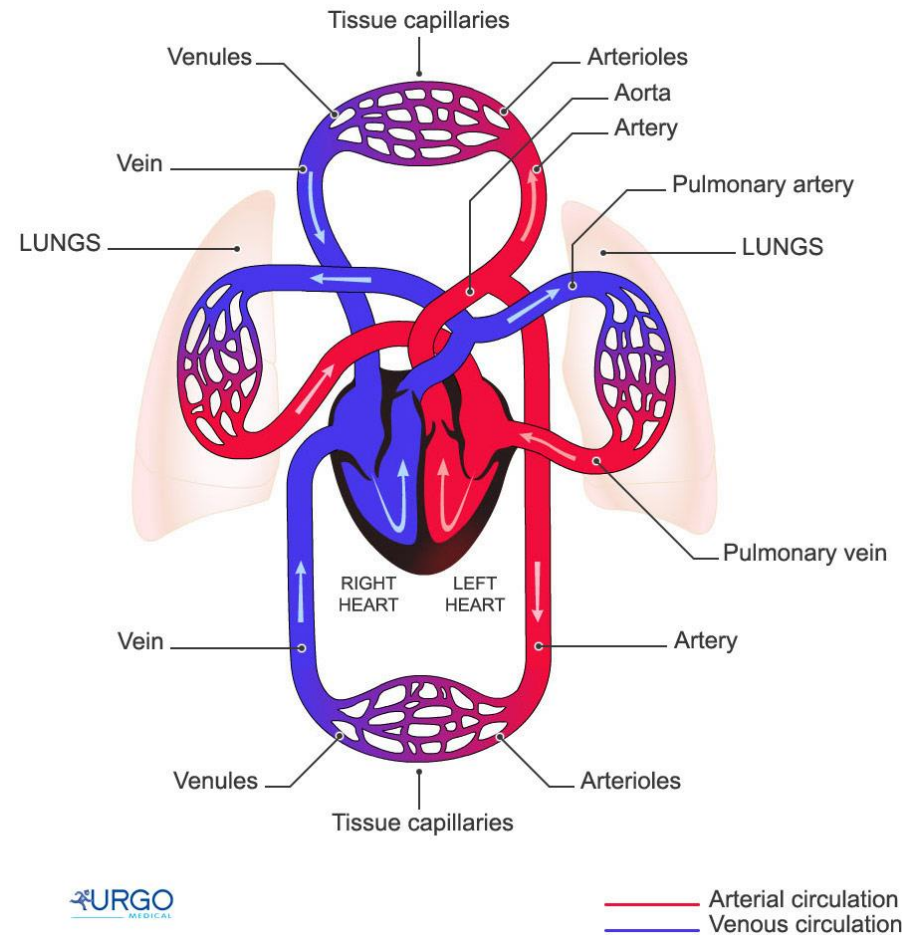
CONTENT

- **Pump: HEART**
- **Network of Tubes: BLOOD VESSELS**



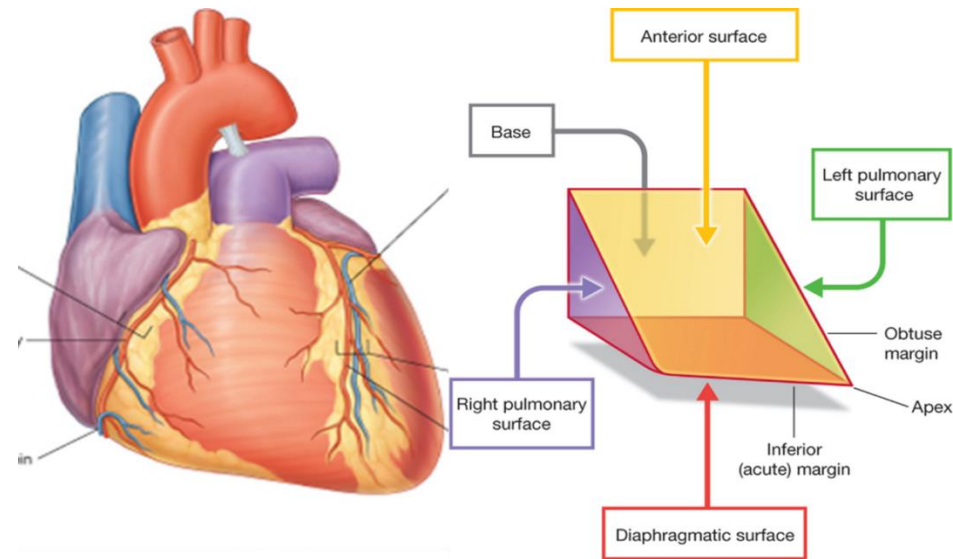
FUNCTIONS

- **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.**
- **It provides forces to move the blood around the body by the beating Heart.**



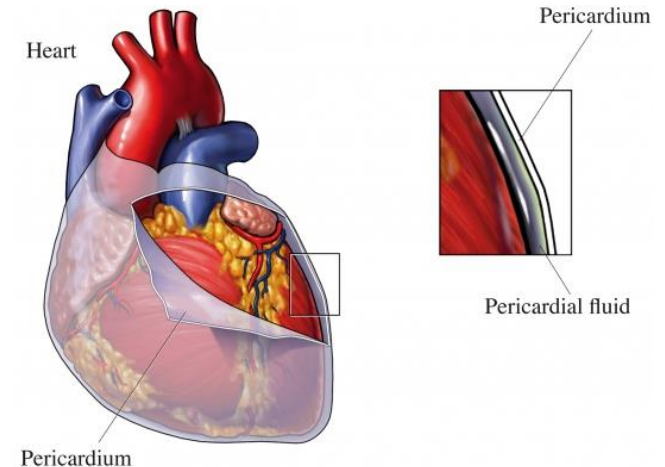
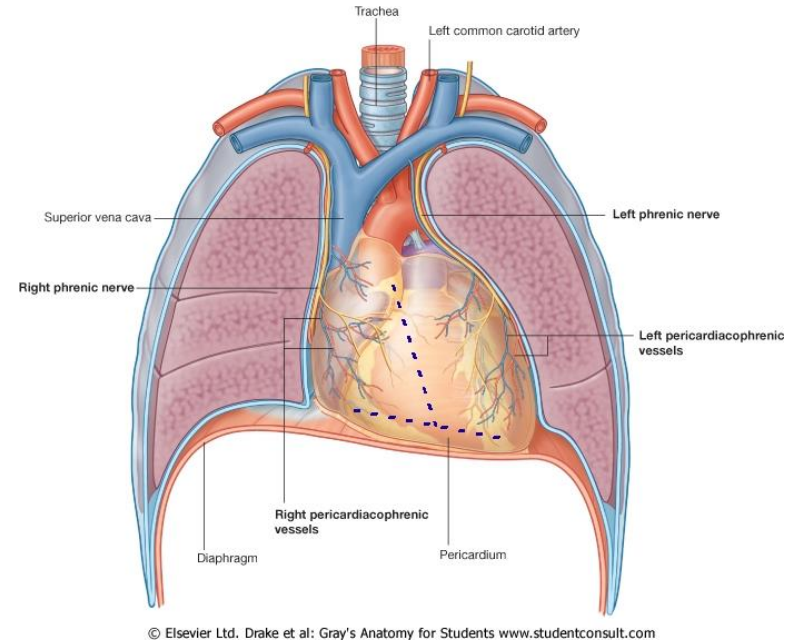
THE HEART

- **It 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**
 - **Surfaces:**
 - ✓ **Diaphragmatic & Sternocostal**
 - **Borders:**
 - ✓ **Right, Left, Inferior.**



LOCATION OF THE HEART

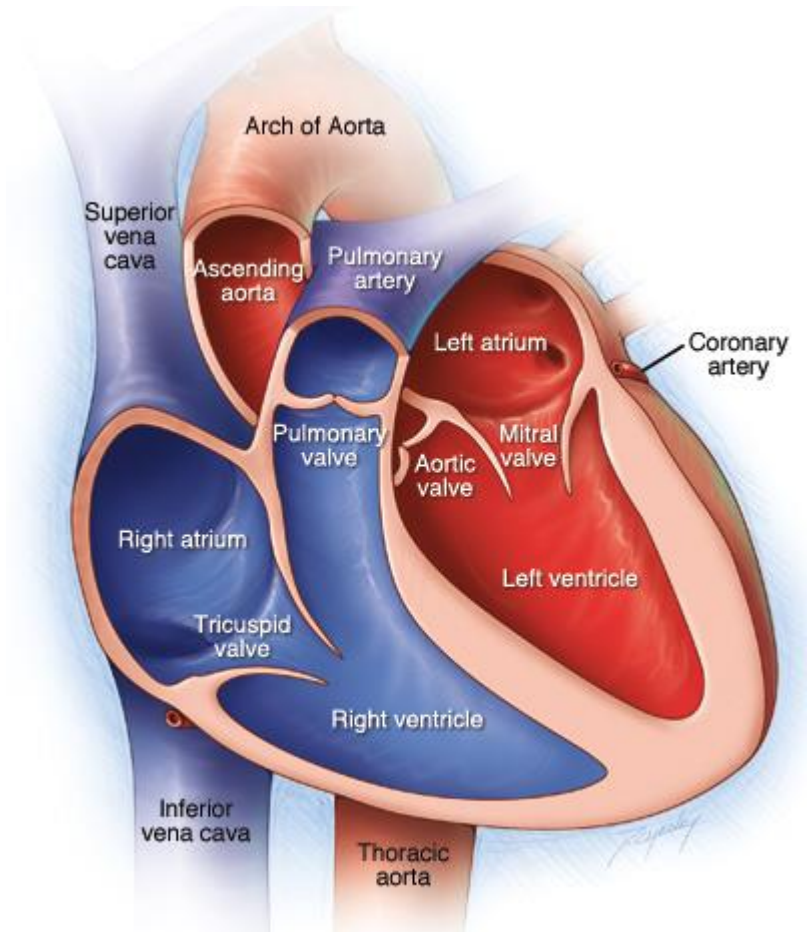
- It is located in the thoracic cavity in a place known as the **Middle Mediastinum** between the two pleural sacs.
- Enclosed by a double sac of serous membrane (**Pericardium**).
- 2/3 of the heart lies to the left of median plane.
- The outer wall of the heart is made up of three layers:
 - **Epicardium.**
 - **Myocardium (muscle of the heart).**
 - **Endocardium.**



CHAMBERS OF THE HEART

ATRIA:

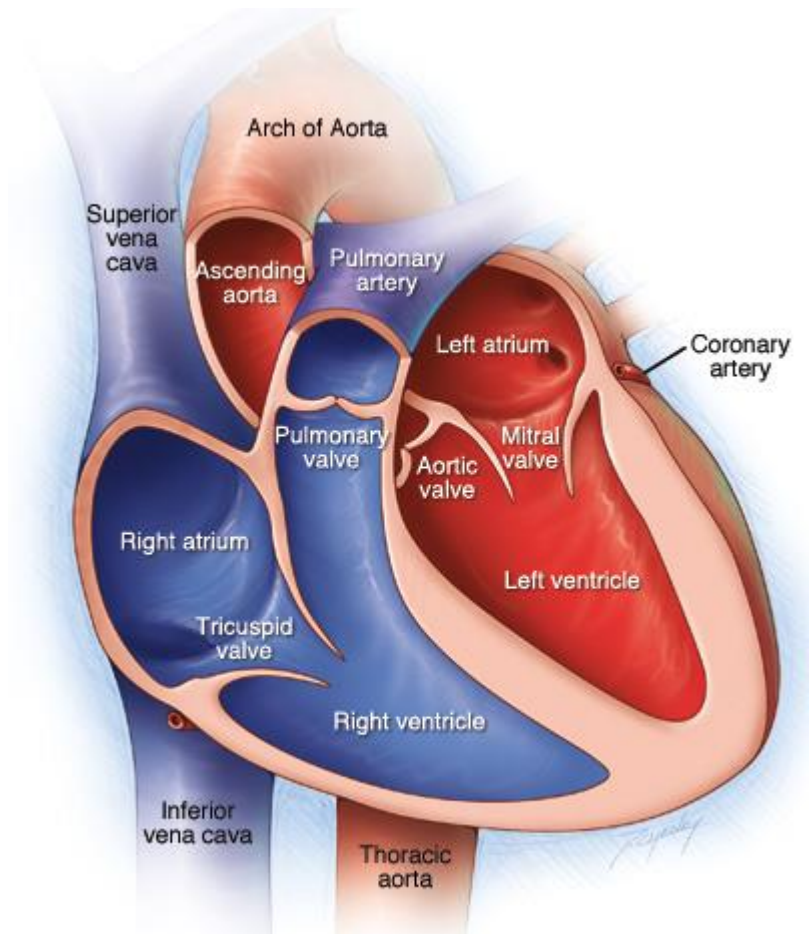
- **They are two (Right & Left).**
- **Superior in position.**
- **They are the receiving chambers.**
- **They have thin walls.**
- **The upper part of each atrium is the Auricle.**
- **The Right Atrium receives the venous blood coming to the heart.**
- **Left Atrium receives arterial blood coming from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



CHAMBERS OF THE HEART

VENTRICLES:

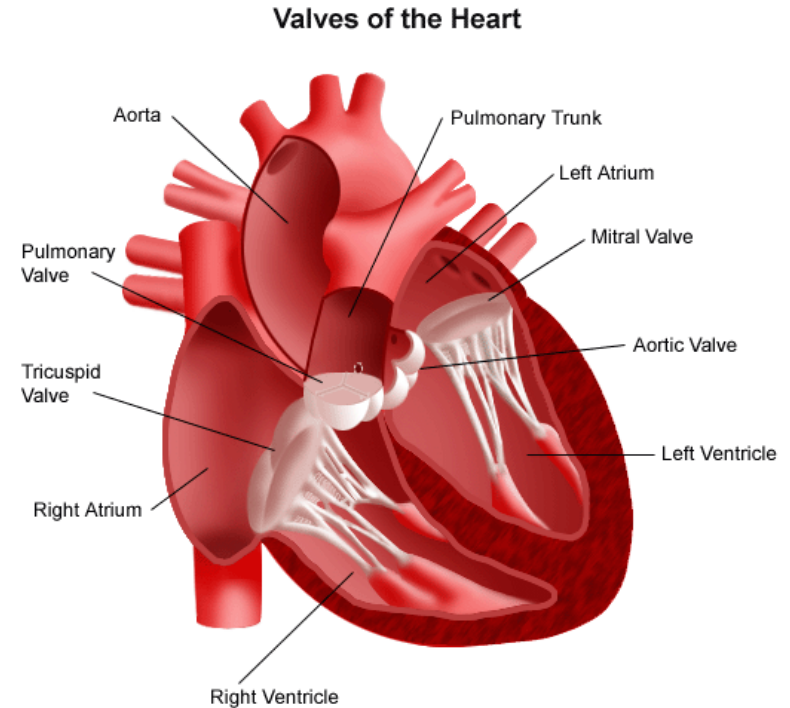
- **The inferior chambers.**
- **They are two (right & left).**
- **They have thick walls.**
- **They are the discharging chambers (actual pumps).**
- **Their contraction propels blood out of the heart into the circulation.**



VALVES OF THE HEART

The heart has FOUR VALVES:

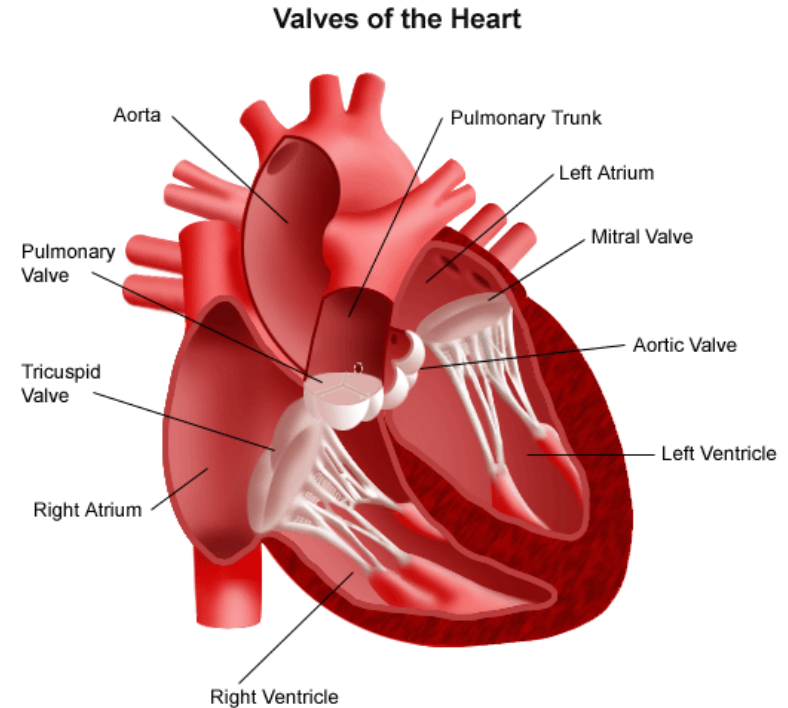
- **Two Atrio-Ventricular valves.**
- **One Aortic Semilunar valve.**
- **One Pulmonary Semilunar valve.**



VALVES OF THE HEART

Atrioventricular Valves:

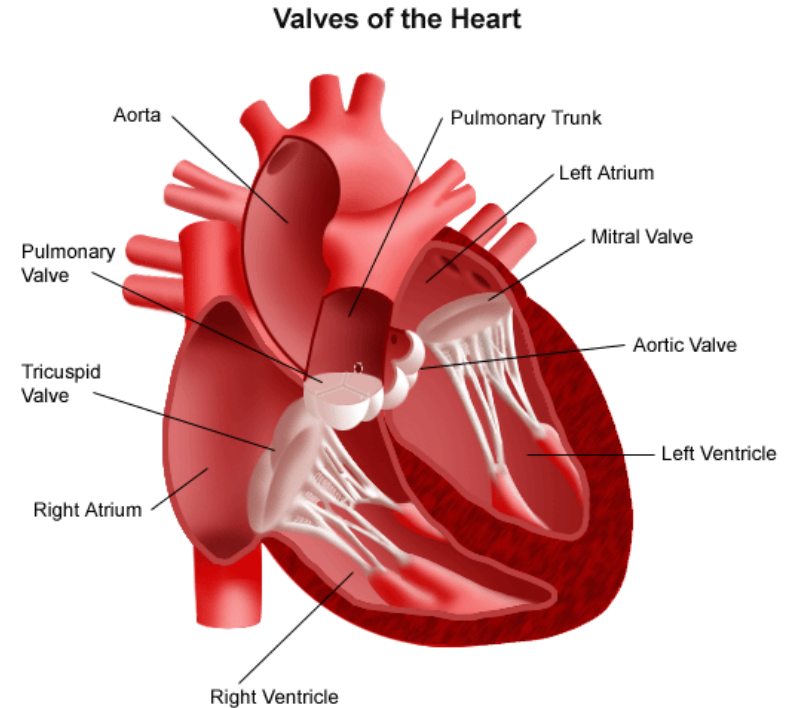
- **Valves between atria & ventricles.**
- **They allow the blood to flow in one direction from the atria to the ventricles.**
- **Right AVV (Tricuspid).**
- **Left AVV (Bicuspid).**



VALVES OF THE HEART

Semilunar Valves (Aortic & Pulmonary):

- **Between the right and left ventricles and the great arteries leaving the heart.**
 - **Aortic Semilunar Valve**
 - **Pulmonary Semilunar Valve**
- **They allow the flow of blood from the ventricles to these arteries.**



BLOOD VESSELS

Arteries:

- **Thick walls.**
- **Do not have valves.**
- **The smallest arteries are arterioles.**

Veins:

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

Capillaries

- **Connect arterioles and venules.**
- **Help to enable the exchange of water, oxygen and other nutrients between blood and the tissues.**

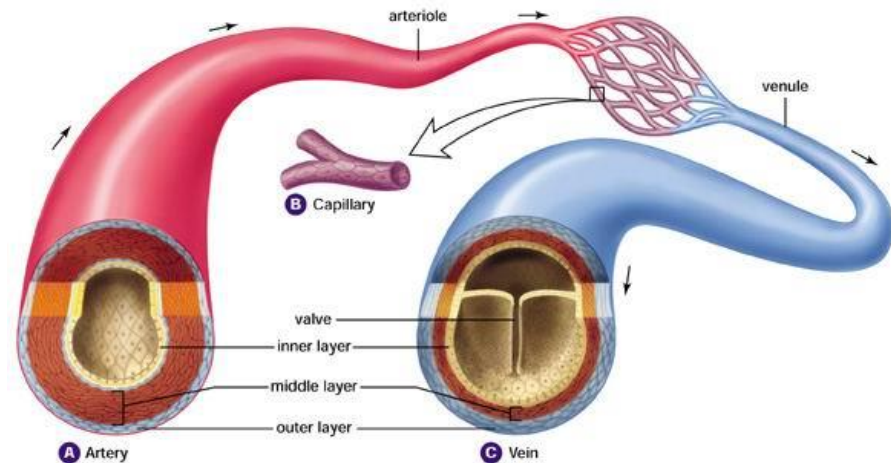


Figure 9.12. Sections through an artery, capillary, and vein. At any given moment, about 30% of the blood in your systemic circulation will be found in the arteries, 5% in the capillaries, and 65% in the veins.

ARTERIES

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

□ Carry oxygenated blood away from the heart.

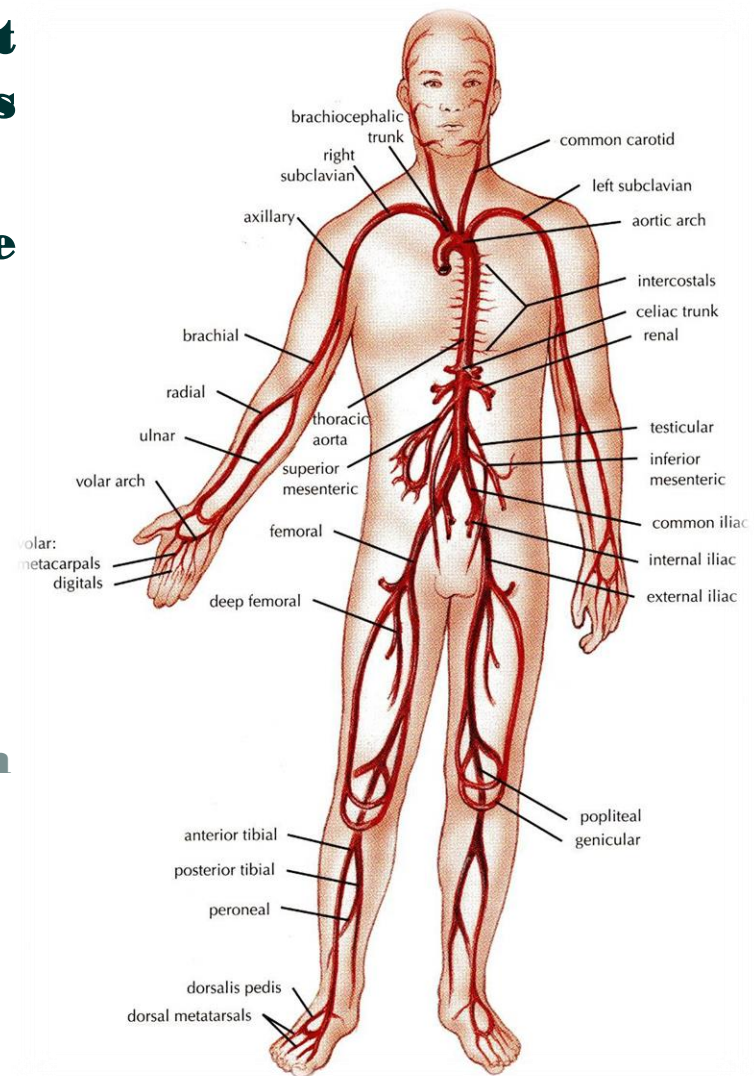
○ **Two Exceptions:**

■ **The pulmonary arteries.**

Carries deoxygenated blood from the heart to the lungs.

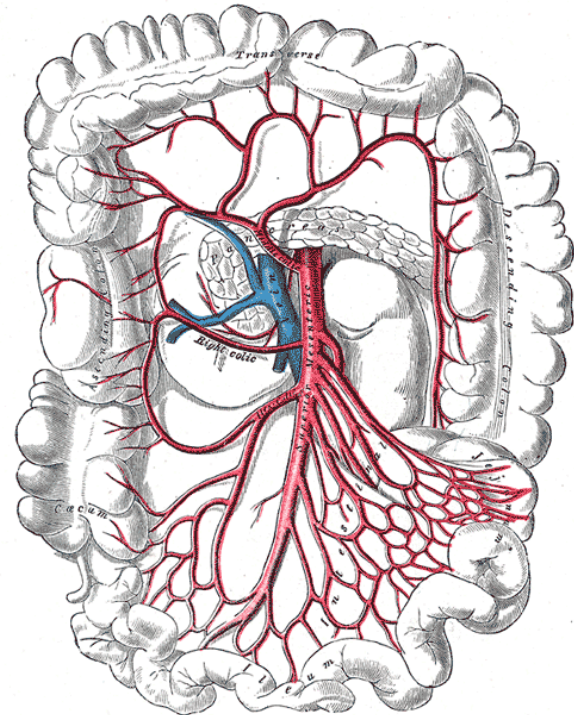
■ **The umbilical arteries.**

Supplies deoxygenated blood from the fetus to the placenta in the umbilical cord.



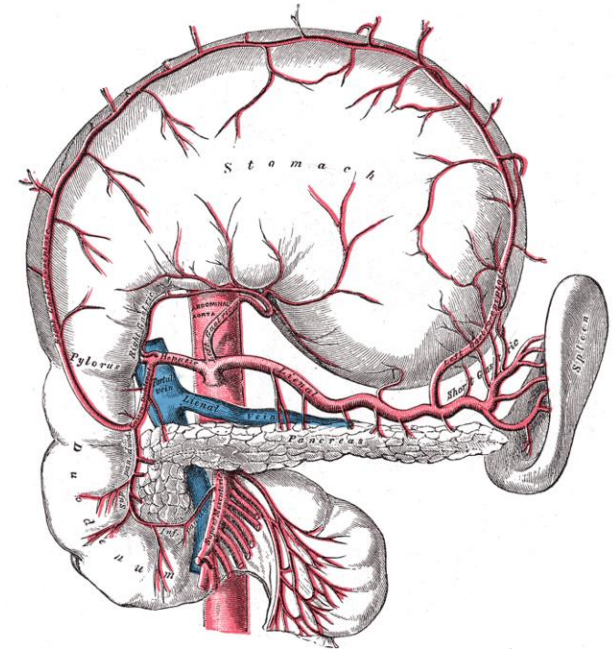
ANASTOMOSIS

- **It is the connection of two structures.**
- **It is the joining of terminal branches of the arteries.**



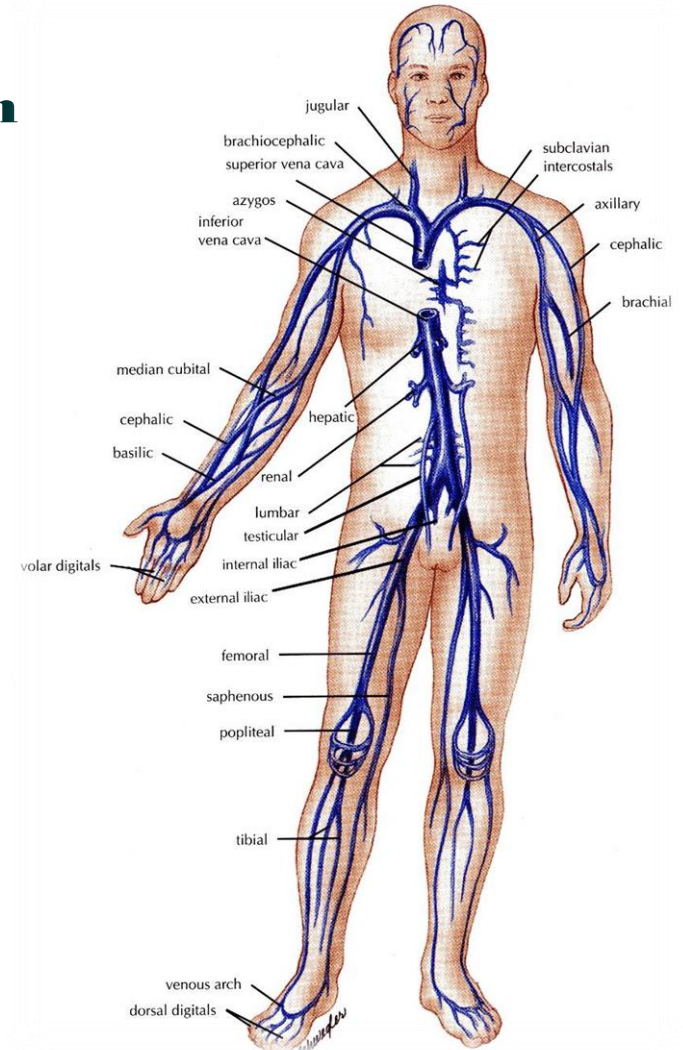
END ARTERIES

- **It is the artery that is the only supply of oxygenated blood to a portion of tissue.**
- **Arteries which do not anastomose with their neighbors are called end arteries.**
- **Examples:**
 - ✓ **Splenic artery.**
 - ✓ **Renal artery.**



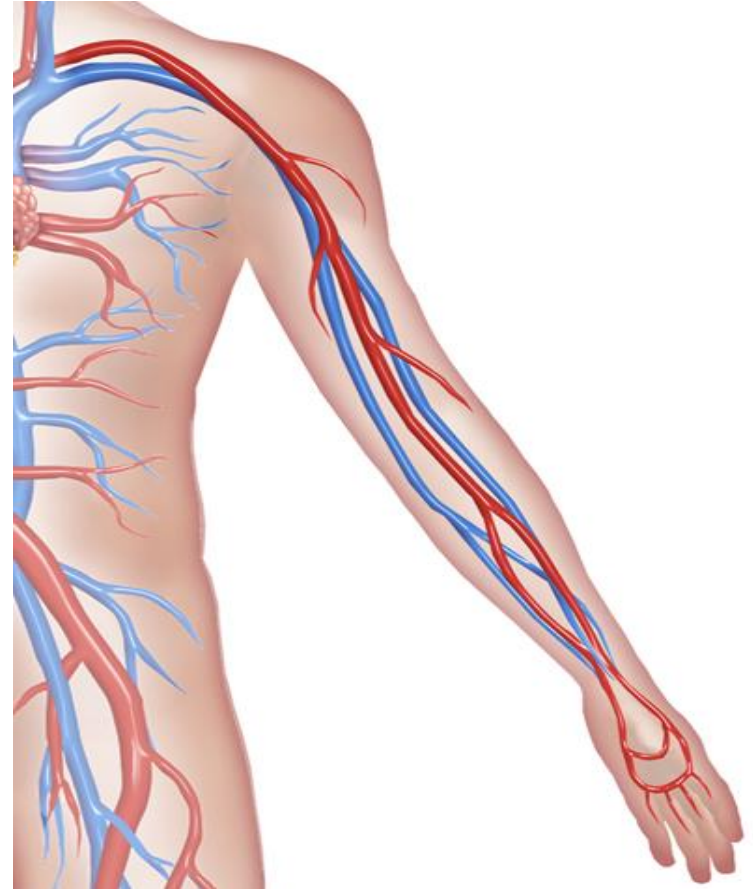
VEINS

- **They transport blood back to the heart.**
- **The smaller veins (Tributaries) unite to form larger veins which commonly join with one another to form Venous Plexuses.**
- **Carry deoxygenated blood toward the heart.**
 - **Two Exceptions:**
 - ✓ **the pulmonary veins.**
receive oxygenated blood from the lungs and drain into the left atrium of the heart.
 - ✓ **the umbilical veins.**
carry oxygenated blood from the placenta to the growing fetus.



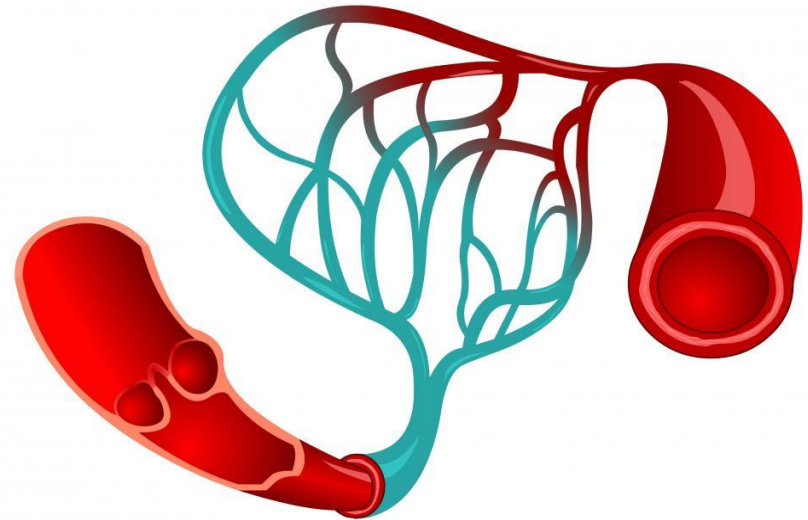
DEEP VEINS (VENAE COMITANTES)

- **Two veins that accompany medium sized deep arteries**
- **Vena comitans is Latin for accompanying vein.**
- **They are found in close to arteries so that the pulsations of the artery aid venous return.**
- **Venae comitantes are usually found with smaller arteries, especially those in the limbs.**
 - **Larger arteries do not have venae comitantes. They usually have a single, similarly sized vein.**



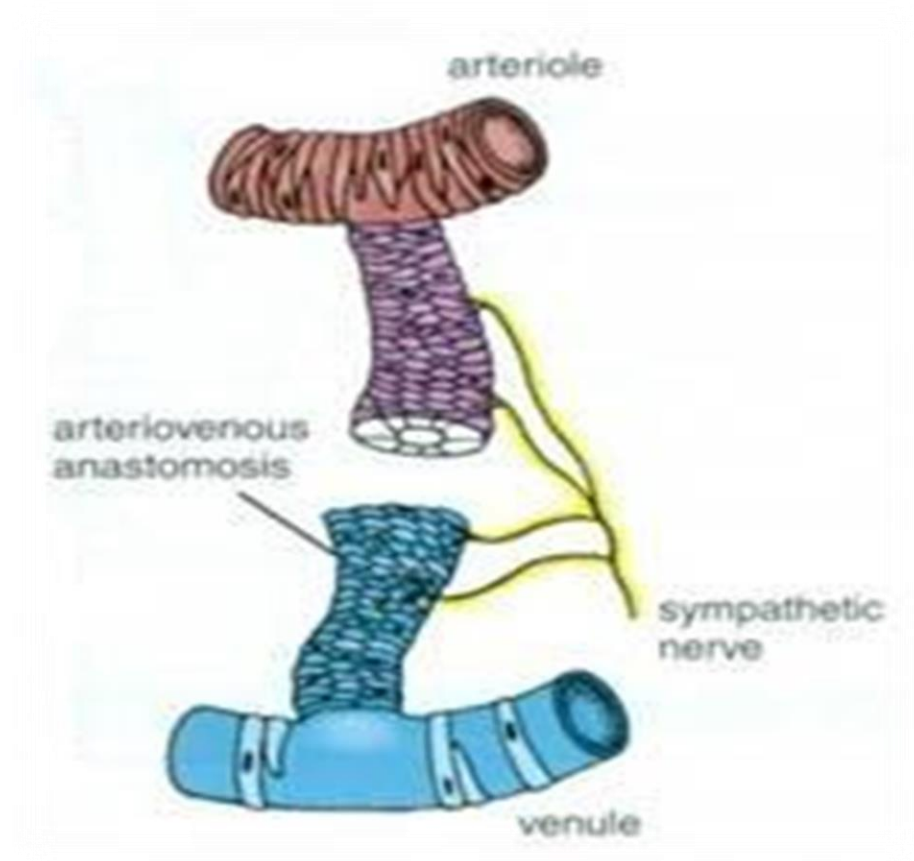
CAPILLARIES

- **Microscopic vessels in the form of a network.**
- **They connect the Arterioles to the Venules.**
- **They help to enable the exchange of water, oxygen and many other nutrients between blood and the tissues.**



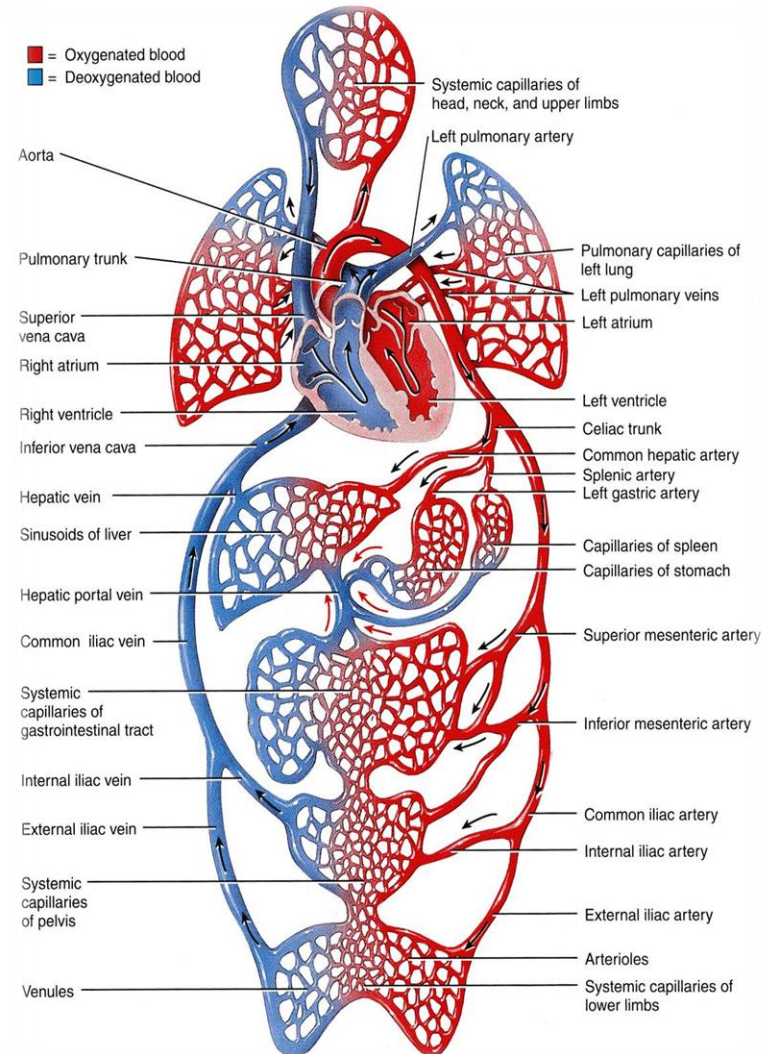
ARTERIOVENOUS ANASTOMOSIS

- **Direct connections between the arteries and veins without the intervention of capillaries.**
- **Found in tips of the fingers and toes.**



PORTAL CIRCULATION SYSTEM

- **Portal Venous System occurs when a capillary bed pools into another capillary bed through veins, without first going through the heart.**
- **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 again into veins of diminishing size which ultimately join capillary like vessels (Sinusoids).**



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.**
- **The portal system is composed of two sets of capillaries.**
- **The veins from the GIT go first to the liver through the portal vein.**

Review Question # 1

❖ **Which one of the following is NOT true?**

- 1. Right atria receive blood from the body.**
- 2. The valve between right atrium and right ventricle called “Bicuspid”.**
- 3. Left ventricle discharging blood to the body.**
- 4. Right ventricle receives blood from right atrium.**
- 5. Valves allow blood to move one way only.**

Review Question # 2

❖ **Which statement of the following is TRUE?**

- 1. Arteries transport blood from the heart to the body.**
- 2. Arteriovenous anastomosis found in tips of the fingers and toes.**
- 3. Capillaries connect the Arterioles to the Venules.**
- 4. Anastomosis is the joining of terminal branches of the arteries.**
- 5. Veins leaving the gastrointestinal tract do not go direct to the heart.**

QUESTIONS !