

Cardiovascular System



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ADVICE

اعترف بخطأك عندما تكون على خطأ واحتفظ برباطة جأشك
عندما تكون على حق لتحظى بعلاقات دافئة مع الآخرين

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.**
- **Describe the component of the blood and its function.**

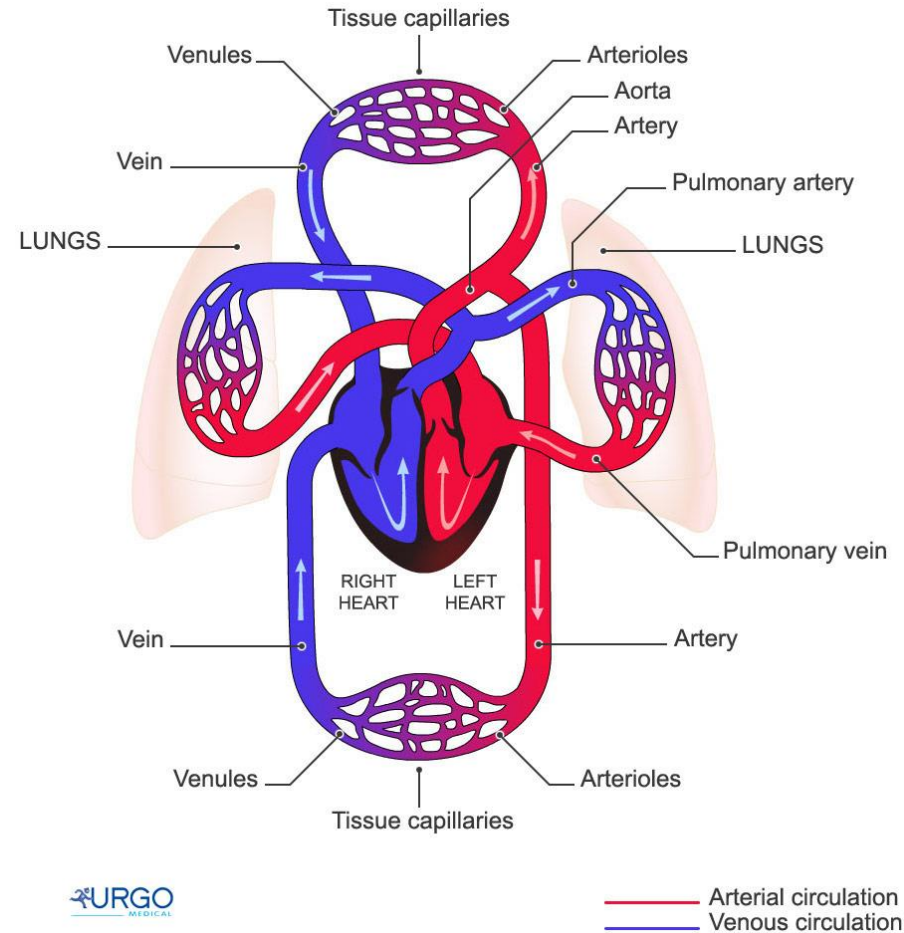
CONTENT

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



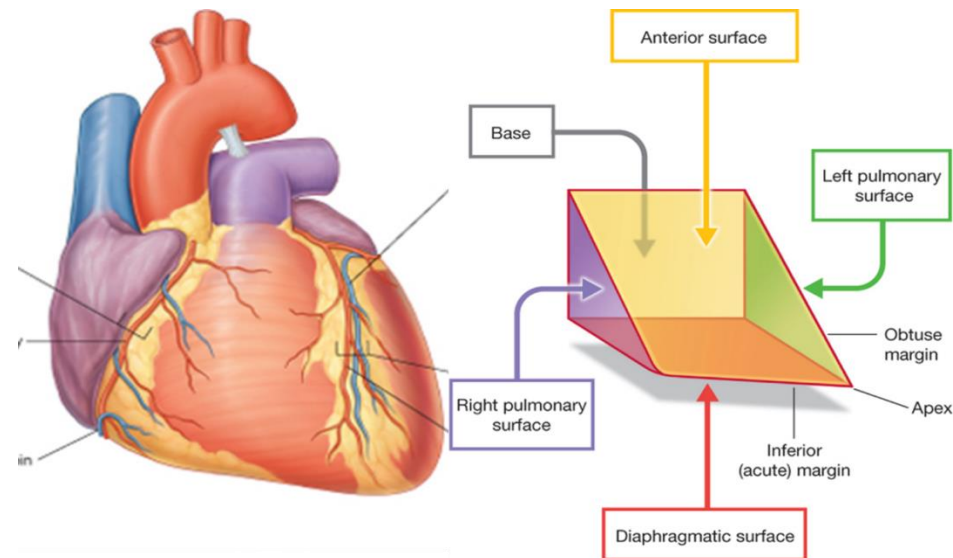
FUNCTIONS

- **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.**



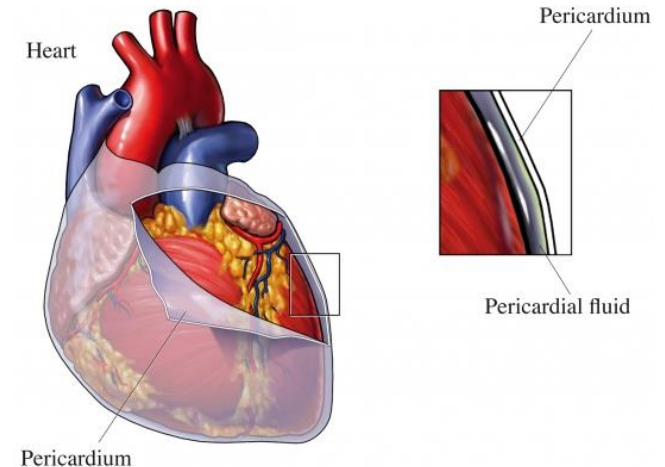
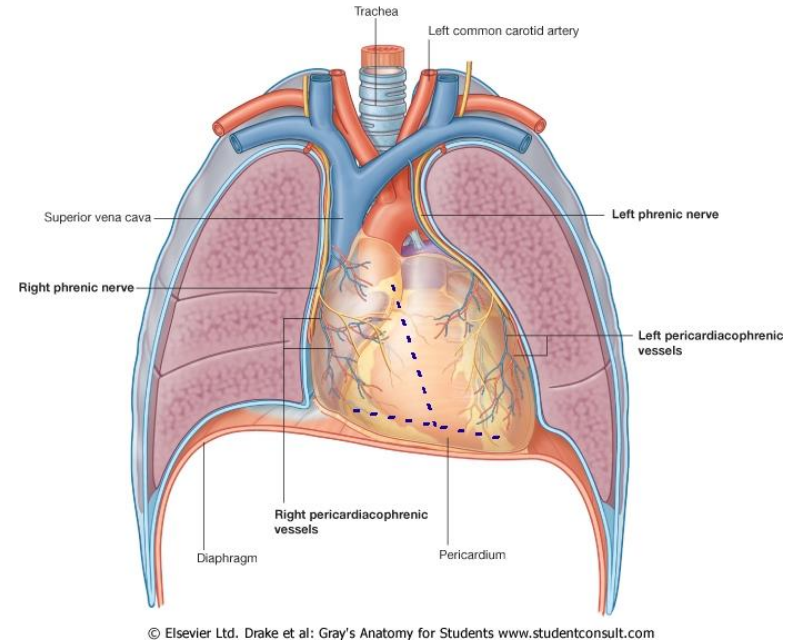
THE HEART

- **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

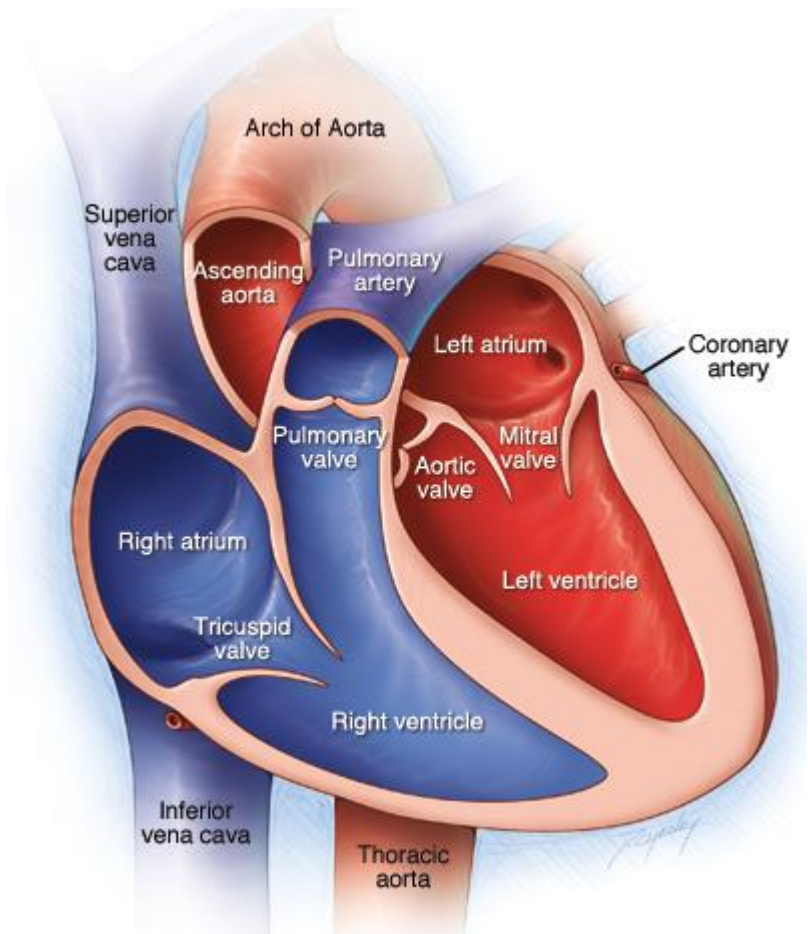
- It is located in the thoracic cavity in a place known as the **Middle Mediastinum** between the two pleural sacs.
- Enclosed by a double sac of serous membrane (**Pericardium**).
- 2/3 of the heart lies to the left of median plane.
- The outer wall of the heart is made up of three layers:
 - **Epicardium.**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



CHAMBERS OF THE HEART

ATRIA:

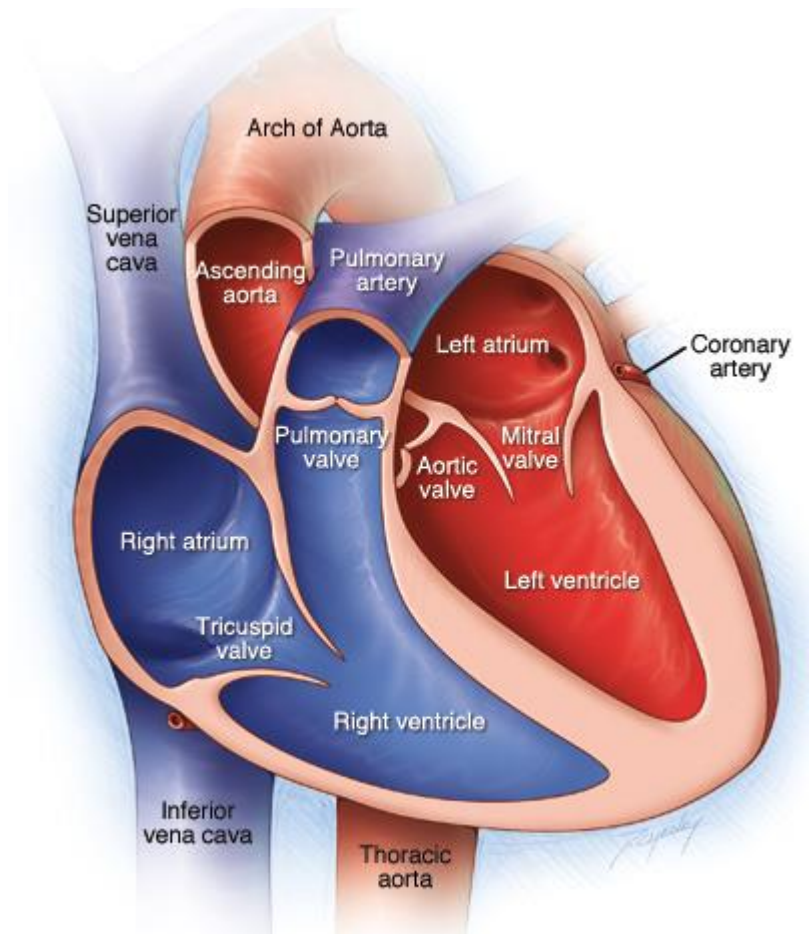
- **They are two (Right & Left).**
- **Superior in position.**
- **They are the receiving chambers.**
- **They have thin walls.**
- **The upper part of each atrium is the Auricle.**
- **The Right Atrium receives the venous blood coming to the heart.**
- **Left Atrium receives arterial blood coming from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



CHAMBERS OF THE HEART

VENTRICLES:

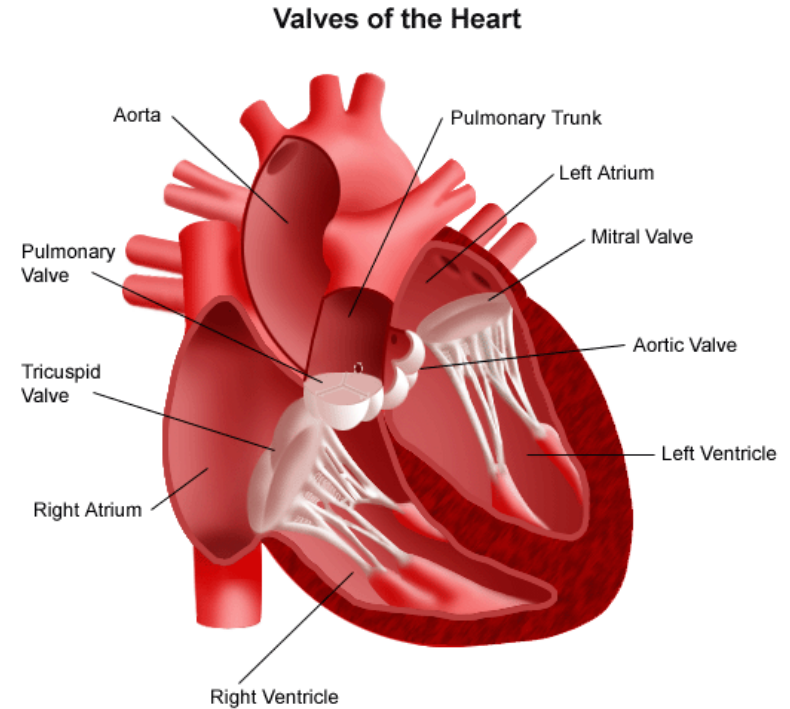
- **The inferior chambers.**
- **They are two (right & left).**
- **They have thick walls.**
- **They are the discharging chambers (actual pumps).**
- **Their contraction propels blood out of the heart into the circulation.**



VALVES OF THE HEART

The heart has FOUR VALVES:

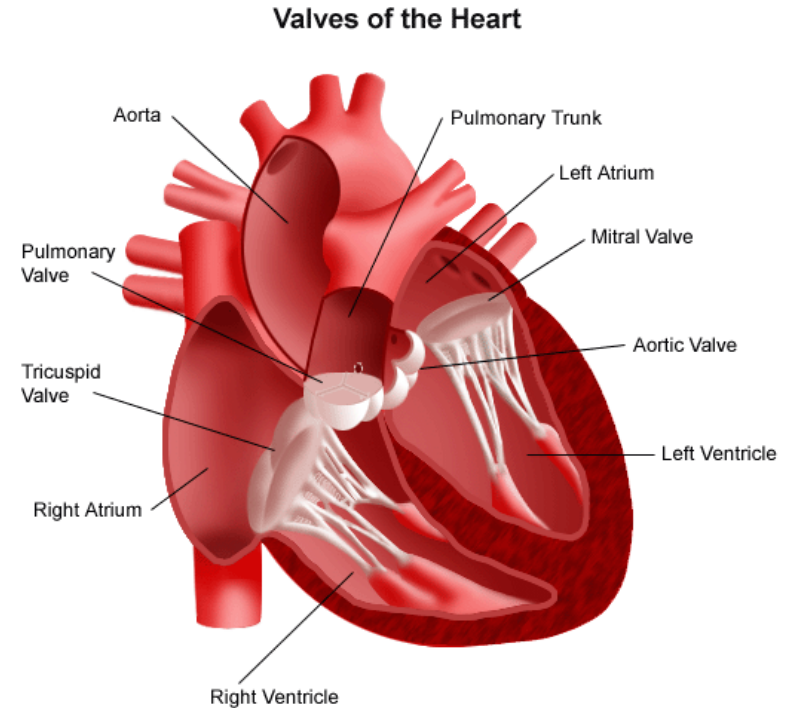
- **Two Atrio-Ventricular valves.**
- **One Aortic Semilunar valve.**
- **One Pulmonary Semilunar valve.**



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).**

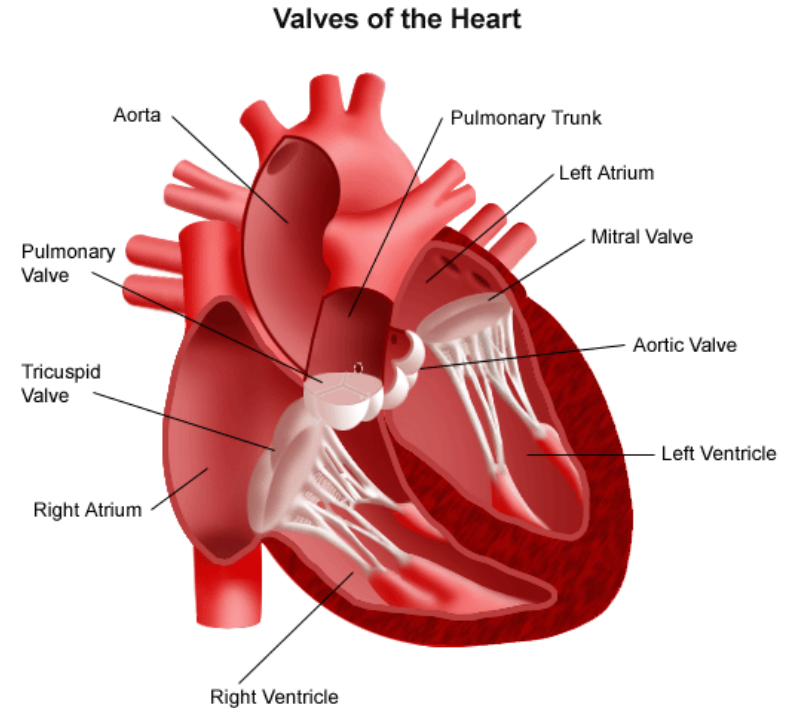


VALVES OF THE HEART

SEMILUNAR VALVES

(AORTIC & PULMONARY):

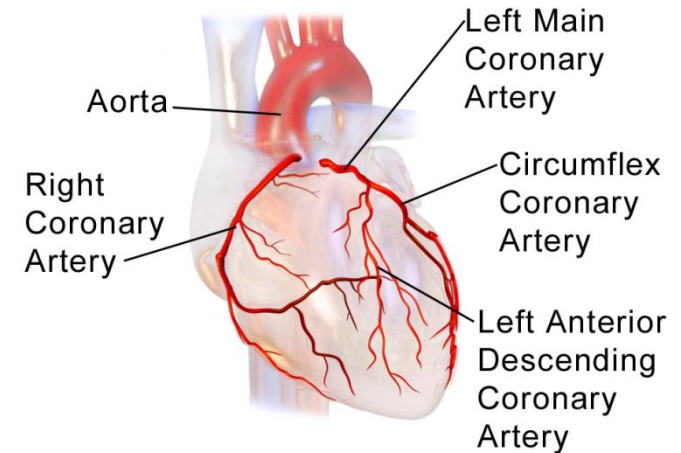
- **Between the right and left ventricles and the great arteries leaving the heart.**
 - **Aortic Semilunar Valve**
 - **Pulmonary Semilunar Valve**
- **They allow the flow of blood from the ventricles to these arteries.**



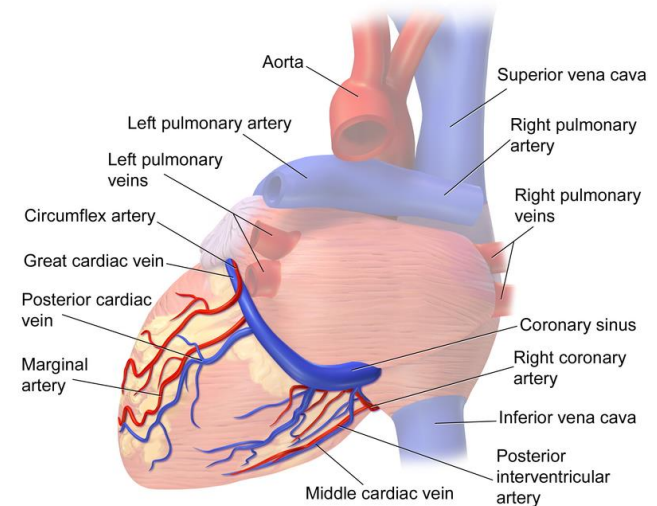
BLOOD CIRCULATION OF THE HEART

CORONARY CIRCULATION

- **The heart has its own blood vessels that provide the myocardium with the oxygen and nutrients necessary to be able to pump blood to the body.**
- **The left and right coronary arteries branch off from the aorta and provide blood to the left and right sides of the heart.**
- **The coronary sinus is a vein on the posterior side of the heart that returns deoxygenated blood from the myocardium to the vena cava.**
- **Great, middle and small coronary veins drain into coronary sinus.**
- **Coronary sinus drains into right atrium.**

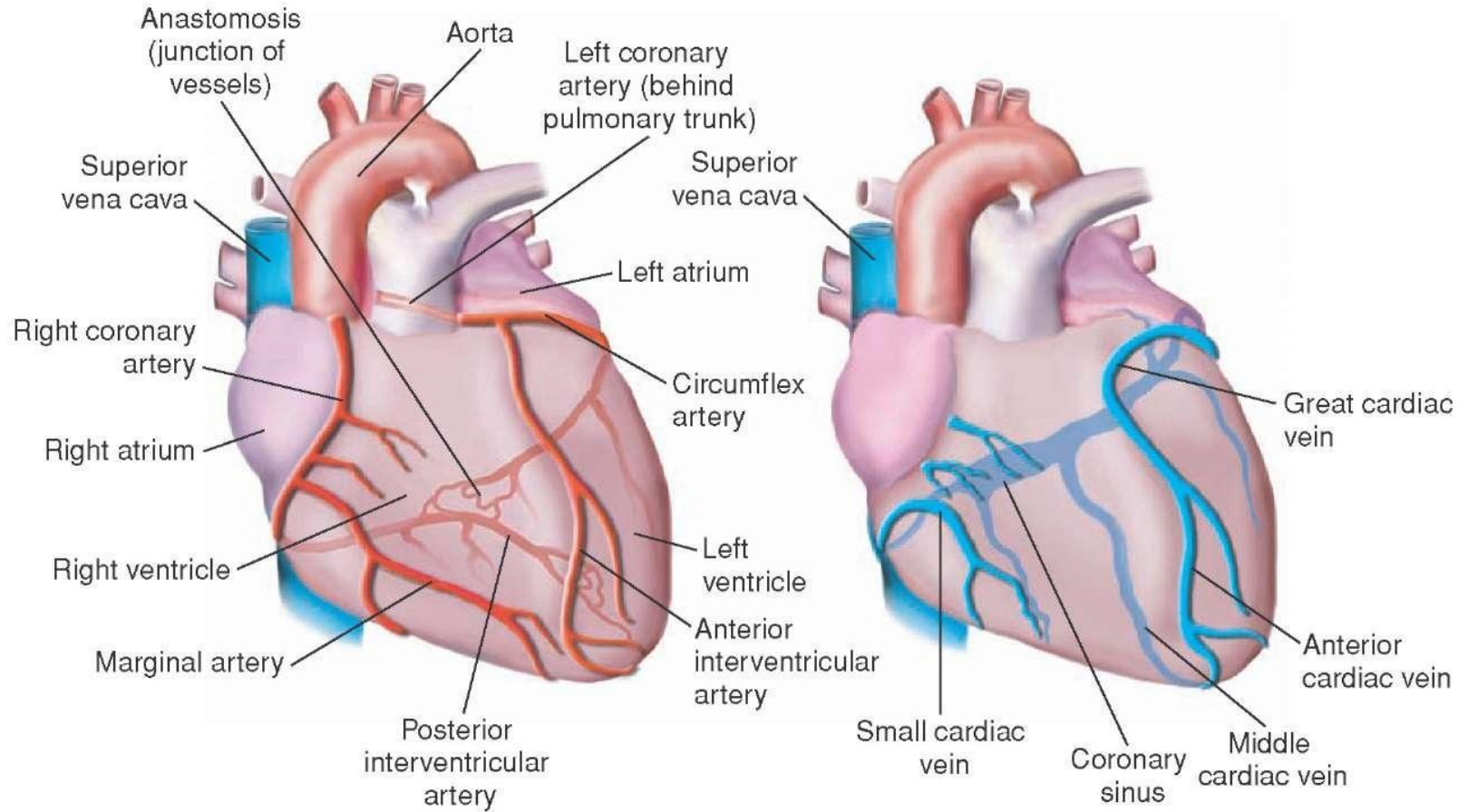


Coronary Arteries



Coronary Circulation (Posterior)

BLOOD CIRCULATION OF THE HEART



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.**

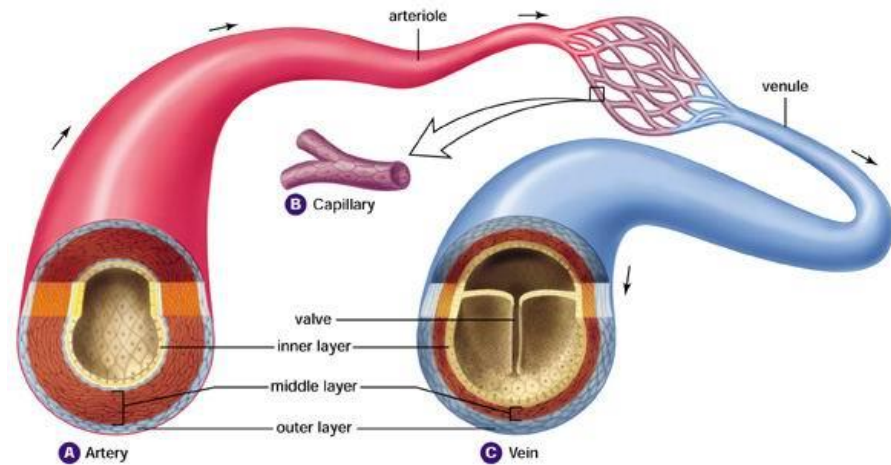


Figure 9.12. Sections through an artery, capillary, and vein. At any given moment, about 30% of the blood in your systemic circulation will be found in the arteries, 5% in the capillaries, and 65% in the veins.

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.

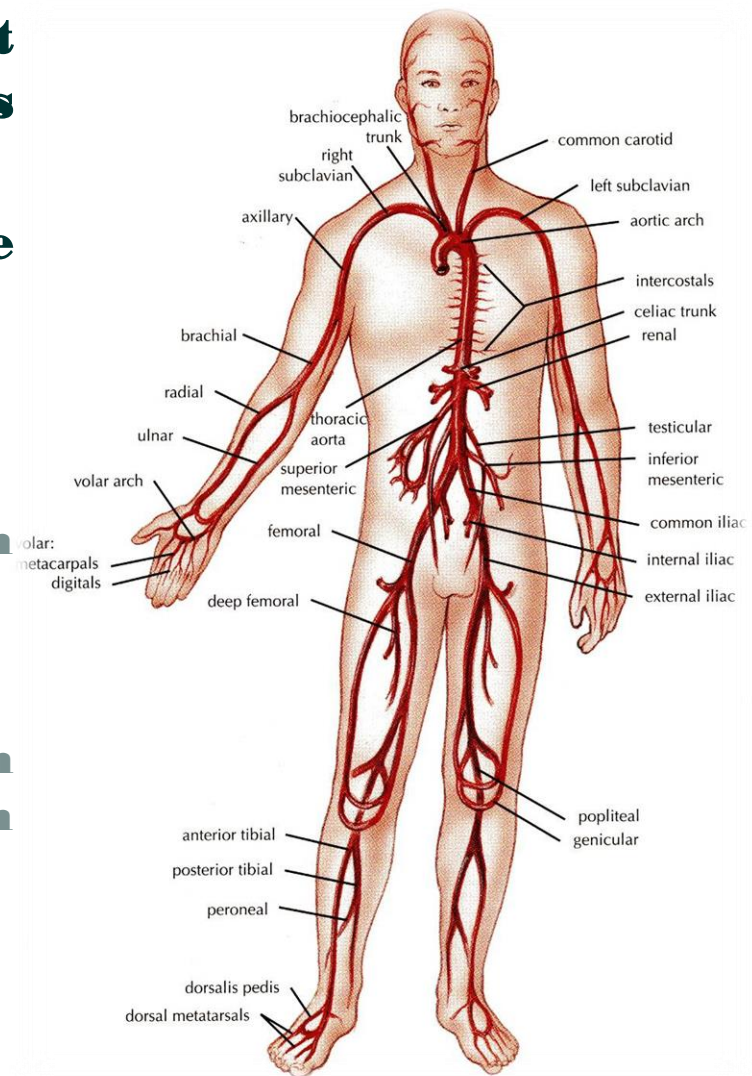
○ **TWO EXCEPTIONS:**

■ **The pulmonary arteries.**

Carries deoxygenated blood from the heart to the lungs.

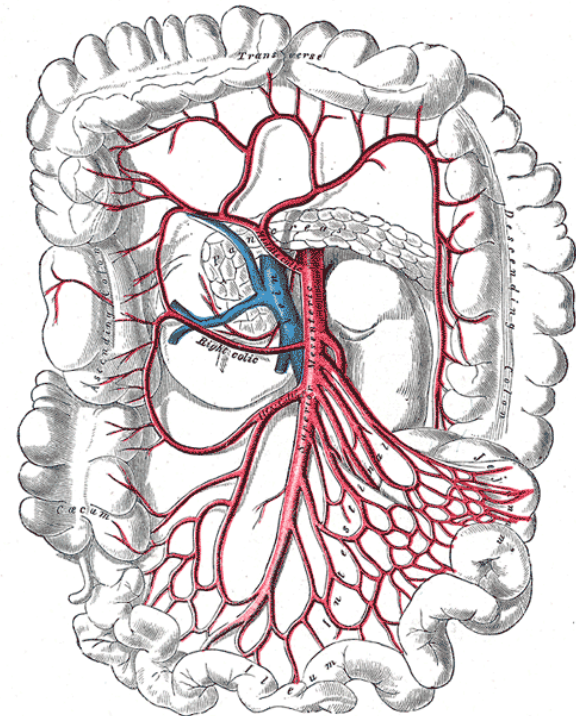
■ **The umbilical arteries.**

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



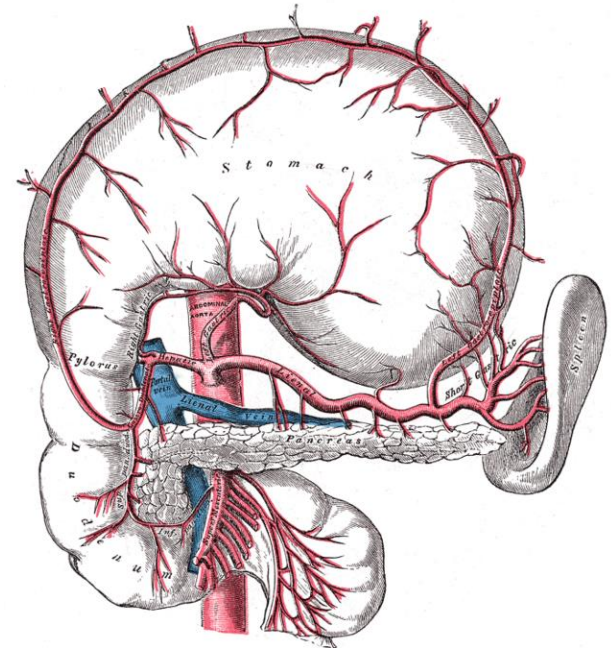
ANASTOMOSIS

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



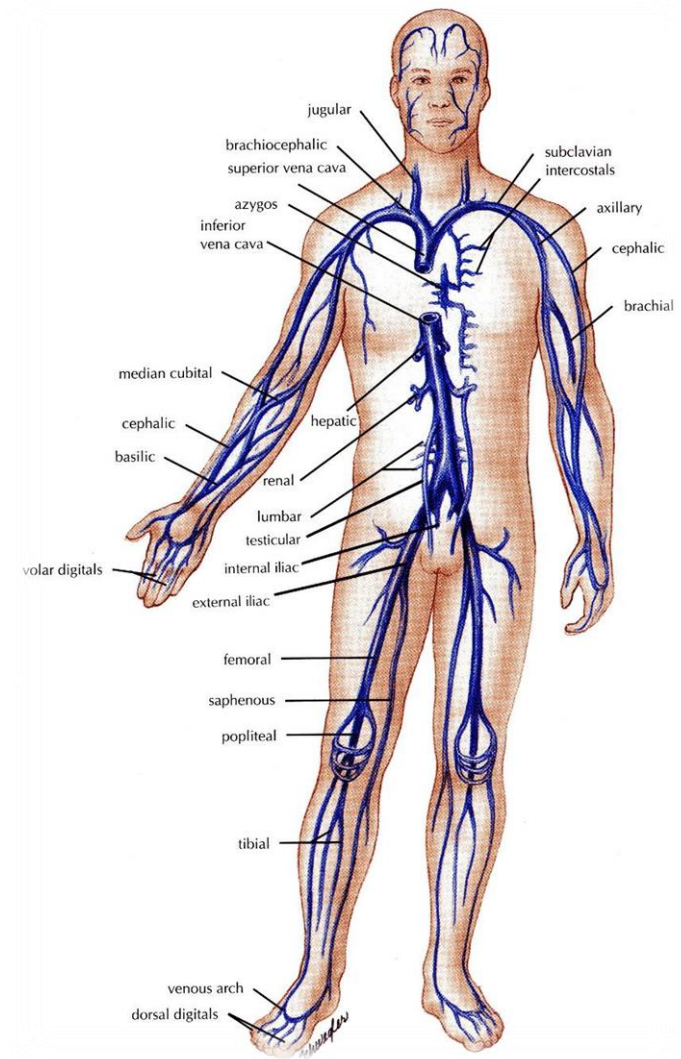
END ARTERIES

- **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.**



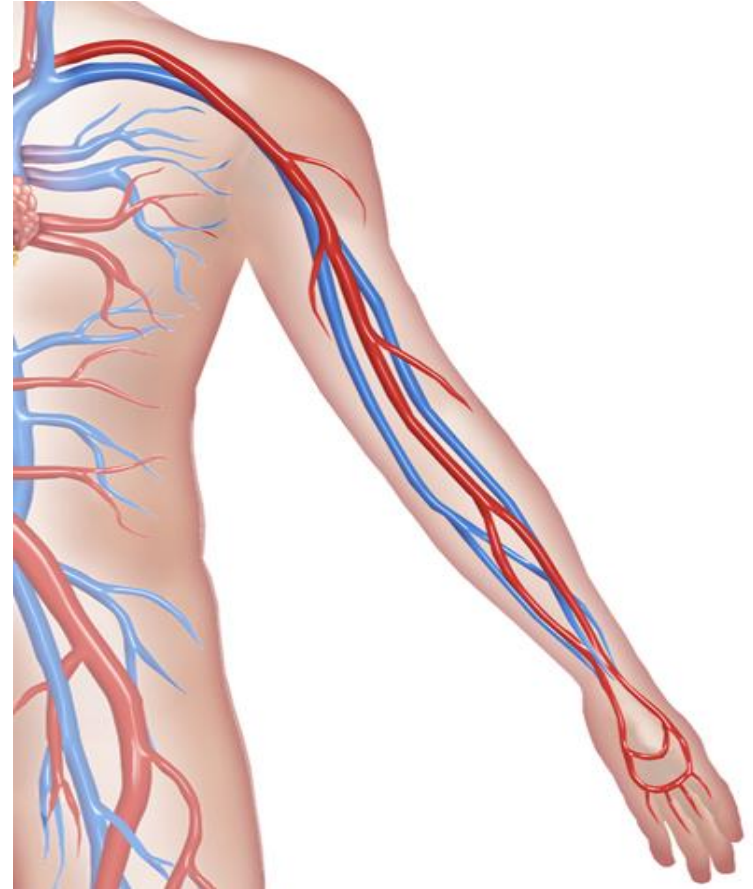
VEINS

- **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.



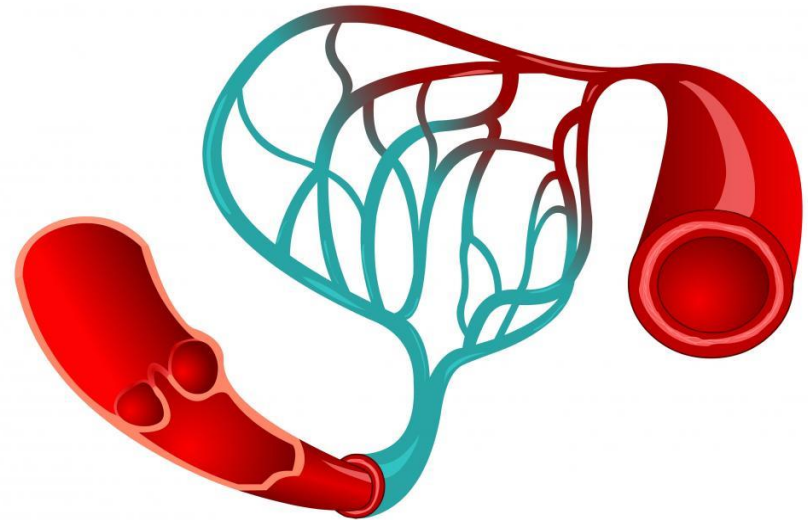
DEEP VEINS (VENAE COMITANTES)

- **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.**



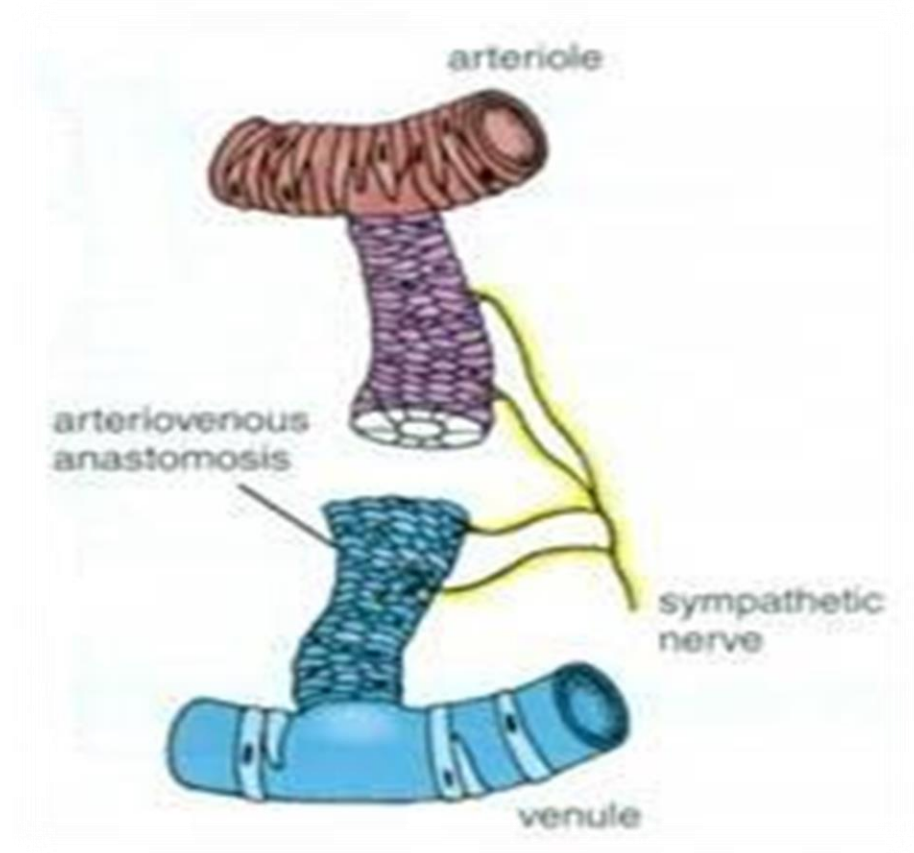
CAPILLARIES

- **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.**



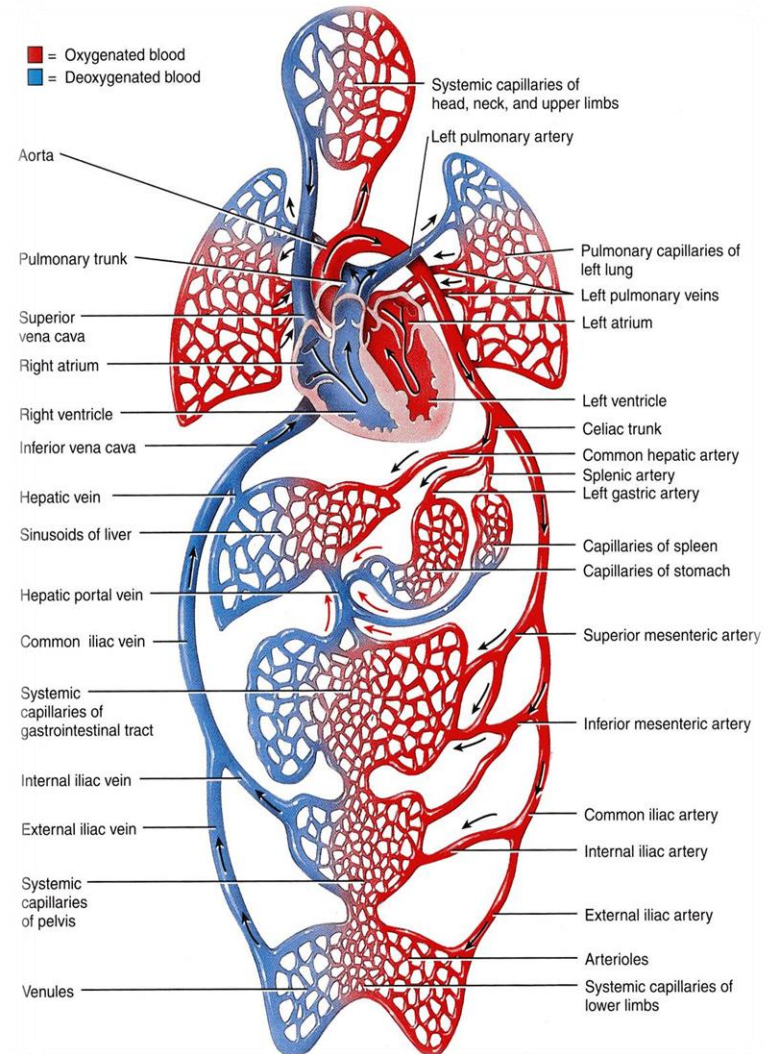
ARTERIOVENOUS ANASTOMOSIS

- **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).**



BLOOD

- **Blood is the actual carrier of the oxygen and nutrients into arteries.**
- **Blood is made mostly of plasma, which is a yellowish liquid that is 90% water.**
- **Plasma contains also salts, glucose and other substances.**
- **Most important, plasma contains proteins that carry important nutrients to the body's cells and strengthen the body's immune system.**
- **Blood has main 3 types of blood cells that circulate with the plasma.**



TYPES OF BLOOD CELLS

PLATELETS:

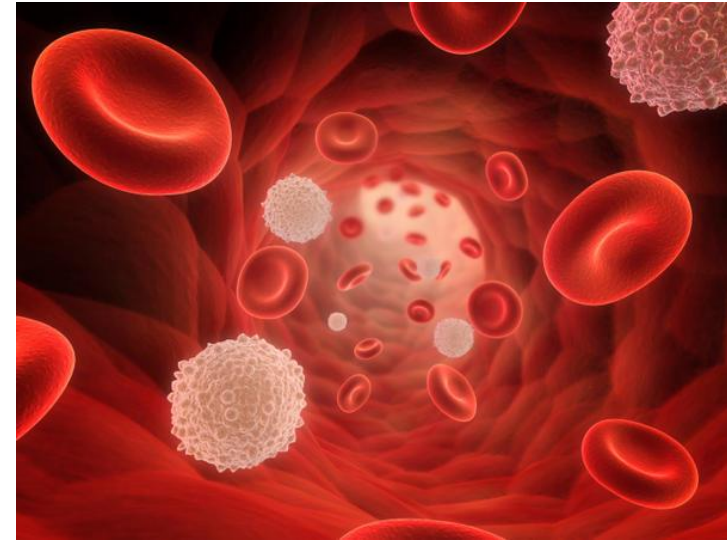
- **Helping the blood to clot. Clotting stops the blood from flowing out of the body when a vein or artery is broken. Platelets are also called **thrombocytes**.**

RED BLOOD CELLS

- **Carry oxygen. A healthy adult has about 35 trillion of them. Red blood cells are also called **erythrocytes**.**

WHITE BLOOD CELLS

- **These cells, which come in many shapes and sizes, are vital to the immune system against infections. When the body is fighting off infection, they increase. White blood cells are also called **leukocytes**.**



CARDIOVASCULAR DISEASES

HEART ATTACK

- **Occurs when blood flow to a part of the heart is blocked by a blood clot. If this clot cuts off the blood flow completely, the part of the heart muscle supplied by that artery begins to die. Most people survive their first heart attack and return to their normal lives to enjoy many more years of productive activity.**



ISCHEMIC STROKE

- **Happens when a blood vessel that feeds the brain gets blocked, usually from a blood clot. When the blood supply to a part of the brain is shut off, brain cells will die.**

CARDIOVASCULAR DISEASES

HEMORRHAGIC STROKE

- **Occurs when a blood vessel within the brain bursts. The most likely cause is uncontrolled hypertension.**

HEART FAILURE

- **It means the heart isn't pumping blood as well as it should. The heart keeps working, but the body's need for blood and oxygen isn't being met.**

ARRHYTHMIA

- **This is an abnormal rhythm of the heart. The heart can beat too slow, too fast or irregularly.**

HEART VALVE PROBLEMS

- **When heart valves don't open enough to allow the blood to flow through as it should.**



SUMMARY

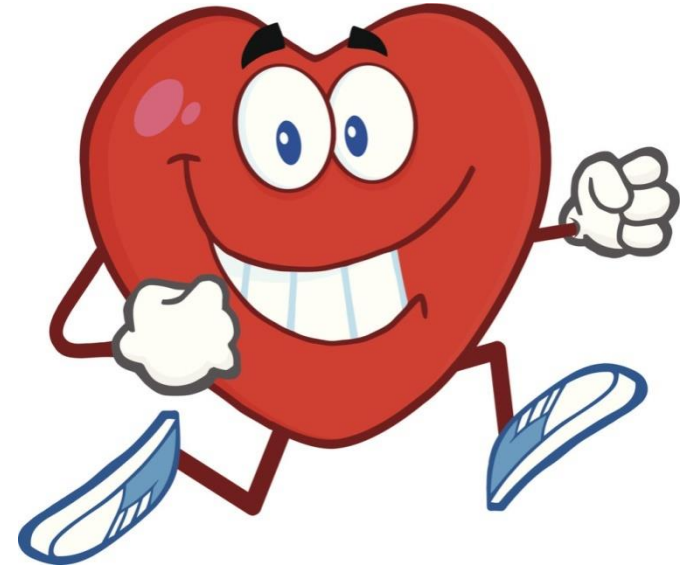
- **The cardiovascular system is a transporting system.**
- **It is composed of the heart and blood vessels.**
- **The heart is cone shaped, covered by pericardium and composed of four chambers.**
- **The blood vessels are the arteries, veins and capillaries.**
- **Arteries transport the blood from the 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.**
- **Blood is the actual carrier of the oxygen and nutrients into arteries.**

HAPPY HEART

Change life style ..

Eat well and healthy ..

Go to gym ..



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!