

Circulatory System

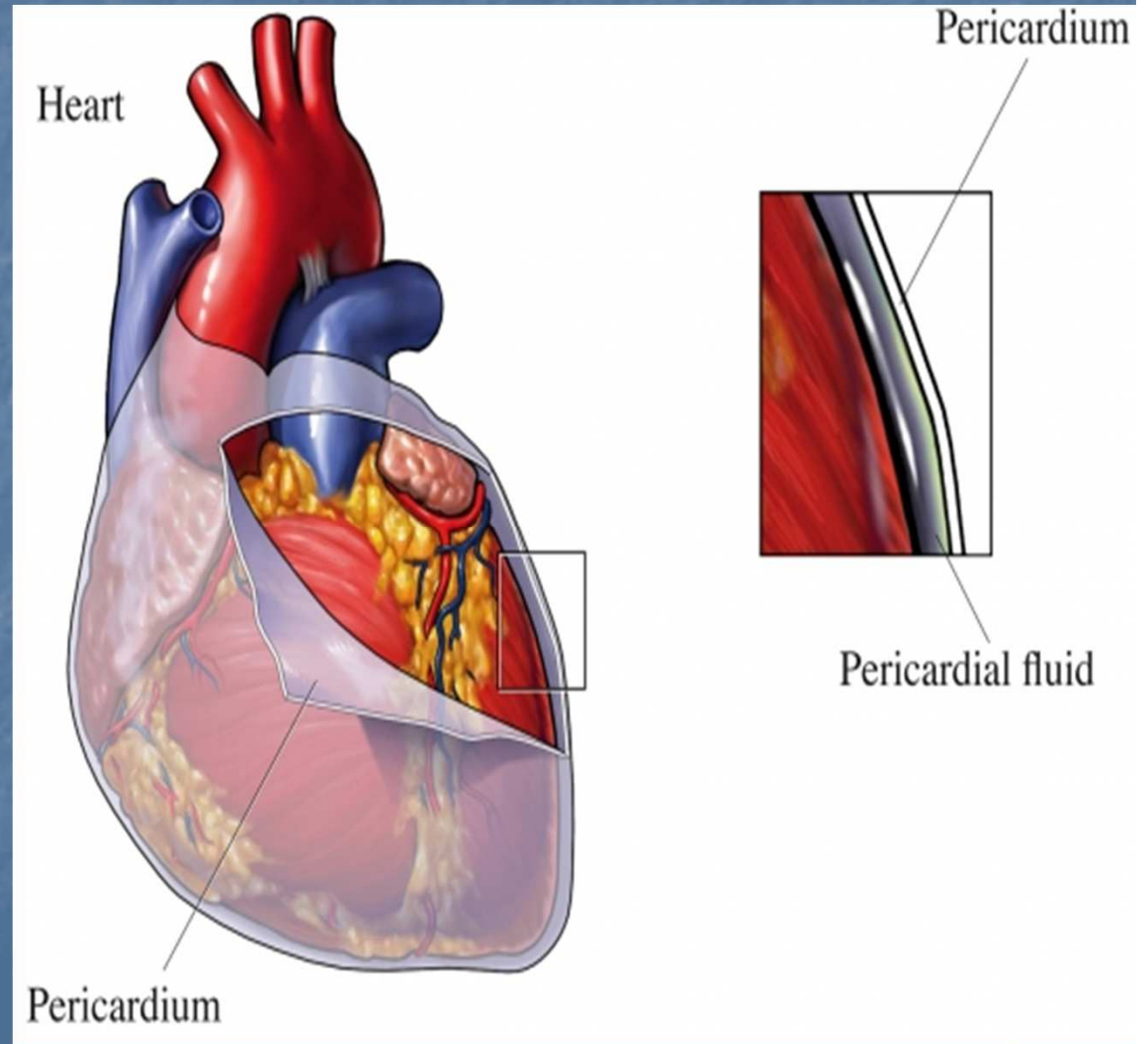
Obj: Explain the structure of the heart

Structure of the Heart

- Size, shape and location
 - 1. Size of a closed fist
 - 2. In thoracic cavity
 - 3. Apex: the tip of the heart that lies on the diaphragm and points to the left of the body
 - 4. Four chambers

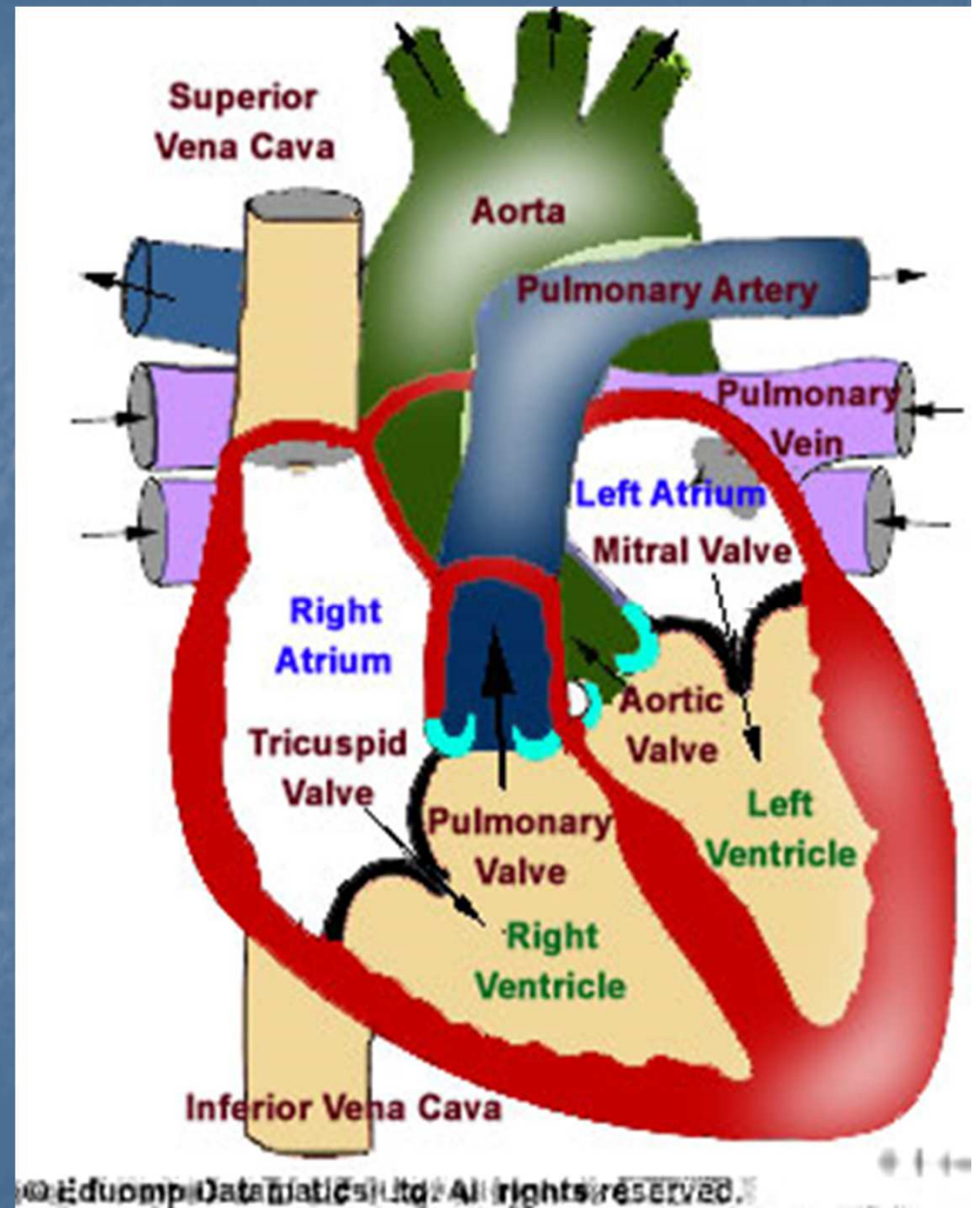
■ Layers

- 1. Pericardium: Sac (membrane) that surrounds the heart
- 2. Myocardium: muscular layer of the heart
- 3. Endocardium: smooth membrane that lines the inside of the heart and heart valves
- 4. Septum: partition between the R and L sides of the heart



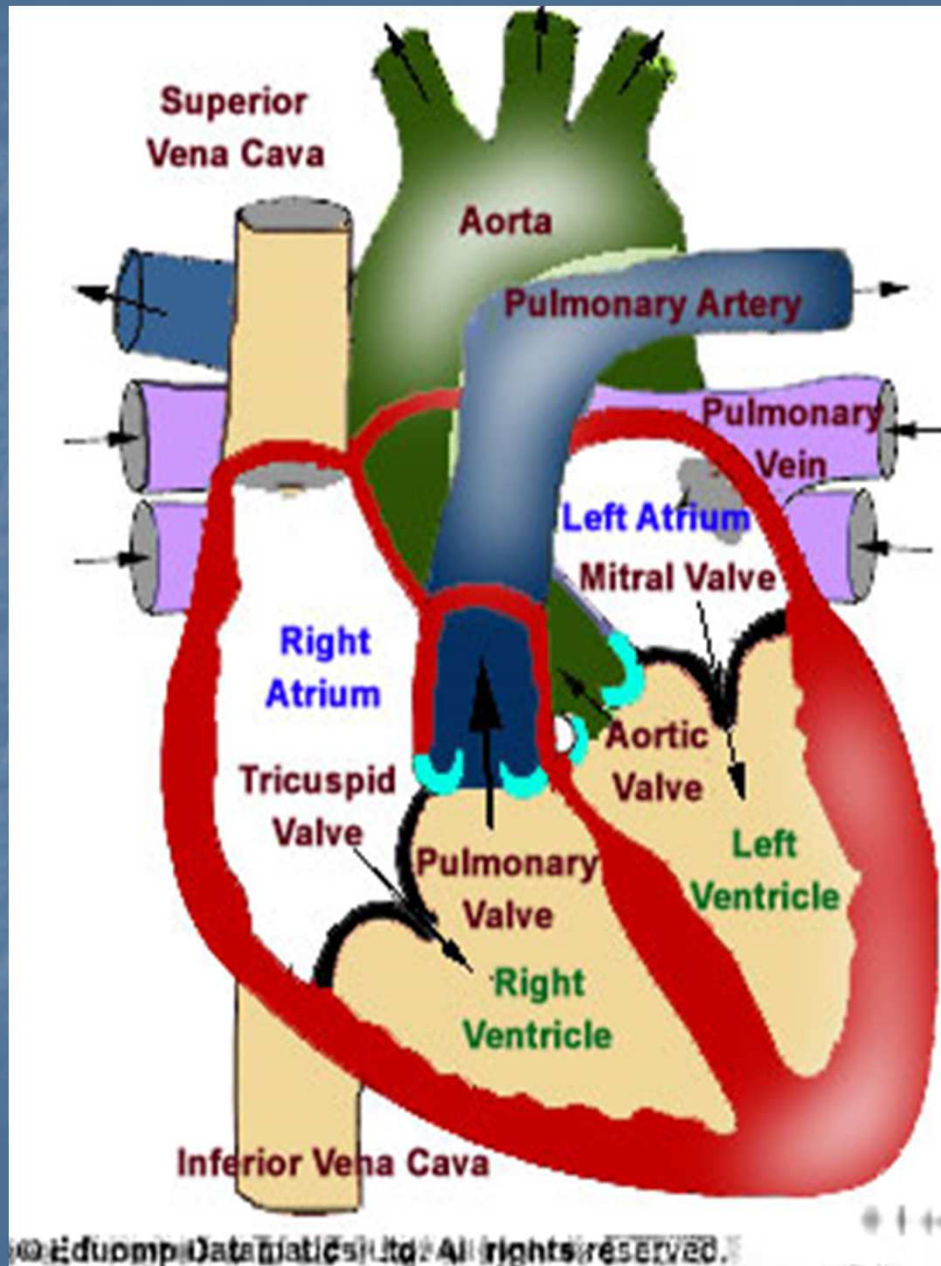
- Structures to and from heart

- 1. Superior and inferior vena cava- veins that bring blood from the body to the heart
- 2. Pulmonary artery and vein- take blood to the lungs and return it to the heart
- 3. Aorta: large artery that blood enters as it leaves the L ventricle of the heart



■ Chambers and valves

- 1. Atria (atrium): have two, top chambers of the heart
- 2. Ventricles (ventricle): have 2, bottom chambers of the heart



Heart Valves

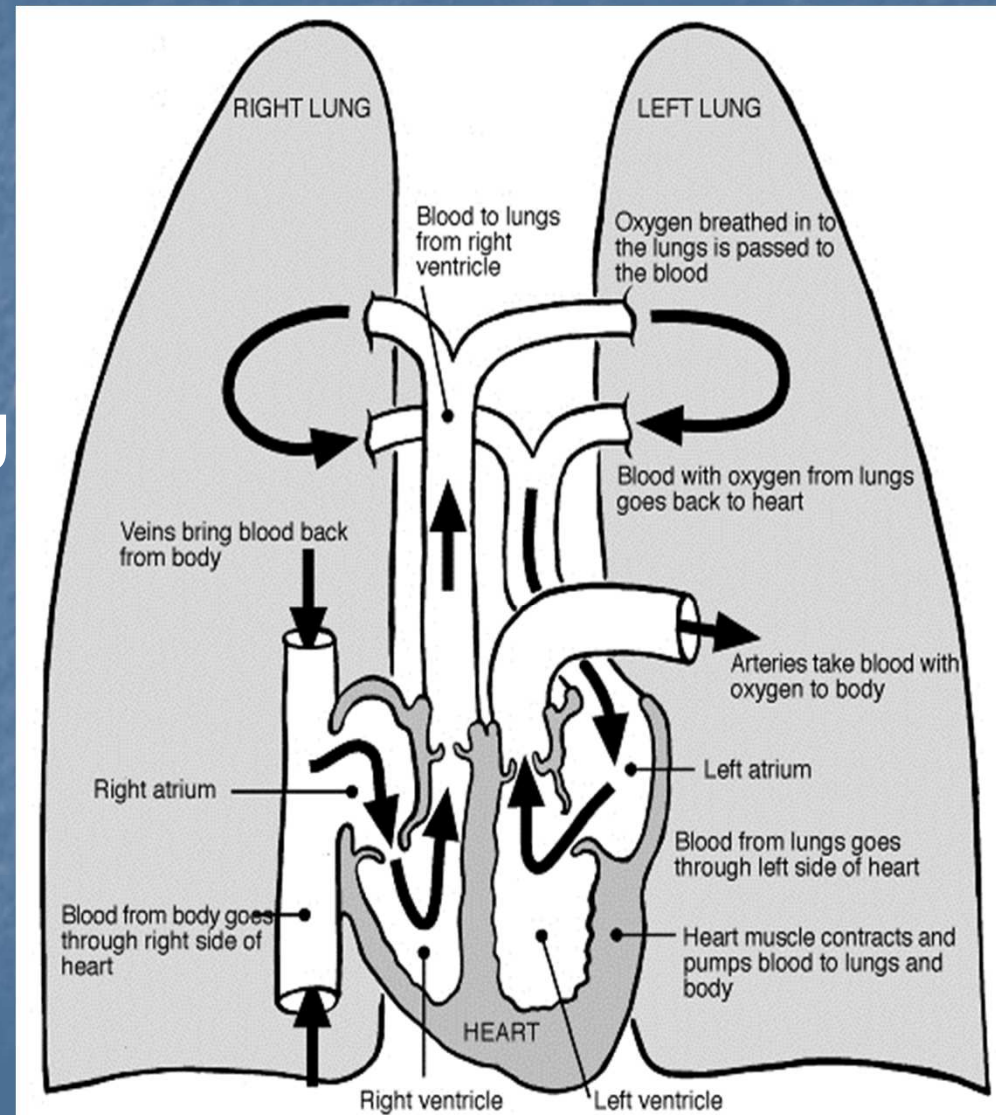
- 3. Tricuspid valve: between the right atrium and right ventricle
- 4. Mitral (bicuspid) valve: between the left atrium and left ventricle
- 5. Pulmonary semilunar valve: between right ventricle and pulmonary artery
- 6. Aortic semilunar valve: between left ventricle and aortic artery

- Obj: Analyze the function of the heart

Function of the Heart

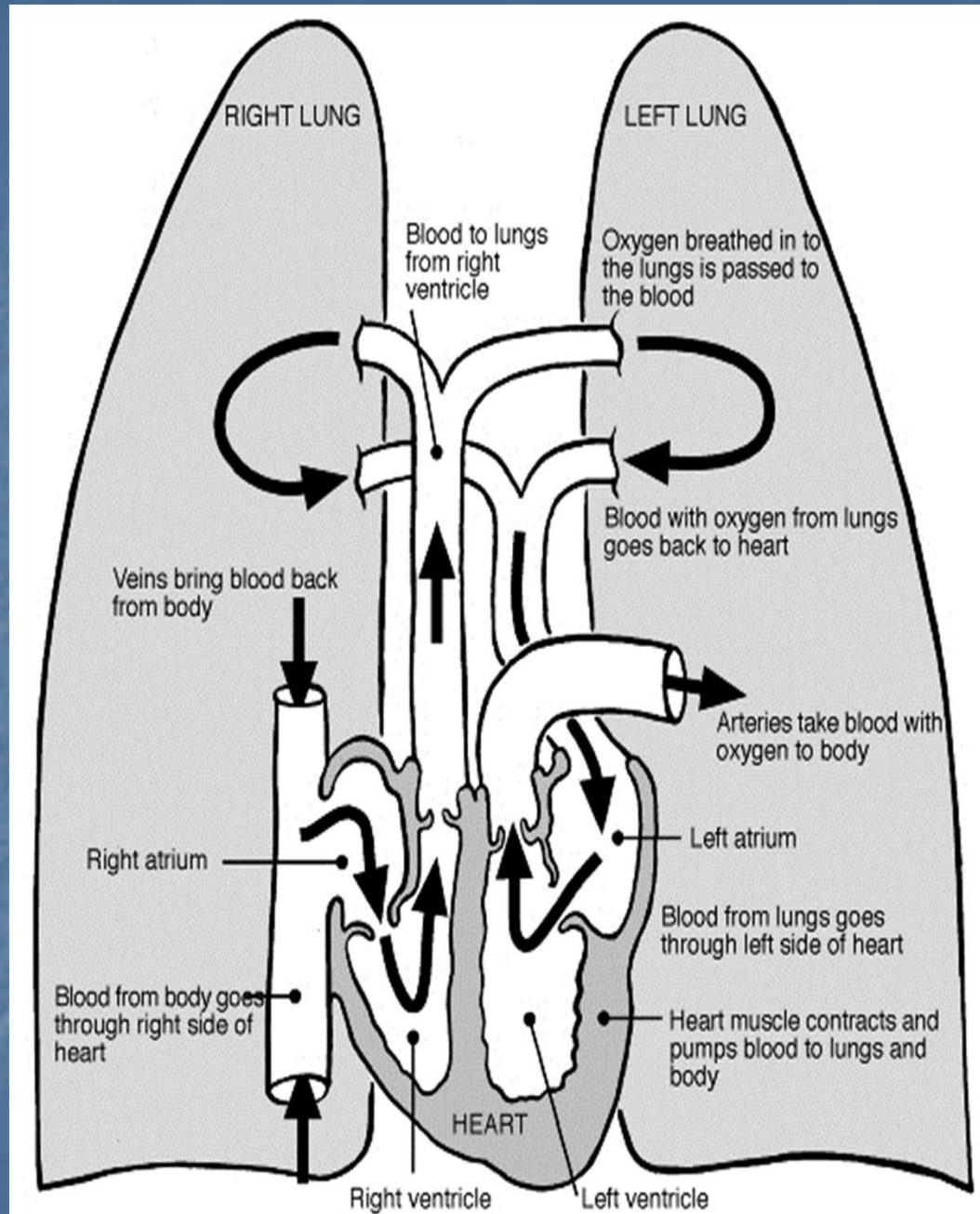
- Four main functions of circulatory system
 - 1. pump
 - 2. blood transport system around body
 - 3. carries oxygen and nutrients to cells, carries away waste products
 - 4. lymph system: returns excess tissue fluid to general circulation

- Heart
- 1. average 72 beats per minute, 100,000 beats per day
- 2. superior (upper body) inferior (lower body) vena cava bring deoxygenated blood to right atrium
- 3. cardiopulmonary circulation: circulation from the heart to the lungs

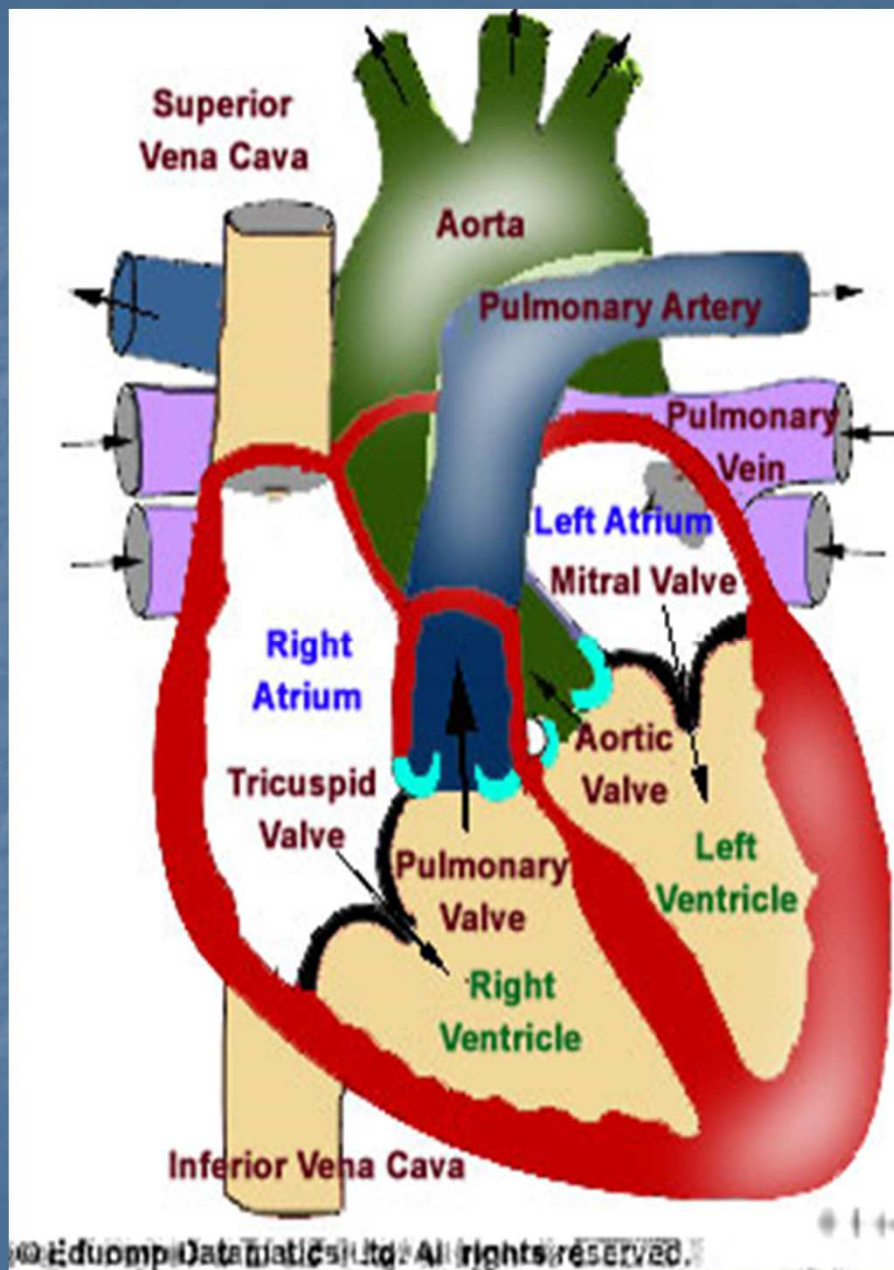


Normal blood flow of heart and lungs

- 4. pulmonary artery takes blood from right ventricle to lungs
- 5. pulmonary veins bring oxygenated blood from lungs to left atrium
- 6. aorta takes blood from left ventricle to rest of the body
- 7. four heart valves permit flow of blood in one direction



Normal blood flow of heart and lungs



- Pump

- 1. heart is a double pump

right heart → right atrium

→ tricuspid valve



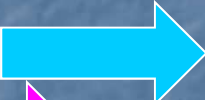



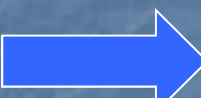

→ right ventricle

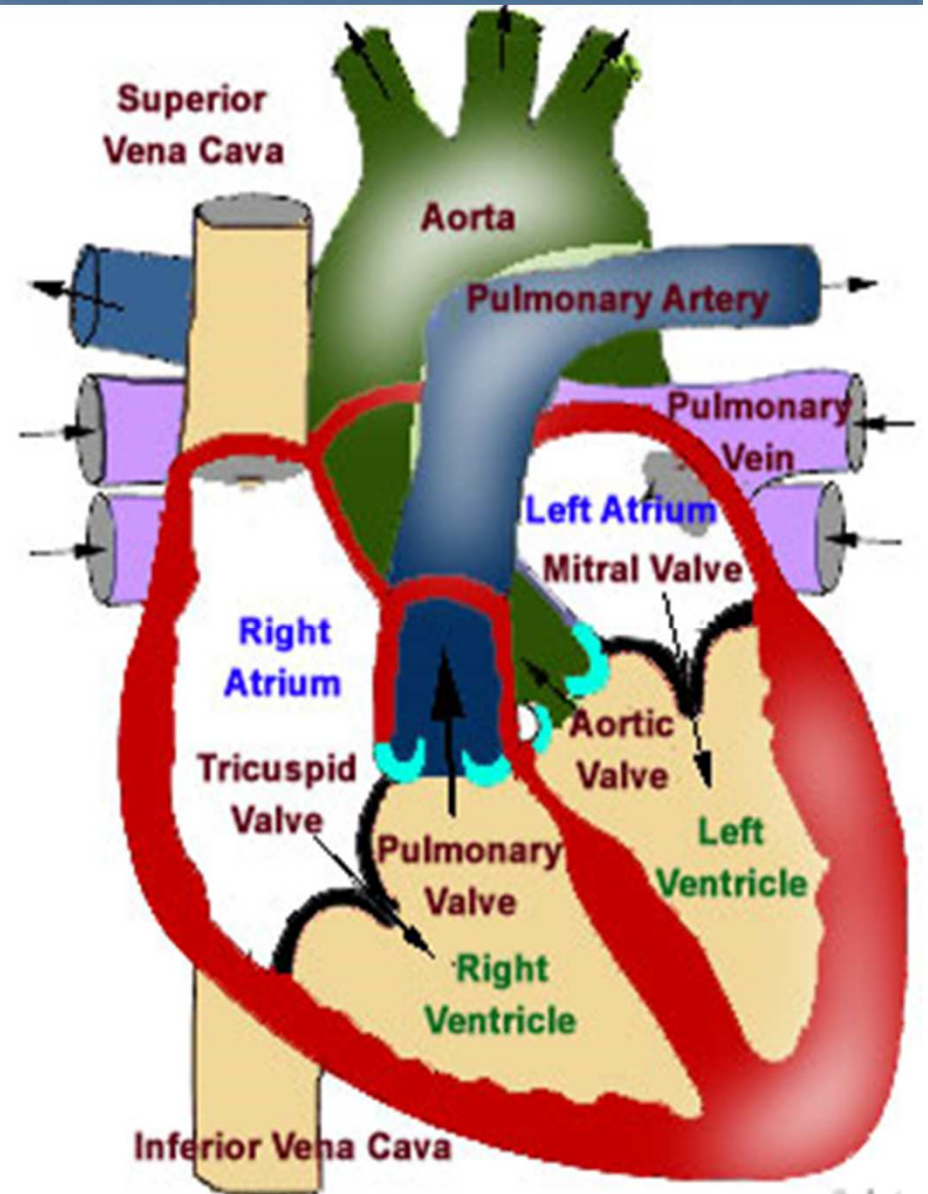
→ pulmonary semilunar valve

→

Pulmonary artery

→ lungs (for Oxygen)

- Left Heart 
- Lungs 
- Pulmonary veins 
- Left atrium 
- Mitral valve 
- Left ventricle 
- Aortic semilunar valve 
- Aorta 
- General circulation



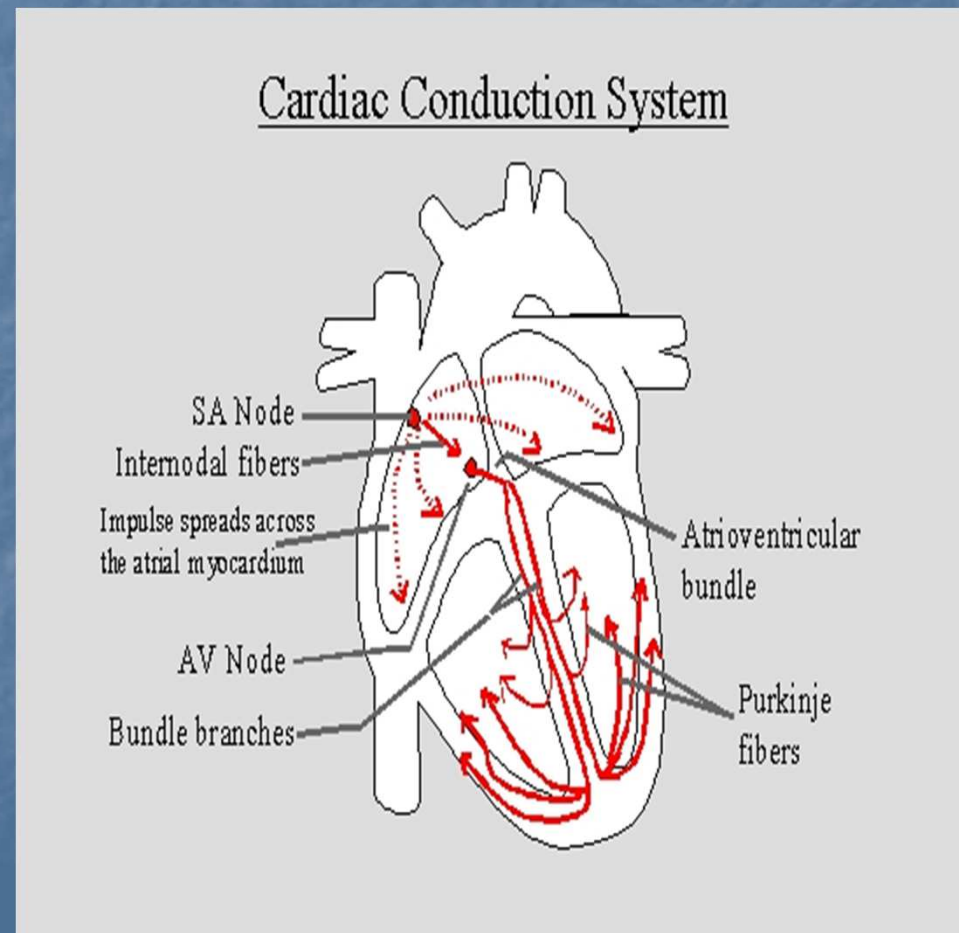
D. Heart Sounds

- Lub dupp: The sounds heard with a stethoscope when the valves close.

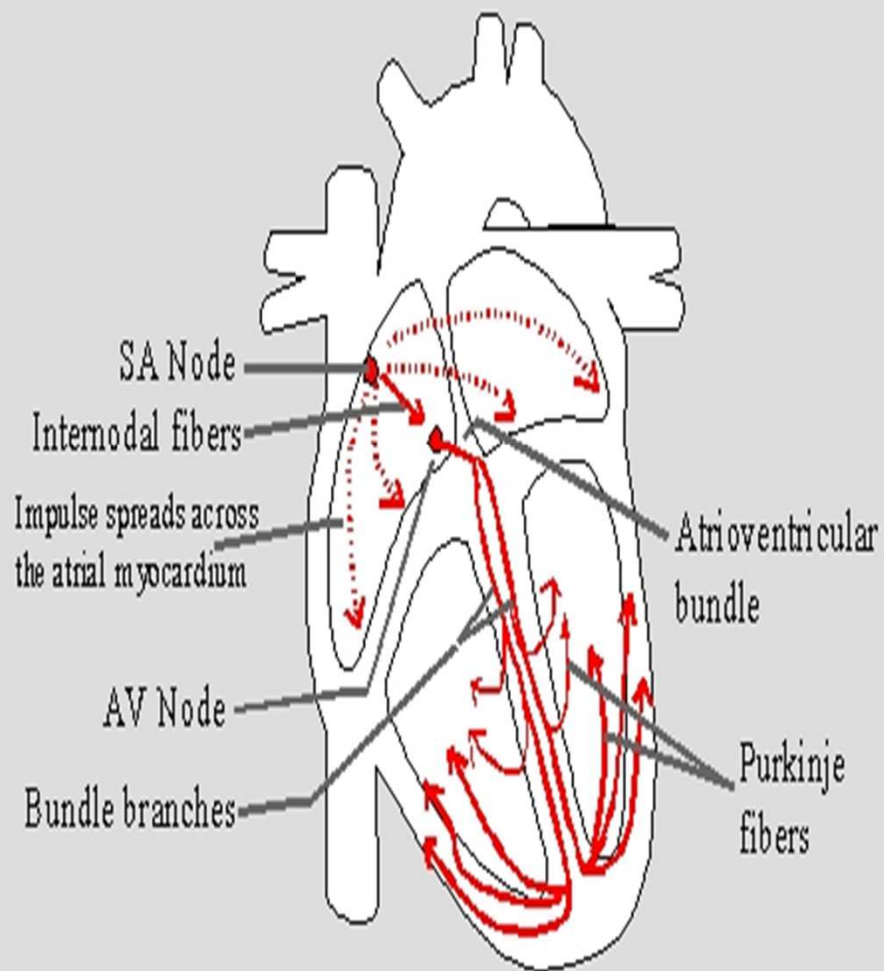
Electrical Activity

The Natural Pacemaker of the Heart

- a. **SA (sinoatrial) node** = conducting cells that originate an electrical impulse that begins and regulates the heart beat
- b. **AV (atrioventricular) node** = carries impulse to bundle of His



Cardiac Conduction System



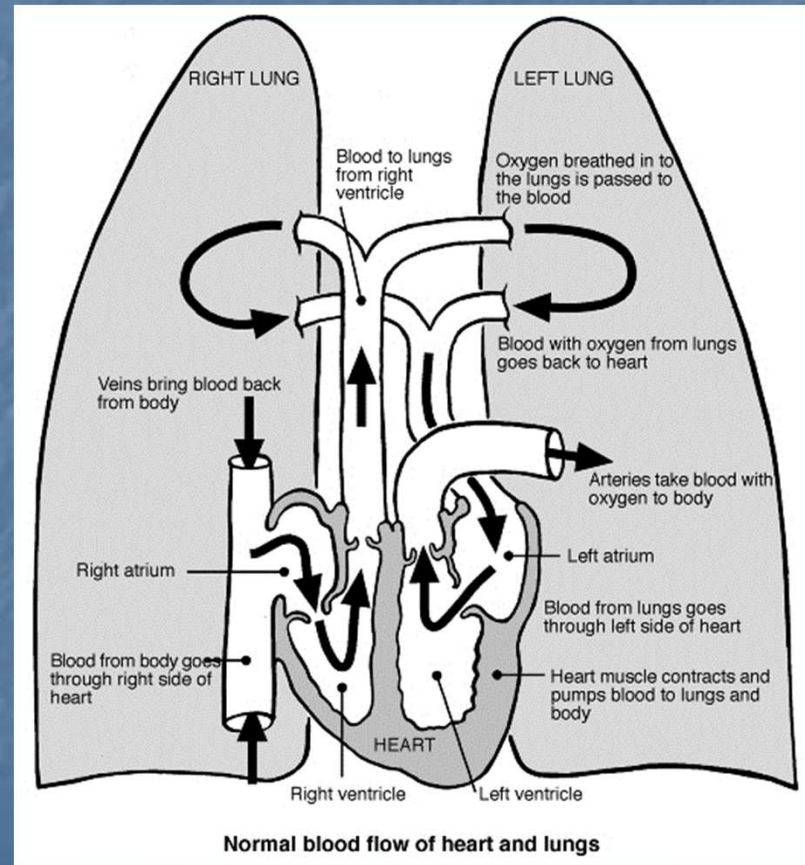
c. **Bundle of His** =
conducting fibers in
septum,
Divides into right and left
branches in ventricles
to Purkinje fibers

d. **Purkinje fibers**=
cause ventricles to
contract

Analyze circulation and the blood vessels

- **Cardiopulmonary circulation:** the circulation of the blood to the lungs to pick up oxygen

1. oxygenated and Deoxygenated blood
2. oxygen/carbon dioxide exchange



Systemic Circulation

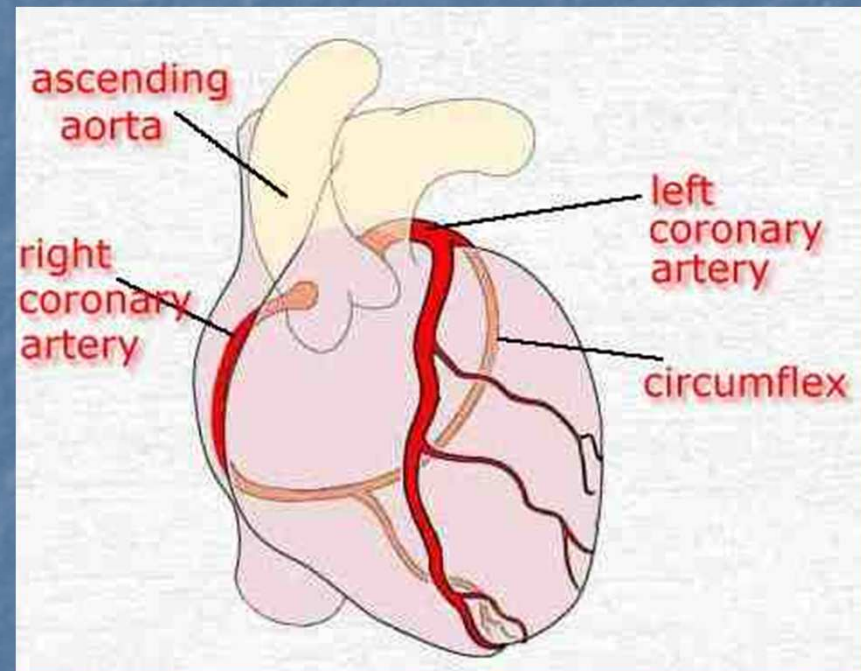
- **Systemic Circulation:**

Blood that travels from the heart to the tissues and cells

1. coronary arteries: vessels that are located on the outer surface of the heart

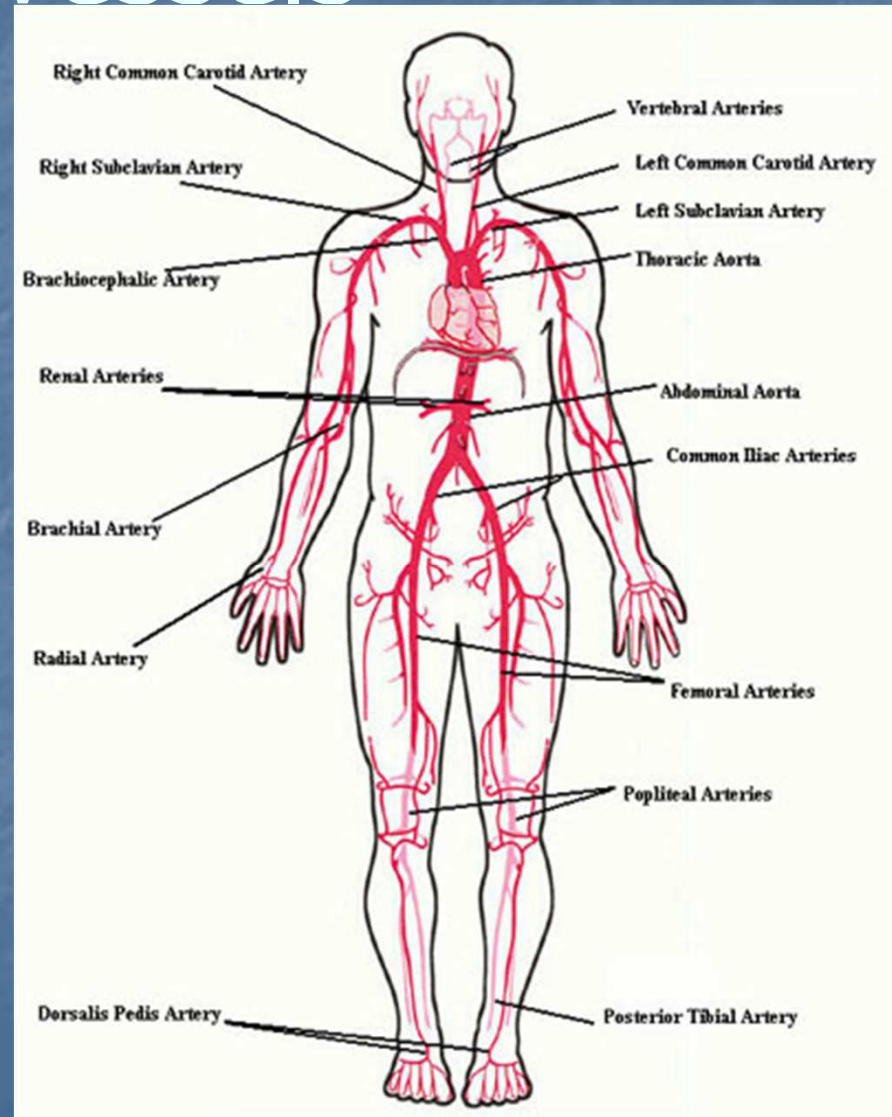
2. aorta: large artery, blood flows to body after it leaves the aorta

3. systemic circulation



Blood vessels

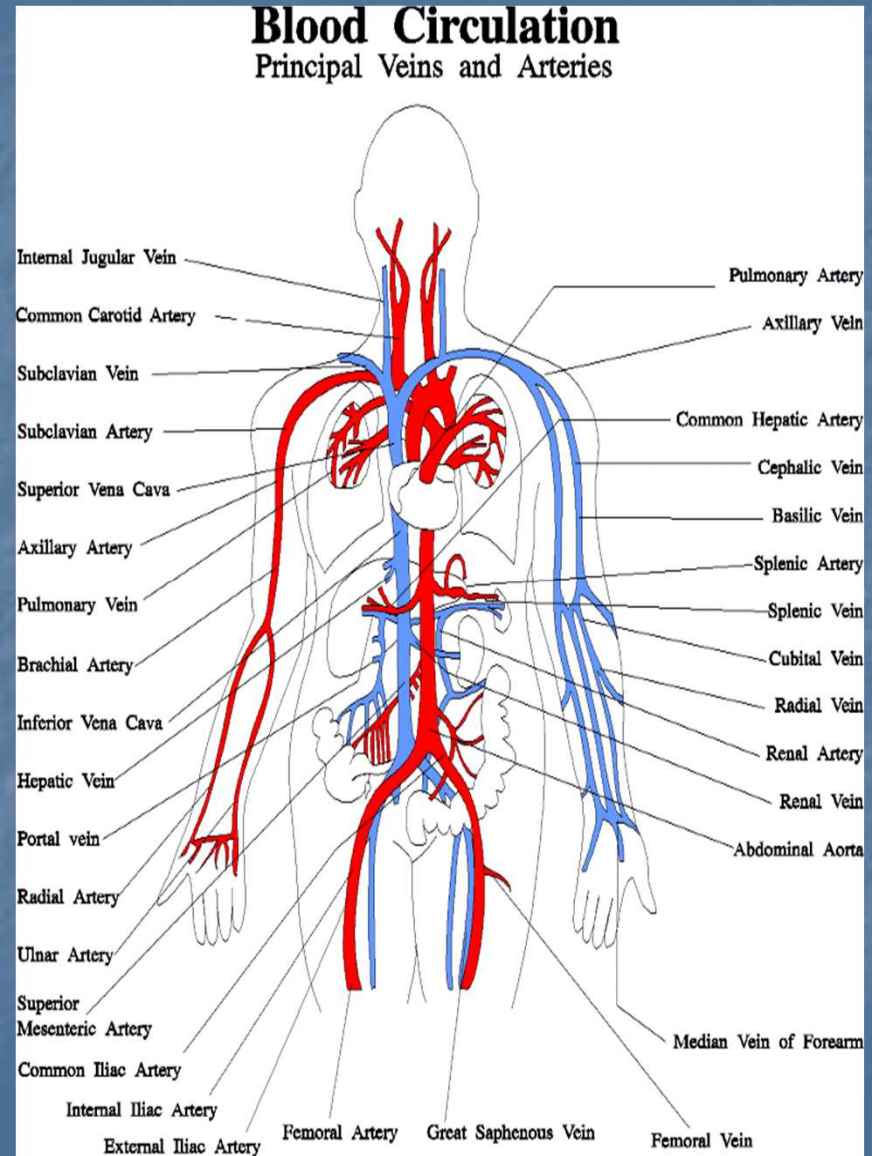
- Blood vessels
 1. Arteries
 - a. carry oxygenated blood away from the heart to the capillaries
 - b. elastic, muscular and thick-walled
 - c. transport blood under very high pressure
 2. Arterioles



- Veins

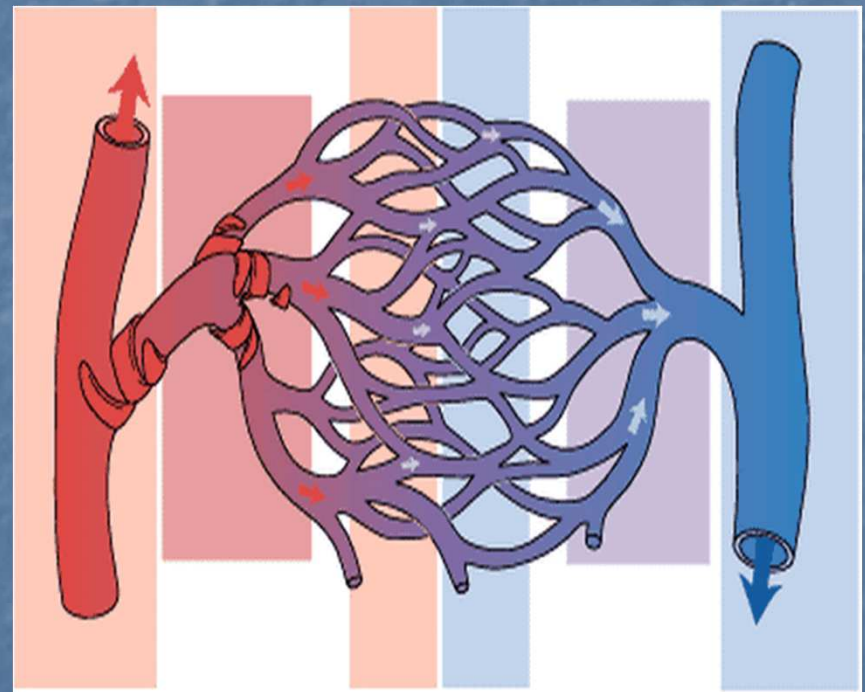
- a. carry deoxygenated blood away from capillaries to heart
- b. less elastic and muscular than arteries
- c. thin walled, collapse easily when not filled with blood
- d. superior and inferior vena cava carry blood to heart

Venules: smaller and less muscular than veins



- Capillaries

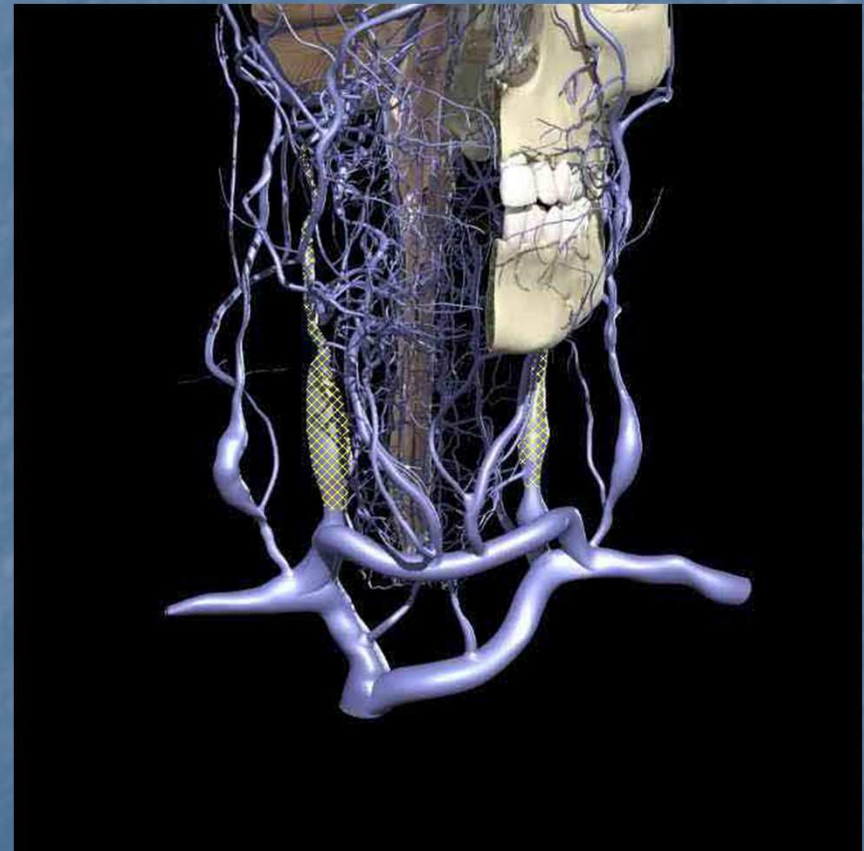
- a. smallest blood vessels
- b. one cell thick and are made of endothelial cells
- c. connect arterioles and venules
- d. walls are one-cell thick, allow for selective permeability



- Valves:

- a. permit flow of blood only in direction of heart

- jugular vein:
- Located in neck
- Drains blood from the head



Arteries to Brain and Meninges



- Carotid artery:
- Major artery that carries blood to the brain

- Blood pressure

1. Systolic:
average=120

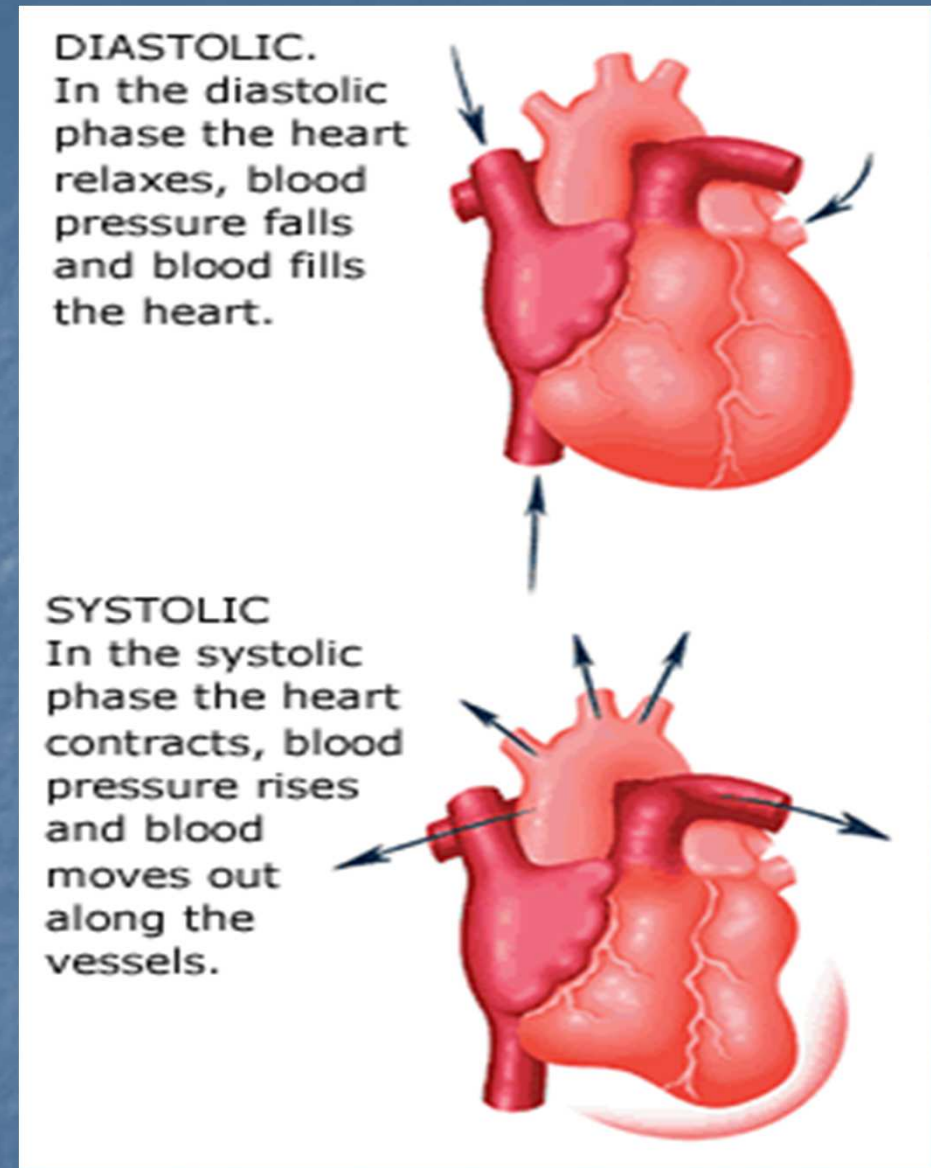
(Systole is contraction phase of the heart)

2. Diastolic:

Average = 80

(Diastolic is the relaxation phase of the heart)

The **Brachial Artery** in the arm is usually used to measure BP



- Pulse:

Alternating expansion and contraction of an artery as blood flows through it:

1. brachial

2. carotid

3. Femoral

4. pedal

5. popliteal

6. radial

Cardiac and Circulatory Disorders

1. Symptoms of Heart disease: usually experience cyanosis
 - a. arrhythmia (dysrhythmia): any change from normal heart rate or rhythm
 - b. Bradycardia: slow heart rate <60 pulse
 - c. Tachycardia: rapid heart rate >100 pulse

2. **Coronary artery disease:**

a. **Angina pectoris:** chest pain due to the lack of oxygen to heart muscle, treat with nitroglycerine

b. **Edema:** venous congestion; heart failure can cause poor circulation that results in edema

3. Myocardial infarction: (MI, heart attack)

a. lack of blood supply to myocardium

b. symptoms: severe chest pain radiating to left shoulder, arm, neck and jaw, N&V, diaphoresis, dyspnea

Vascular Disease

1. **Aneurysm:** abnormal condition, ballooning or protrusion of the wall of an artery
2. **Arteriosclerosis:** arterial walls thicken and lose elasticity
3. **Atherosclerosis:** fatty deposits form on walls of arteries and block circulation reducing the amount of blood going to an organ
4. **Hypertension:** High blood pressure: over 140/90, called the silent killer because there are usually no symptoms, occurs 1 of 5 Americans

5. **Hypotension:** low blood pressure

Patient becomes dizzy especially when standing up suddenly.

6. **Embolism:** traveling blood clot

a. transient ischemic attacks (TIAs)

b. Cerebral vascular accident (CVA) stroke

7. **Varicose veins:** swollen, inflamed and painful:
enlarged veins result from a slowing of blood
flow back to the heart

Diagnosis and treatment:

- 1. EKG/ECG; electrocardiogram; electrical tracing of the heart
- 2. Coronary bypass:
- 3. AED: automated external defibrillator
- 4. Defibrillator: electrical shock bringing heart back to normal sinus rhythm

- 5. CPR: cardiopulmonary resuscitation
- 6. Artificial pacemaker: used with conduction problems of the heart
- 7. Angiogram: An x-ray that takes pictures of the blood within an artery or a vein.