

Cardiovascular System Heart

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Objectives

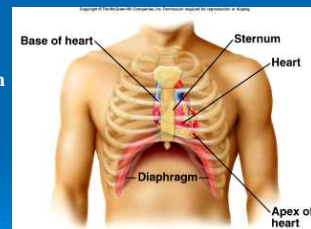
- Location of heart
- Structure of the heart
 - Layers
 - Coverings
 - Chambers
- Structure and function of myocardial valves

Components of cardiovascular system

- Heart- circulates blood through vessels
- Blood vessels
 - Arteries- away from heart
 - Veins- towards heart
 - Capillaries- location of internal respiration
- Blood- transport medium

Location of Heart

- posterior to sternum
- medial to lungs
- anterior to vertebral column
- base lies beneath 2nd rib
- apex at 5th intercostal space
- lies upon diaphragm



Coverings of the heart

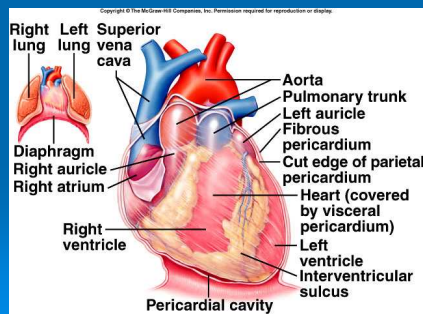
Pericardium-loose fitting, double layered sac

Visceral pericardium-serous membrane that is on the surface of the heart muscle

Parietal pericardium- inner layer of sac; secretes pericardial fluid

Pericardial fluid- (Serous fluid)-fluid that is between the parietal and visceral pericardium which prevents friction as the heart beats.

Coverings of Heart



Layers of heart tissue

- Epicardium
- Myocardium
- Endocardium

Endocardium

Inner lining

Smooth surface that permits blood to move easily through the heart without agglutination.

Continuous with lining of blood vessels

Myocardium

Middle layer made of cardiac muscle

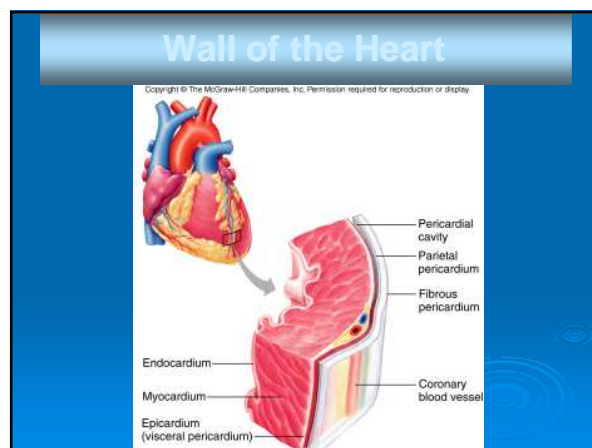
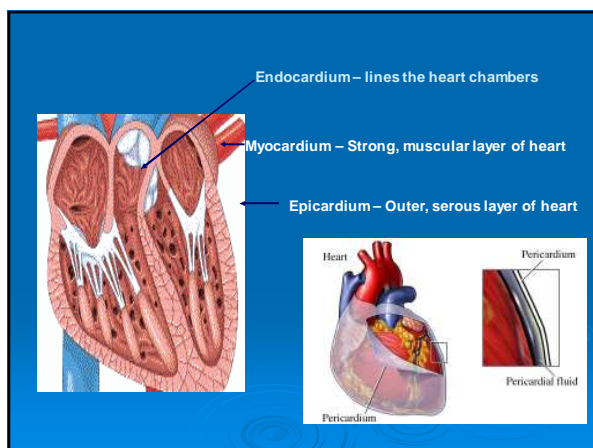
Forms the bulk of the heart wall

Contains the septum- a thick muscular wall that completely separates the blood in the right side of the heart from the blood in the left side.

Epicardium

Protective, outer layer of the heart wall same as the visceral pericardium

The coronary blood vessels that nourish the heart wall are located here



Chambers Right Atrium

- Thinner wall than ventricles
- Receives deoxygenated blood from vena cava
- Passes blood through tricuspid valve into right ventricle

Chambers Right Ventricle

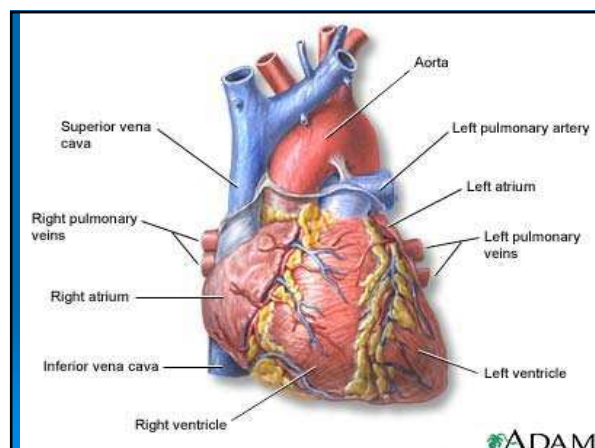
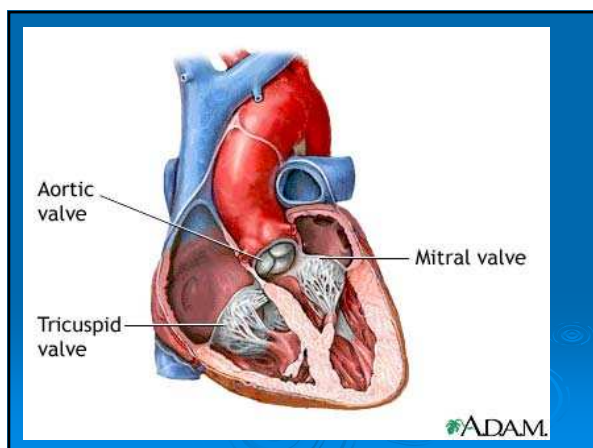
- Thicker wall than atria
- Comprises most of anterior surface of heart
- Circulates deoxygenated blood to lungs through the pulmonic valve into pulmonary trunk

Chambers Left Atrium

- Receives freshly oxygenated blood from pulmonary vein
- Passes blood to left ventricle through mitral valve

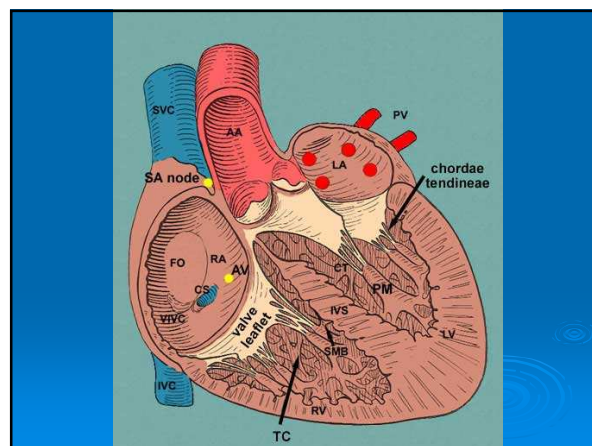
Chambers Left Ventricle

- Receives blood from left atrium
- Thickest myocardial wall
- Forms apex of heart
- Sends blood to systemic circulation via aorta



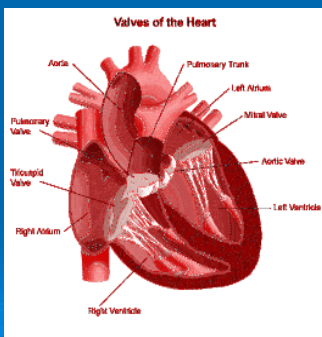
Septa

- Interatrial septum
 - Muscular division b/w atria
 - Foramen ovale- opening in fetus
 - Fossa ovalis- shallow depression; remnants of foramen ovale
- Interventricular septum
 - Thick muscular wall
 - Separates ventricles



Heart Valves

- Function- prevent blood from flowing backwards
- Responds to changes in pressure
- Two types of valves in heart
 - Atrioventricular valves (AV)
 - Semi-lunar valves

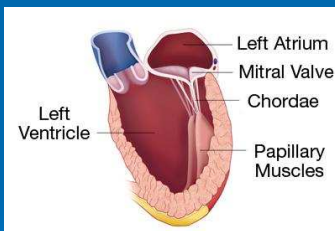


Semilunar valves

- Located at exit of ventricles, originate from endothelial lining of veins
- Heart contains two semilunar valves
 - Pulmonic
 - Aortic (Frequently damaged by Htn)

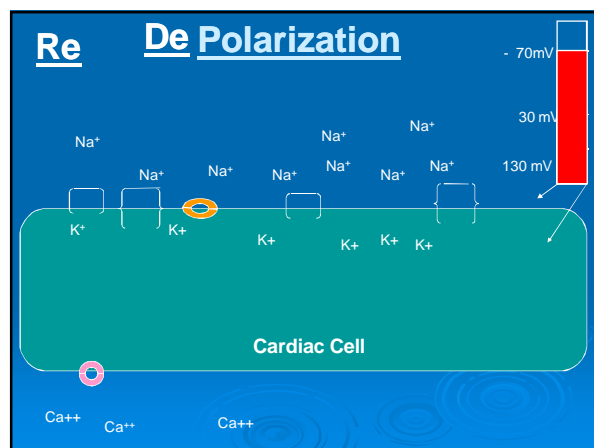
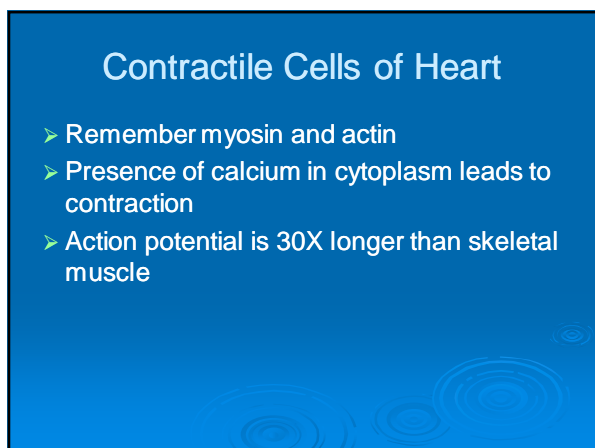
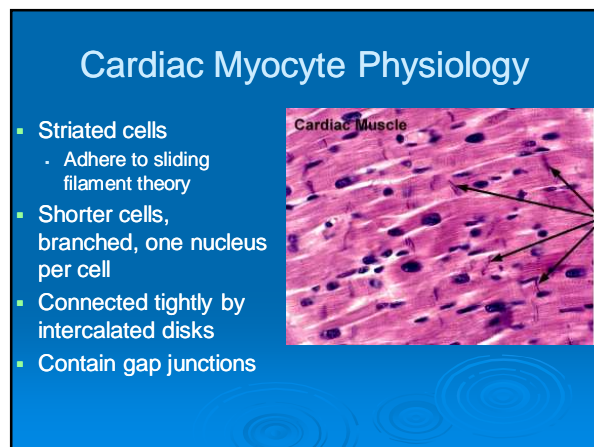
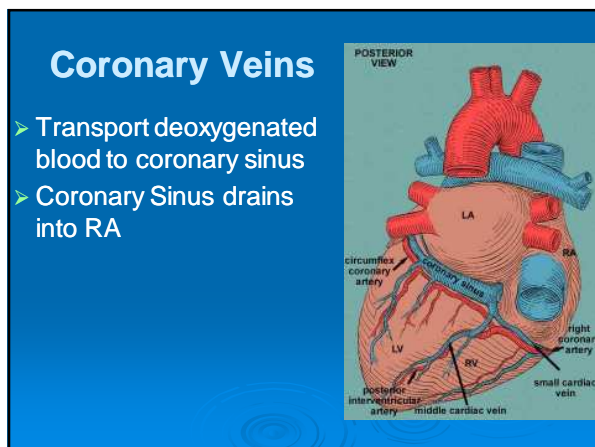
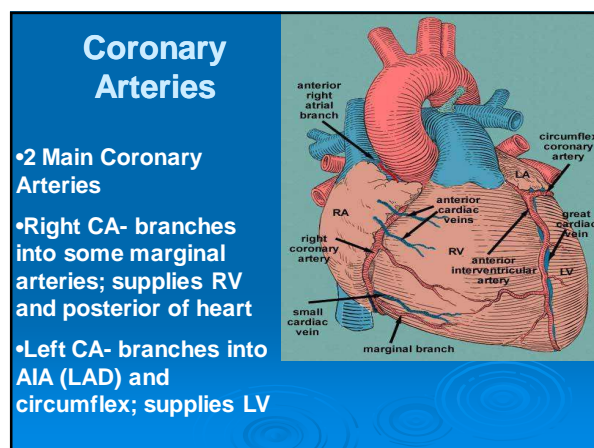
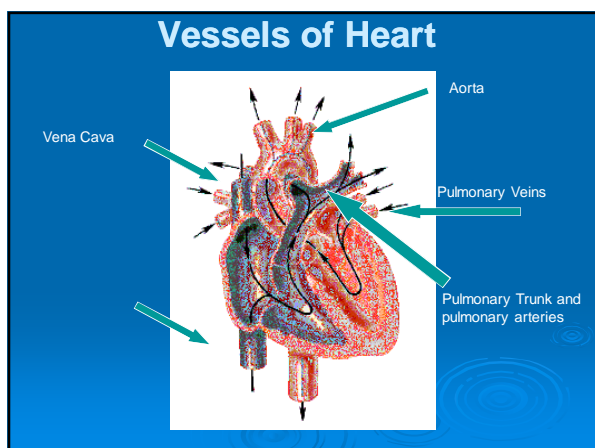
Atrioventricular Valves

- Valve cusps are connected to papillary muscles
- Chordae tendineae- tiny collagen cords that anchor cusps of valve to papillary muscles



Atrioventricular Valves

- Left AV valve (Mitral, bicuspid)
 - Contains 2 cusps
 - Subject to abuse
- Right AV valve (Tricuspid)
 - Contains 3 cusps
 - Not subjected to great abuses

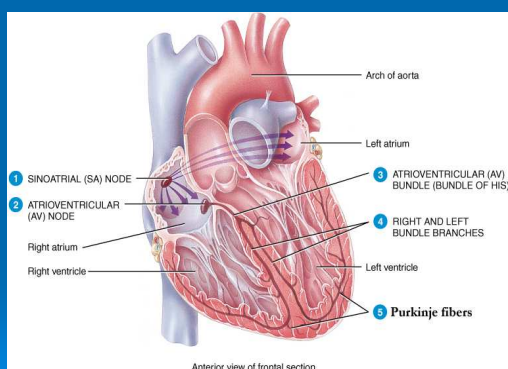


Conduction System

- Cardiac cells are automatic
 - They can depolarize spontaneously
- Autorhythmic cells
 - Non-contractile cells,
 - self-excitabile,
 - generate spontaneous action potentials,
 - Trigger heart contractions

Conduction System

- Located in
 - SA node
 - AV node
 - AV bundle
 - Bundle branches
 - Purkinje system



Intrinsic Rates

- Three potential areas capable of beginning cardiac conduction
 - SA Node- Located in right atria; 60-100 bpm
 - AV Node- Located at AV junction; 40-60 bpm
 - Ventricular System- Ventricles; < 40
 - Rate depends upon where in ventricles conduction originates

Atrial Depolarization

- Visualized as P wave
- Normal duration is 0.12-0.16 seconds



Atrial Delay

- Visualized as PR interval
- Normal duration is 0.12-0.20 seconds



Ventricular Depolarization

- Visualized as QRS complex
- Normal duration is less than 0.12 seconds



Ventricular Repolarization

- Visualized as T wave
- Normal duration is 0.16-0.20 seconds
- Absolute and relative period of refraction



Innervation of heart

- Heart rate can be influenced by autonomic nervous system
- Sympathetic
 - Speeds up heart rate and increases force of contraction
- Parasympathetic
 - Slows down heart rate

