

Cardiovascular System

Part 1
Bio 250

The Cardiovascular System

- A closed system of the heart and blood vessels
 - The heart pumps blood
 - Blood vessels allow blood to circulate to all parts of the body
- The function of the cardiovascular system is to deliver oxygen and nutrients and to remove carbon dioxide and other waste products

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The Heart

- Location
 - Thorax between the lungs
 - Pointed apex directed toward left hip
- About the size of your fist

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The Heart

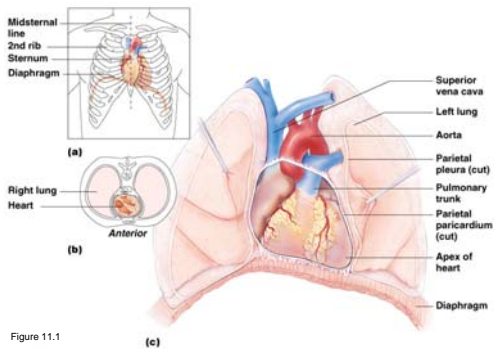


Figure 11.1
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Slide 11.2b

The Heart: Coverings

- Pericardium – a double serous membrane
 - Visceral pericardium
 - Next to heart
 - Parietal pericardium
 - Outside layer
- Serous fluid fills the space between the layers of pericardium

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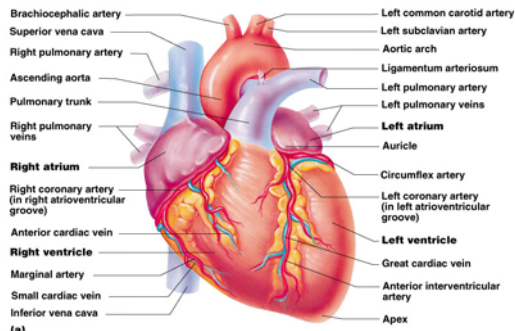
The Heart: Heart Wall

- Three layers
 - Epicardium
 - Outside layer
 - This layer is the parietal pericardium
 - Connective tissue layer
 - Myocardium
 - Middle layer
 - Mostly cardiac muscle
 - Endocardium
 - Inner layer
 - Endothelium

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External Heart Anatomy



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Figure 11.2a Slide 11.5

The Heart: Chambers

- Right and left side act as separate pumps
- Four chambers
 - Atria
 - Receiving chambers
 - Right atrium
 - Left atrium
 - Ventricles
 - Discharging chambers
 - Right ventricle
 - Left ventricle

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Blood Circulation

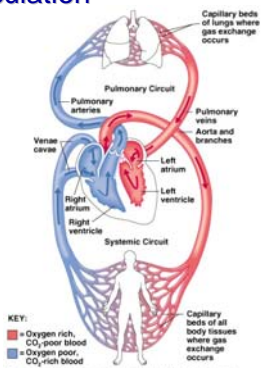


Figure 11.3

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The Heart: Valves

- Allow blood to flow in only one direction
- Four valves
 - Atrioventricular valves – between atria and ventricles
 - Bicuspid valve (left)
 - Tricuspid valve (right)
 - Semilunar valves between ventricle and artery
 - Pulmonary semilunar valve
 - Aortic semilunar valve

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The Heart: Valves

- Valves open as blood is pumped through
- Held in place by chordae tendineae (“heart strings”)
- Close to prevent backflow

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Operation of Heart Valves

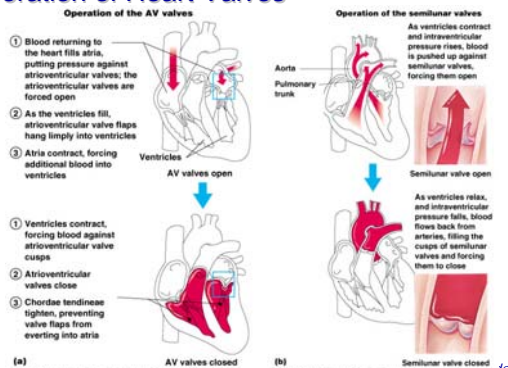


Figure 11.4 (a) AV valves closed (b) Semilunar valve closed
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The Heart: Associated Great Vessels

- Aorta
 - Leaves left ventricle
- Pulmonary arteries
 - Leave right ventricle
- Vena cava
 - Enters right atrium
- Pulmonary veins (four)
 - Enter left atrium

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Coronary Circulation

- Blood in the heart chambers does not nourish the myocardium
- The heart has its own nourishing circulatory system
 - Coronary arteries
 - Cardiac veins
 - Blood empties into the right atrium via the coronary sinus

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The Heart: Conduction System

- Intrinsic conduction system (nodal system)
 - Heart muscle cells contract, without nerve impulses, in a regular, continuous way

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The Heart: Conduction System

- Special tissue sets the pace
 - Sinoatrial node
 - Pacemaker
 - Atrioventricular node
 - Atrioventricular bundle
 - Bundle branches
 - Purkinje fibers

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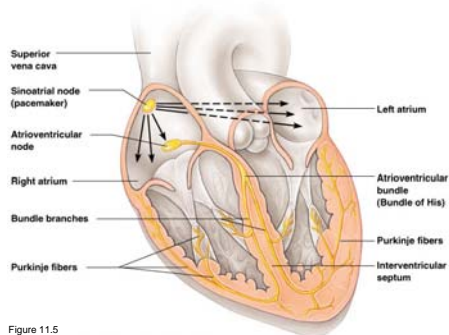
Heart Contractions

- Contraction is initiated by the sinoatrial node
- Sequential stimulation occurs at other autorhythmic cells

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Heart Contractions



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Filling of Heart Chambers – the Cardiac Cycle

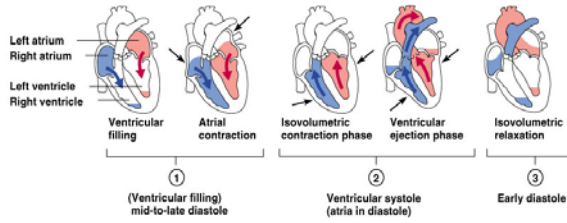


Figure 11.6

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The Heart: Cardiac Cycle

- Atria contract simultaneously
- Atria relax, then ventricles contract
- Systole = contraction
- Diastole = relaxation

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