Cardiovascular System: The Heart
Chapter 11 p. 314-325

Objectives
1. Identify the major anatomical areas of the heart on a model or diagram
2. Trace the pathway of blood through the heart
3. Compare the pulmonary and systemic circulations
4. Explain the functions of the heart valves
5. Name the elements of the conduction system of the heart and identify on an ECG

Physical Characteristics of the Heart
- Relatively the size of a fist; 1 lb; hollow
- Positioned to the left of thoracic cavity
- Cone-shaped
- Apex – pointed end; directed toward the left hip
- Base – posterosuperior; leads to major bv

Heart Coverings & Walls
- Pericardium – sac containing heart
  - Epicardial / visceral pericardium – hugs external surface; outermost layer of heart wall
  - Parietal pericardium – dense c.t.; anchors heart to sternum & diaphragm
- Pericardial fluid – between two layers; reduces friction as heart beats
LAYERS OF HEART WALL

- **Epicardium** – outermost
- **Myocardium** – bundles of cardiac muscle; contraction
- **Endocardium** – innermost; endothelial tissue lines the heart chambers

Inflammatory Conditions

- **Endocarditis** is an inflammation of the inner layer of the heart, the endocardium
- **Pericarditis** is an inflammation of the pericardium (the fibrous sac surrounding the heart).

OVERVIEW: HEART CHAMBERS

- Right Atria – receives deoxygenated blood from the body
- Left Atria – receives oxygenated blood from the lungs
- Right Ventricle – releases deoxygenated blood to the lungs
- Left Ventricle – releases oxygenated blood to the body
- Interventricular septum – wall separating ventricles

Right Side of Heart (pulmonary circulation)

- Makes a pulmonary circuit
- Right atrium receives all the oxygen poor blood from the veins through the superior and inferior venae cavae
- Right ventricle pumps oxygen poor blood to the lungs through the right and left pulmonary arteries
- Pulmonary veins bring oxygenated blood to the left side of heart (to I. atrium)

Left Side of Heart (Systemic Circulation)

- Oxygen rich blood enters the left ventricle and is pumped to body tissues through the aorta
- Once oxygen is used all the veins of the body bring the blood back the venae cavae
- Left ventricle is the strongest “pump” so has more muscle
FETAL HEART

- Foramen ovale & ductus arteriosus are fetal structures that close at birth
- Function is to bypass blood from the fetal lungs

Review

- Pulmonary circulation – circulation of blood between the heart and lungs
- Systemic circulation – circulation of blood throughout the body
- Coronary arteries – vessels on the outer surface of heart that provide oxygen & nutrients to the heart muscle

HEART VALVES

- Atrioventricular (AV)
  - between atria & ventricles
  - Bicuspid/ mitral valve – located between left atria & ventricle; 2 cusps or flaps
  - Tricuspid – located between right atria & ventricle; 3 cusps or flaps

http://www.smm.org/heart/heart/pumping.htm
http://health.howstuffworks.com/adam-200083.htm
http://www.guidant.com/condition/heart/heart_bloodflow.shtml
• **Semilunar valves** – guard large arteries leaving the ventricle
  - **Pulmonary semilunar** – located between right ventricle & pulmonary trunk
  - **Aortic semilunar** – located between left ventricle & aorta

• **Chordae tendinae** – “heart strings”
  - Anchor flaps to walls of heart


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**ELECTROCARDIOGRAM**

**ECG / EKG**

• Records the electrical activity of the heart as wave lines on a graph
• SA node (sinoatrial) in the right atrium sends electrical impulses through the heart muscle controlling contractions – PACEMAKER
• If signals are interrupted or delayed the heart beats irregularly
• Irregular readings indicate disease or damage to the heart muscle

- **P wave** – contraction of atria (depolarization)
- **QRS wave** – contraction of ventricles (depolarization)
- **T wave** – relaxation of ventricles

• In a resting state the cells of heart are “polarized” – inside is negatively charged compared to outside
• Rapid movement of negative ions out of the cell creates an electrical current – depolarization
• Movement of positive ions out of the cell – repolarization – returns membrane back to negative state

• http://nobelprize.org/educational_games/medicine/ecg/index.html
• http://www.medtropolis.com/VBody.asp
• http://www.fi.edu/learn/heart/index.html