A. Physical Characteristics
1. cone shaped
2. size of fist
3. Flat base is the top, which points toward right shoulder
4. Apex is at bottom and points toward left hip
5. 2/3 of its mass lies to left of midsternal line.
6. Composed of (cardiac) specialized muscle found nowhere else in body

What is purpose of intercalated discs of cardiac muscle?
B. Coverings (M/B) of the HEART

1. pericardium (around) 2 layers
   a. fibrous pericardium
      (1) is dense connective tissue
      (2) function of fibrous pericardium
         (a) protects
         (b) anchors
         (c) prevents overfilling
   b. serous pericardium, 2 thin slippery layers

(1) Parietal M/B lines inside of fibrous pericardium
(2) Slit-like pericardial cavity, which contains thin layer of serous fluid is between layers = no friction when heart beats
(3) Visceral layer is epicardium, an integral part of heart wall

2. myocardium, mostly cardiac muscle cells arranged in circular bundles.
   (a) thicker around left ventricle.
Cardiac muscle appears on the left below, while cardiac muscle and connective tissue is on right.

3. endocardium, “inside heart” is glistening white sheet of squamous endothelium lining inside of myocardium, thus,
(b) lines heart chambers and covers fibrous skeleton of valves
(c) is continuous with endothelial lining of blood vessels entering & leaving heart

III. Parts and Functions of Heart

A. Atria = receiving chambers
1. Atrial volume is increased somewhat by small wrinkled appendages that cover atria are auricles
2. Atria have 2 basic parts, anterior which is ridged by bundles of muscle tissue (called pectinate muscles).
3. They are small and thin walled, since they need to contract only minimally to push blood into ventricles.
4. The inter atrial septum bears a shallow depression, the fossa ovalis, which is the spot where foramen ovale existed in the fetal heart (fetal heart = 3 chambers).

5. Oxygen poor blood enters the right atrium thru 3 veins, superior vena cava (from head and neck), inferior vena cava (from body systems & lower body) and the coronary sinus (see to right. It drains the heart).

6. Four pulmonary veins enter the left atrium, transporting oxygen rich blood from the lungs back to the heart.
1. Ventricles = most of heart’s volume. Right ventricle is most of anterior surface, while left ventricle dominates posterior lower portion.

2. The internal walls are irregular ridges of muscles called trabeculae carneae.

3. Papillary Muscles to contract (to which chordae tendineae attach) to anchor flaps of AV valves preventing backflow of blood when powerful ventricle contact.

4. These ventricular pumps have walls that are more massive than atrial (thicker myocardium).
5. When ventricles contract, blood is propelled out of the heart into the pulmonary trunk from the right ventricle and on to lungs.

6. The left ventricle ejects blood into the aorta, the largest artery in the body.

1. **Introduction**
   a. The heart is really two side by side pumps.
      (1) Right side pulmonary from heart to lungs and back
      (2) Left side systemic from heart to body systems and back

   (1) The pulmonary circuit (right side) takes blood to and from lungs. After it receives blood from the capillary beds surrounding body cells of systemic circuit, oxygen poor blood goes to the lungs to unload CO2 and load oxygen.
The systemic circuit (left side) pumps blood to & from all body cells. So it brings oxygen poor blood from body cells to heart. Pulmonary system takes this blood to the lungs. After left side gets oxygen rich blood from lungs, it pumps this blood to these body cells.

1. O2 poor blood enters from superior and inferior vena cava and coronary sinus into right atrium. At same time O2 rich blood enters left atrium from 4 pulmonary veins.

2. As pressure in atria rises from accumulating blood, A/V valves on each side open (tricuspid on right and mitral (or bicuspid) valve on left.) Blood flows passively into ventricles

3. When all the blood of one cycle is in the ventricles, it tries to flow backwards into in the atria; this slams both AV valves shut (heart sound #1).

4. Blood is now in a somewhat stretchy, but closed container.

5. As ventricles contract, the container is filled, but not closed.
6. This raises the pressure in ventricles above that of aorta and pulmonary trunk, so the pulmonary semilunar valve of the right heart opens (as does the aortic semilunar valve on the left).

7. Under great pressure, blood surges into the pulmonary trunk on the right and aorta on the left. Pulmonary trunk leads to Pulmonary arteries which carry blood to the lungs, where CO2 diffuses out and Oxygen diffuses in.

8. Blood rushes through the aortic semilunar valve and enters the Aorta with great speed and pressure. Before the aortic arch is reached, oxygen rich blood travels to the coronary artery. When blood

arteries, Common carotids (external and internal carotids =brain) and left subclavian artery

9. The descending aorta extends behind the heart where it becomes the abdominal aorta, which sends oxygen rich blood to all the body systems.
D. Coronary Circulation

1. The functional blood supply of the heart is located in epicardium. Coronary circulation only delivers blood when heart is relaxed.

2. Arising from the base of the aorta and circling the heart thru the atrioventricular groove the right and left coronary arteries supply the heart with oxygen and nutrient rich blood.

3. The short left coronary artery runs toward the left side of the heart, with 2 major branches- anterior interventricular artery (Front) and circumflex artery (around)

4. Right coronary artery courses to right side of the heart where it divides into marginal artery (serves margin or left side) and posterior interventricular artery

5. After passing thru capillary beds of the myocardium, venous blood is collected in cardiac veins, whose paths follow those of the coronary arteries. The coronary sinus on posterior has 3 branches- great cardiac, middle cardiac and small cardiac
Is the pattern of depolarization, which must precede the actual contraction of the heart muscle.

Heart depolarization and PQRS

Figure 11-3 The sequence of excitation of the heart related to the deflection waves of an ECG tracing.
Enough!