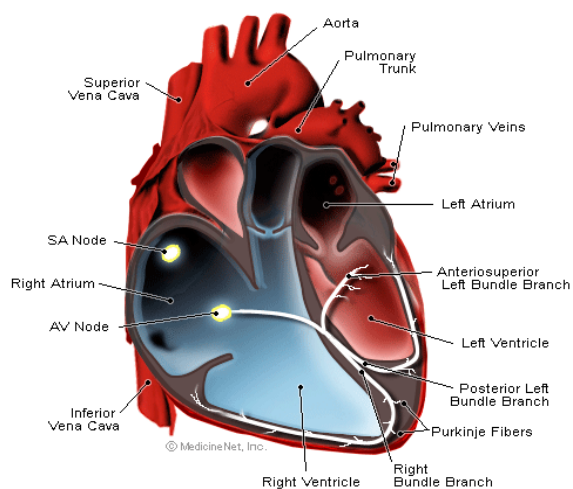
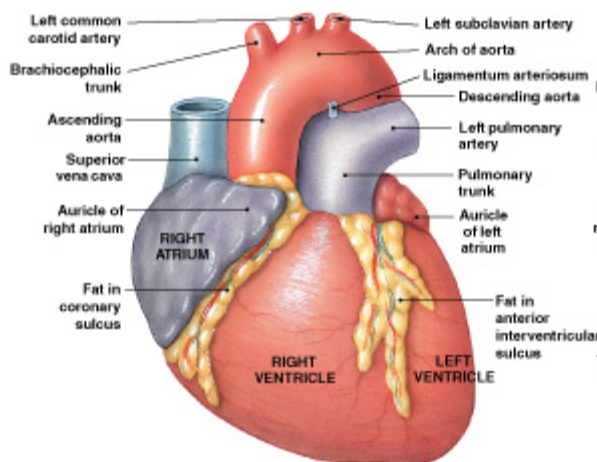


## Lab 7: Heart Sounds and Blood Pressure

### PART I: HEART ANATOMY

a) You should be able to identify the following structures on an adult human heart diagram.

- the 4 chambers
- the bicuspid (mitral) and tricuspid valves (right and left atrioventricular)
- the superior and inferior vena cava
- the pulmonary artery
- the pulmonary veins
- the aorta
- the semilunar valves (aortic and pulmonary)



- c) You should understand the direction of blood flow through the heart.
- d) You should understand deoxygenated and oxygenated blood and where these are located in the heart.

## **PART II: PULSE**

### **A) *Defining pulse:***

Pulse is caused by the alternate expansion and recoil of the artery as the ventricle pumps blood under pressure from the heart. Which chamber of the heart is truly responsible for pulse?

\_\_\_\_\_

### **B) *Determining pulse rate:***

Any surface artery can be used to determine pulse. Most commonly the carotid artery in the neck or the radial artery in the wrist is used.

- 1) Pulse is taken by placing the pointer and index finger over the radial artery of the wrist which is often easily located about two inches above the beginning of the hand on the outside (thumb-side) of the wrist.
- 2) Using the second hand of a watch count the number of pulses for 30 seconds. Multiply this by 2 to obtain the pulse rate per minute.
- 3) What is your pulse rate per minute when sitting? \_\_\_\_\_
- 4) The standard pulse rate is approximately 72 per minute when one is relaxed but this figure can vary greatly with physical exertion.

## **PART III: HEART SOUNDS**

### **A) *Cause of heart sounds:***

There are two heart sounds usually described as “lub,” “dub” or “lupp,” “dupp.” The first sound (lub) is caused by closing of both the tricuspid and bicuspid (atrioventricular) valves between the atria and ventricles. The second sound is caused by the closing of the semilunar valves in the aorta and pulmonary artery (called the aortic and pulmonary valves).

### **B) *Listening to the heart:***

- 1) The heart is located in the chest cavity and the lower part of the heart (the ventricles) “leans” to the left side of the breast bone (sternum).
- 2) Using a stethoscope, listen for the two heart sounds.
- 3) By moving the stethoscope, the two different sounds may become more clear.
  - a) To best hear the first sound (lub) place the stethoscope on left side of sternum - lower on chest.
  - b) To best hear second sound (dub) place the stethoscope on the left or right side of sternum higher on chest.

## **PART IV: BLOOD PRESSURE MEASUREMENT USING SPHYGMOMANOMETER**

### **A) *Nature of the two readings:***

- 1) First blood pressure reading is called systolic. It is the highest of the two readings. During systolic the artery is fully expanded, the high pressure is due to the contraction (systole) of the left ventricle of the heart.
- 2) The second blood pressure reading is called diastolic. It is the lower of the two readings. During diastolic the artery has recoiled. The low pressure would result from the relaxation of the left ventricle (termed diastole).

Which of these readings would be more important to have low, systole or diastole?

### **B) *Reporting blood pressure:***

Blood pressure is recorded in **mm of mercury**.

Example 120 (systolic)

80 (diastolic)

### **C) *Method:***

- 1) While sitting, wrap cuff on upper arm approximately 1-2 inches above the elbow joint.
- 2) Rest arm on table.
- 3) Locate the pulse in the brachial artery just above the elbow joint toward the inside (medial) of the arm.
- 4) Close screw valve and pump pressure into the rubber bag to approximately 160 mm of mercury.
- 5) Listen for “tapping” sounds called **Karotkoff** sounds. No sounds should be heard at this point. What is the condition of the artery if no sound is heard? \_\_\_\_\_  
What artery in the arm are we listening to? \_\_\_\_\_
- 6) Open the screw valves and release the pressure slowly (2-3 mm per second) and listen for sounds.

- 7) Record the pressure when first sound is heard. This is the systolic blood pressure.
- 8) Continue to release pressure while listening. At the point when the sound disappears or becomes very muffled, this is the diastolic pressure.
- 9) Record your personal blood pressure (e.g. 120/80). \_\_\_\_\_

**D) Compare your blood pressure with the table given below:**

**TABLE – Systolic and diastolic blood pressure**

Blood Pressure Category	Systolic (mm Hg)	Diastolic (mm Hg)
Normal	Less than 120	Less than 80
Prehypertension	120-139	80-89
Hypertension, Stage 1	140-159	90-99
Hypertension, Stage 2	160 or higher	100 or higher

SOURCE: National Institutes of Health, National Heart, Lung and Blood Institute, March 2003.

**E) Understanding the sounds produced in blood pressure measurement:**

Pulse as a rule has no sound that a stethoscope can decipher. However, as an artery is partially blocked or occluded, a turbulence is produced as the heart pumps blood into the artery and this causes the blood to flow against the artery walls producing the sounds.

- (a) Therefore by blowing the cuff up to 160 mm, we have completely occluded the artery--therefore no sound.
- (b) As we release the pressure, sound will be heard for the first time when blood does flow through again (systolic reading).
- (c) The sound continues as the artery remains partially occluded. When, however, the artery is fully open there is no turbulence and the sound disappears (diastolic reading).

**F) Effect of exercise on pulse rate and blood pressure:**

Exercise:

- 1) Take the resting pulse and systolic blood pressure of one member of your group.  
Resting pulse \_\_\_\_\_ Systolic b.p. \_\_\_\_\_

- 2) Have that member run in place for 3-5 minutes (with the cuff in place).
- 3) Take his/her systolic blood pressure and pulse rate immediately after the exercise.

Pulse \_\_\_\_\_ Systolic b.p. \_\_\_\_\_

### **G) Questions:**

1. Assuming a person has a blood pressure of 110/70, answer the following:
  - a) If I inflate the cuff to a pressure of 65, will I hear a sound? \_\_\_\_\_
  - b) If I inflate the cuff to 120, will I hear a sound? \_\_\_\_\_
  - c) If I inflate the cuff to 100, what is the condition of the brachial artery?  
\_\_\_\_\_
  - d) What is the diastolic pressure? \_\_\_\_\_
2. A blood pressure “machine” is properly called a \_\_\_\_\_.
3. Blood pressure sounds are caused by: \_\_\_\_\_
4. The artery in the wrist used for taking a pulse is called \_\_\_\_\_.
5. A “leaky” or defective bicuspid valve will lead to a murmur of the first or second heart sound? \_\_\_\_\_
6. a) Another name for the right atrioventricular valve is \_\_\_\_\_.  
b) Another name for the left atrioventricular valve is \_\_\_\_\_
7. Name the 2 semilunar valves.
  - a) \_\_\_\_\_
  - b) \_\_\_\_\_
8. What is the standard adult human pulse rate? \_\_\_\_\_
9. What side of the heart is the mitral valve? \_\_\_\_\_
10. Put the following structures in the correct order of blood flow. Right atrium, right ventricle, left atrium, left ventricle, vena cava, aorta, pulmonary veins, pulmonary arteries.
11. a) The “lub” sound is due to the closing of these two valves.  
\_\_\_\_\_

b) The “dub” sound is due to the closing of these two valves.

\_\_\_\_\_

12. Which of the following contain oxygenated blood?

Right atrium, left atrium, vena cava, aorta, pulmonary arteries, pulmonary veins