

Laboratory Activity No. 12

THE HEART

Scope of the Laboratory Activity

This laboratory activity consists of:

- 12.1. Gross Anatomy of the Human Heart
- 12.2. The Heart Sounds
- 12.3. Physiology of the Heart

Overview

In this laboratory activity, we will examine further the gross anatomy of the human heart, how heart sounds are produced, and the physiology of the heart.

Objectives

At the end of this laboratory activity, you will be able to:

- 1. Identify gross structure and functions of the heart
- 2. Trace the flow of blood through the heart
- 3. Appreciate the basic heart sounds using a stethoscope
- 4. Determine the effects of exercise on the heart

Laboratory Activity 12.1. Gross Anatomy of the Human Heart

Materials needed:

- Model of the human heart (or a virtual illustration of the human heart)
- Anatomic charts (or virtual anatomic chart)
- Reference text

- 1. Examine the model of the heart taking note of the structural characteristics (in terms of size, shape, and location) of the muscles, blood vessels, and divisions of the human heart.
- 2. Label the figure below. Write the name of the part at the space provided corresponding to the number being pointed in the figure.

Write your answers below:

1.	8.
2.	9,
3.	10.
4.	11.
5.	12.
6.	13.
7.	

4. Trace the flow of blood through the heart

5. Trace the flow of cardiac rhythm

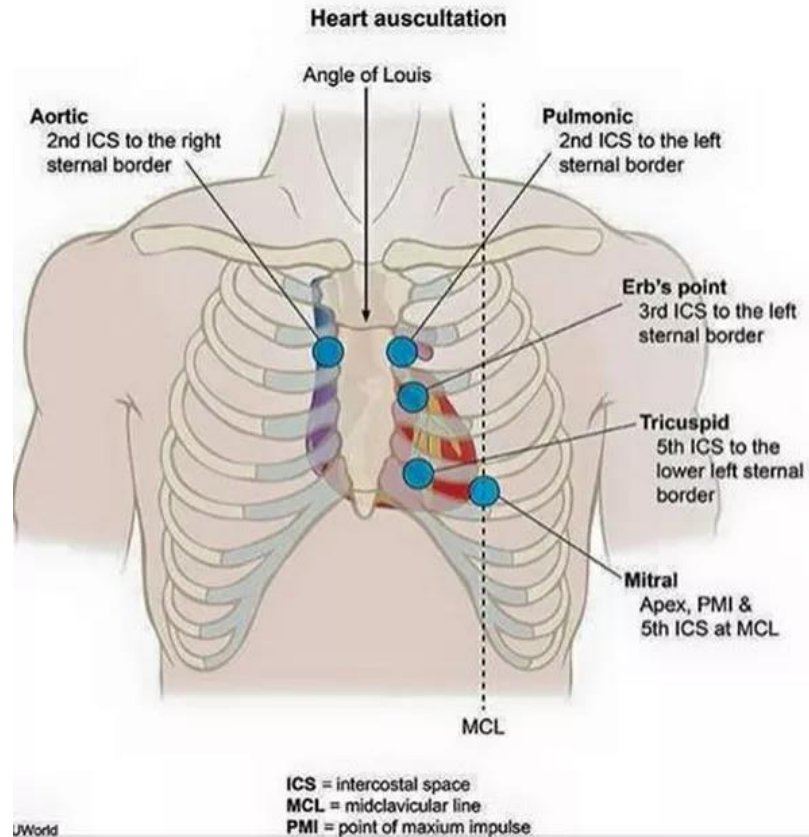
Laboratory Activity 12.2. Heart Sounds

Familiarize yourself with the basic heart sounds using a stethoscope. An alternative when you are working without a stethoscope is to listen to the normal heart sounds through the following video: <https://www.youtube.com/watch?v=xER8Bp4L2kM>

To listen to the heart sounds using a stethoscope, follow the procedures below:

1. Place your stethoscope over the apex of the heart located over the left intercostal space near the nipple. This is the **mitral area** where the first heart sound, systole, or the ‘lubb’ sound can be heard loudest. This is almost simultaneous to the beat that you can feel in the radial pulse.
2. To listen to the second sound, the ‘dubb’, place your stethoscope over the left 2nd intercostal space near the sternum. This is the **pulmonic area**. The second sound, the ‘dubb’ will be louder than the ‘lubb’ sound.
3. In the right 2nd intercostal space near the sternum is the **aortic area** where the second sound, the ‘dubb’ can also be best heard.
4. On the sternal border near the xiphoid process, is the **tricuspid area** where the closure of this valve contributes to the first sound – the systole.

You can watch the following video to help you locate the auscultation sites of the heart: <https://www.youtube.com/watch?v=KMYzpJLOF1c>. Please also see the figure below:



Answer the following questions:

What causes the heart sounds 'lubb' and 'dubb'? _____

The atria and ventricles are kept contracting at the same rate by the:

Laboratory Activity 12.3. Physiology of the Heart

1. To demonstrate the effects of exercise on the heart, get a partner and do the following activity:
 - a. While your partner is seated quietly in a chair, get his/her heart rate by placing the stethoscope over the 5th intercostal space of the left chest, the mitral area. If you do not have a stethoscope, you may get the pulse rate instead in the radial pulse.

The radial pulse is felt on the wrist just below the thumb. Place your index and middle finger at the base of your partner's thumb and slide down about 2cm into the groove of the wrist, pressing slightly. Look at the clock or a watch and begin counting when the second hand is on 12, 3, 6, or 9 to help you remember your starting point. Count the number of beats for one whole minute (60 seconds).

Record the data in the table below.

- b. Get your partner to exercise for 3 minutes by stepping up and down an elevated platform (you may use the stairs) or by doing jumping jacks or jogging in place. Immediately after stopping, get his/her heart rate. Alternatively, you may get the radial pulse rate. Record this data also.

	Heart rate or Pulse rate
At Rest	beats per minute
After Exercise	beats per minute

- c. Was there a change in the heart rate (or pulse rate)? If so, how do you explain this?

2. Answer the following questions:

- a. How does the heart's ability to contract differ from that of other muscles?

- b. What is the main function of the heart valves?

c. What are the factors influencing cardiac output?

References:

1. Betts JG, Desaix Peter, Johnson E et al (2017). Chapter 1 An Introduction to the Human Body. *Anatomy and Physiology*. OpenStax Rice University. Pp 7-40.
2. Tortora GJ & Derrickson B. (2014). Chapter 1 An Introduction to the Human Body. *Principles of Anatomy and Physiology*. John Wiley & Sons, Inc. 14 edition. Pp 1-26.