E - Bio Lab Activity

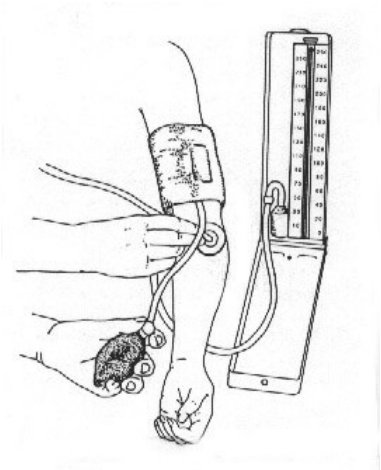
Blood Pressure – The Force That Circulates the Blood

Blood Pressure Animation

View the animation of how blood pressure is taken and answer the following questions before starting the lab.

1. Where is the blood pressure the highest? The lowest?
2. What type of tissue is in the arteries that allows them to expand and contract?
3. What are the two components of blood pressure? What happens to the ventricles during each?
4. in 110/80 which number is systolic and which is diastolic?
5. When taking blood pressure the first tapping sound heard is recorded systolic or diastolic? When the last tap is heard is it systolic or diastolic?

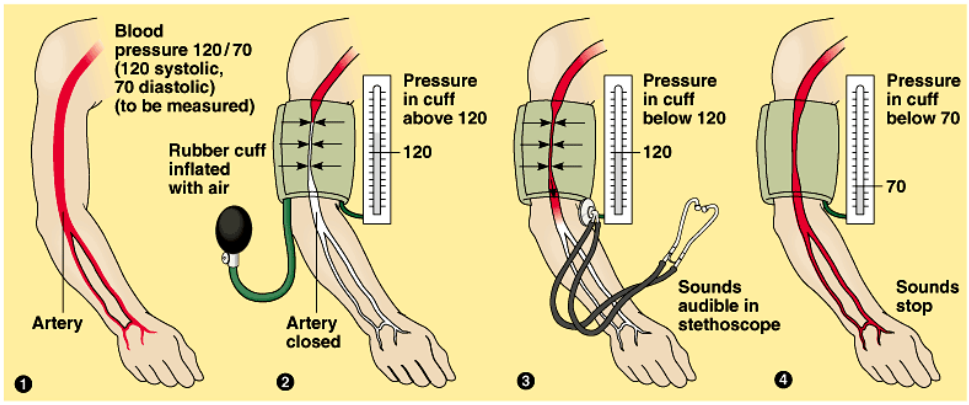
Blood Pressure Information



An important measurable aspect of the circulatory system is blood pressure. When the ventricles of the heart contract, pressure is increased throughout all the arteries. The pressure during contraction is the **Systolic** pressure and during relaxation is the **Diastolic** pressure. Arterial blood pressure is directly dependent on the amount of blood pumped by the heart per minute (cardiac output) and the resistance to blood flow through the arterioles (peripheral resistance). The blood pressure is measured using a **sphygmomanometer**. This consists of an inflatable cuff connected by rubber hoses to a hand pump and to a pressure gauge graduated in millimeters of mercury. The cuff is wrapped around the upper arm and inflated to a pressure that will shut off the brachial artery. The examiner listens to the sounds of the brachial artery by placing the disc of the stethoscope on the inside of the elbow below the biceps; the pressure in the cuff is allowed to fall gradually by opening a screw valve located next to the hand pump. The examiner then listens for the tapping sounds created by the pulse.

At rest, the blood normally goes through the arteries so that the blood in the central stream moves faster than the blood on the outer edge of the artery. Under these conditions the artery is silent when one listens. When the sphygmomanometer bag is inflated to a pressure above the systolic pressure the flow of blood is stopped and the artery is silent. As the pressure in the cuff gradually drops to levels between the systolic and diastolic pressures of the artery, the blood is pushed through the compressed walls of the artery in a turbulent flow. Under these conditions, the layers of blood are mixed by eddies that flow at right angles to the stream, and the turbulence sets up vibrations in the artery that are heard in the stethoscope. The cuff pressure at which the first sound is heard (snapping sound) is called the **systolic pressure**. The second pressure when the sound becomes muffled and disappears is called the **diastolic pressure**.

The diagram found below illustrates what is happening when the blood pressure is taken.



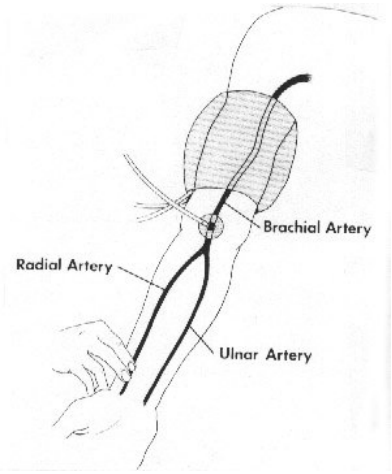
Blood Pressure Lab

Purpose - To develop an understanding of blood pressure and how changes in posture affect an individual's blood pressure.

Material - stethoscope, sphygmomanometer, alcohol swabs

Part I - Taking Blood Pressure

1. The resting blood pressure is considered the control in this experiment. Divide yourselves into groups of **three** and select **one** person to be a subject. You will find that you may not be able to read the subject's blood pressure due to many reasons. If this becomes a problem use the other arm or change subjects and do Part I over again. Have the subject seated comfortably and relaxed with the forearm on a smooth surface at heart level. It is essential that the room is quiet so that you can hear the sounds. Using the radial artery in the wrist or the carotid in the neck **record the subject's resting heart rate for later use.**
2. Take an alcohol soaked swab and wipe off the ear pieces of the stethoscope. Make sure the needle of the manometer is set to zero and the exhaust valve is open.



3. Locate the brachial artery (see diagram) with your two fingers as if you were taking a pulse. It is located on the inside of the upper arm just above the bend in the elbow.
4. The deflated cuff should be wrapped snugly (but not tightly) around the upper arm 2 to 3 cm above the bend in the elbow. Be sure to position the inflatable bag so about half of it is on each side of the brachial artery.
5. While feeling the radial pulse in the wrist with one hand, close the exhaust valve and rapidly inflate the cuff with the other hand. Inflate to a pressure about 30 mm Hg above the point where the radial pulse ceases. **(NO MORE THAN 140 mm Hg). If using the electronic sphygmomanometer you inflate until you here a beep.**
6. Without undue pressure, place the stethoscope over the brachial artery just below the cuff. Exhaust the cuff at a rate of 2 to 5 mm Hg per second. The electronic version will deflate automatically. As the cuff exhausts, listen for the first clear tapping sound; the manometer reading at this point is the systolic pressure. Continue to listen carefully to the sounds which become muffled (even disappear) and then become louder. At

the point they begin to muffle a second time, read the manometer again. This is recorded as your diastolic pressure. The systolic pressure is the top number and the diastolic the bottom number when you are given your blood pressure by a doctor or nurse. **The electronic sphygmomanometer will record the pressures and will display them in digital form**.
Q1 - Record these numbers in the **RESTING BLOOD PRESSURE SECTION OF YOUR DATA TABLE.**
7. Before taking the blood pressure again, allow the subject to relax for 30 to 60 seconds with the cuff deflated. **Never leave the cuff inflated on the subject for more than a few seconds.**

Part II - Position And Blood Pressure

1. The exercise will take the blood pressure with the arm extended above the head. The cuff will be on the extended arm.
Q2 – Before starting predict if the blood pressure will be higher or lower. Record your answer.
2. Test your hypothesis by having the subject raise their arm above their head. After 30 seconds take the blood pressure of the extended arm. Once the blood pressure is taken lower the arm and repeat after 2 minutes. Record your data in the table that is provided.
Q3 - Do your findings support your prediction ?
Q4 - How do they compare with the resting blood pressure? Why does this occur?

Student Blood Pressure Records

Activity	Systolic Pressure	Diastolic Pressure	Pulse Pressure
Resting			
Arm Up #1			
Post Exer. #1			
Post Exer. #2			

PART III - EXERCISE

Exercise can effect blood pressure in many ways. This part of the lab will be done following a short period of stepping exercise.
1. Use the resting blood pressure as your control in this activity.
2. The subject will do the step exercise for 1 minute.
3. Immediately following the exercise the heart rate and the blood pressure should be taken. Record the blood pressure in the table found above.
Q5 – What was the pulse rate following exercise?
4. take the blood pressure and heart rate 3 minutes after completing the exercise? Record the blood pressure.
Q6 – What was the pulse rate?

Part IV – Pulse Pressure

Pulse pressure is the difference between the systolic and the diastolic blood pressure readings. Calculate the pulse pressure for each activity and record in the table above.

Part V – Hypertension Webquest

Hypertension or abnormally high blood pressure is a major contributor to many cardiovascular diseases. It is estimated that 1 in 6 adults have hypertension with 90% of these having no known cause. It is known as the silent killer because it has no noticeable symptoms and often people feel perfectly well. Using the following websites answer the questions found below.

Causes of High Blood Pressure

Causes of High Blood Pressure

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Causes of High Blood Pressure

Q7 - Above what blood pressure is considered hypertensive?
Q8 - Identify **FOUR** factors other than exercise that may contribute to the incidence of hypertension.