

Week 2: Cardiovascular System

GE 345 Physiology/Kinesiology

Name

Blood Pressure and Heart Rate

As the heart beats, it creates pressure causing blood to flow through the vessels. Heart rate is measured in beats per minute (bpm), and can be determined through pulse point palpation (ex: brachial or carotid), listening, or measuring electrical activity. *Normal* heart rate is considered to be about 60 bpm. Low heart rate is called *bradycardia* and high heart rate is *tachycardia*.

Blood pressure can be indirectly measured with a sphygmomanometer and stethoscope, and is recorded as systolic over diastolic pressure in mm Hg. *Normal* blood pressure is about 120/80. High blood pressure is known as *hypertension*. Low blood pressure is called *hypotension*.

Stresses such as deadlines, bullies, pain or emotional disturbance can stimulate the sympathetic response in what is commonly known as the “fight or flight” response, raising blood pressure and heart rate. However, some individuals do not show a significant increase in blood pressure (less than 22 mm Hg average BP) in acute situations. These people are classified as *hyporeactors*.

During physical activity, “milking” action of the muscles and deep respiration increase venous return of blood to the heart. This stretches the heart’s muscle fibers, resulting in increased contraction force, which in turn increases stroke volume. Heart rate also increases to keep up with increased flow. A long-term effect of exercise (also known as “training effect”) is that the heart’s elasticity increases, allowing increased stroke volume, so the heart works less to transport more blood through the body and the heart doesn’t need to beat as frequently.

Paraphernalia

The heart rate monitor’s transmitter must be damp and touching bare skin around the rib cage, with the logo centered over the xiphoid process. Once in place, the receiver should display heart rate within a few seconds.

Wrap the blood pressure cuff evenly and snugly around the left arm about an inch above the elbow. Press the ball of the stethoscope lightly over the brachial artery. Inflate the cuff rapidly to about 50mm Hg above the point at which the radial pulse disappears. Open the valve to permit cuff pressure to drop at about 3mm Hg/sec. Cuff pressure when the first sound appears equals systolic pressure. Cuff pressure at the point the last sound is heard equals diastolic pressure.

1 or 2 volunteers from class will be our test subjects.

Today's Activity

We will explore how different situations influence blood pressure and heart rate.

1. **Resting Measurements.** Have subject sit comfortably for about 3-5 minutes. The forearm should be bared, and supported at heart level on a smooth surface. Average 2 heart rate and blood pressure measurements. If the measurements are not reasonably close (within 3 bpm or 5 mm Hg), take a third and average the two closest measurements. Record average measurements here:

Heart Rate = _____ bpm

BP = _____ / _____ mm Hg

2. **Respiration.** Have subject hold breath following a deep inspiration, keeping abdominal and diaphragm muscles relaxed. Take readings often during the breath holding. What do you think will happen?

Heart Rate: ___ increase ___ decrease

Blood Pressure: ___ increase ___ decrease

Record your readings here:

	1 st Reading	2 nd Reading	3 rd Reading	4 th Reading	5 th Reading
Heart Rate					
Blood Pressure					

3. **Standing.** Have subject stand rigidly at attention for 15 minutes. The individual must resist the temptation to shift weight during this time. Take measurements every 1.5 minutes.

What do you expect will happen?

Heart Rate: ___ increase ___ decrease

Blood Pressure: ___ increase ___ decrease

Record your actual readings here:

	HR	BP			HR	BP
1:30				9:00		
3:00				10:30		
4:30				12:00		
6:00				13:30		
7:30				15:00		

4. **Lying Down.** Subject lies down for 3-5 minutes. Still lying down, take measurements. What do you think will happen?

Heart Rate: ___ increase ___ decrease

Blood Pressure: ___ increase ___ decrease

Record your actual results here:

Heart Rate = _____ bpm

BP = _____ / _____ mm Hg

5. **Discomfort.** Subject remains lying on table with hand in ice water – it should be unpleasantly cold. Take measurements after 30 seconds and 1 minute. What do you predict will happen?

Heart Rate: ___ increase ___ decrease

Blood Pressure: ___ increase ___ decrease

Record your actual results here:

	After 30 seconds	After 1 minute
Heart Rate		
Blood Pressure		

6. **Exercise.** Have subject step up onto a chair, straighten his/her body, and step down every 2 seconds for 2 minutes. Take measurements immediately upon cessation, and then every 30-45 seconds until normal.

What do you predict will happen as a result of the activity?

Heart Rate: ___ increase ___ decrease

Blood Pressure: ___ increase ___ decrease

Record your actual results here:

	1 st	2 nd	3 rd	4 th	5 th	6 th
HR						
BP						

