

## **Laboratory 11- Cardiovascular Measurements**

**Purpose:** The purpose of this lab is to learn how to properly determine blood pressure using a pressure cuff from a sphygmomanometer. We will also be comparing the effect of regular exercise on the heart between males and females before and after physical activity. We will also be testing what effect the divers response is in correlation to heart rate.

### **Procedures:**

#### **11-A: Determination of blood pressure:**

1. Wrap the pressure cuff of the sphygmomanometer snugly around the upper left arm of your lab partner. Your lab partner should assume a relaxed, sitting or supine position.
2. Place the stethoscope securely over the brachial artery. Close the pressure valve and begin pumping up the rubber ball.
3. You will begin to hear the arterial pulse as you pass the diastolic pressure. Continue pumping until the pulse is not heard, approximately 10 mmHg above your partner's normal systolic pressure. The brachial artery is now totally occluded.
4. Slowly open the pressure valve and listen for the pulse sounds to reappear as the pressure drops. These are known as Korotkoff sounds
5. The first sound heard signals the systolic BP. Record this value from the scale.
6. The sound will become louder as the pressure drops until it finally starts to become muffled. Record the pressure at which the sound vanishes. This signals the diastolic BP. Record your blood pressure as systole/diastole
7. Alternate with your lab partner and repeat these procedures.
8. Next, measure the BP of each of you immediately upon standing. (NOTE: be sure to have your cuff inflated prior to standing, so that you can begin to release pressure immediately upon standing.)
9. Lastly, measure the BP three minutes after standing. Record these values for your use and on the chalkboard.
10. Discuss the orthostatic response in terms of the receptors used and the effects of postural change. Include any limitations to obtaining reliable results.

#### **11-B: Demonstration of a measure of physical fitness:**

1. Select three students who exercise regularly and three students who do not. Each student will take his/her resting pulse rate for one minute and record this value.
2. Each student will then run the track twice at a fast but comfortable pace.
3. Immediately upon returning to the laboratory, each student will record his/her pulse after exercise.
4. Each student will take his/her pulse at one minute intervals until the resting pulse is reestablished. (NOTE: The best method to employ is to take the pulse rate for 15seconds and multiply by 4.)
5. These results will be recorded on the chalkboard for discussion. Is there a difference between the exercisers and the non-exercisers? Which student(s) do you consider to be in better physical condition? Why?
6. Determine the target heart rate range for each student (if the ages are available) and for yourself. The target heart rate range determines the heart rate that should be maintained for 20-30 minutes, at least 3 times per week for cardiovascular fitness. To determine your target heart rate range do the following calculations for the Karvonen formula (only use numbers rounded off to whole numbers):
  - a.  $220 - \text{your age} = \text{maximum heart rate (max HR)}$
  - b.  $\text{Max HR} - \text{resting HR} = \text{HR reserve}$  (to find your resting heart rate, take your pulse before getting out of bed each morning for three days and then take the average)
  - c.  $\text{target heart rate range} = (\text{HR reserve} \times 60\%) + \text{resting HR} = \text{low target heart rate}$

$(\text{HR reserve} \times 80\%) + \text{resting HR} = \text{high target heart rate}$

Example: 20 year old with a resting heart rate of 65 beats per minute

$220 - 20 = 200$  (max HR)

$200 - 65 = 135$  (HR reserve)

$(135 \times 60\%) + 65 = 81 + 65 = 146$

$(135 \times 80\%) + 65 = 108 + 65 = 173$

This student's target heart rate range would be 146–173 beats per minute.

7. Include your calculations for your target heart rate in the results section of your report.
8. Evaluate the class results in terms of target heart rate and level of fitness for each individual

### **11-C: Demonstration of the diving response**

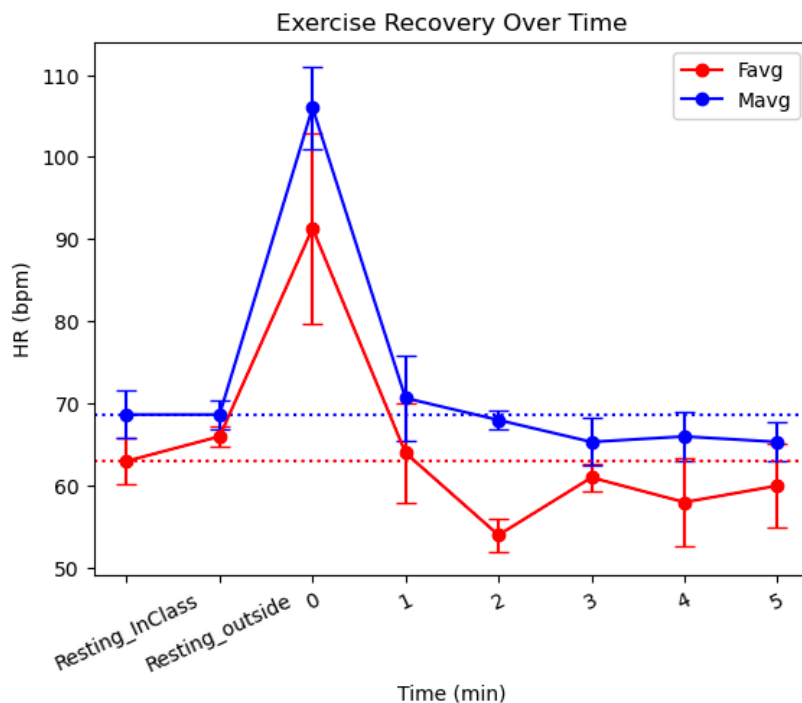
1. Fill a large tub with ice cold water.
2. Select one student volunteer and hook him/her up to the computer.
3. Recordings of a Lead II ECG and pulse pressure from a thumb will be obtained with the student at rest for a baseline measurement.
4. Recordings will then be taken with the student holding his/her breath for at least 20 seconds, hopefully for 30 seconds.
5. The experiment will be repeated with the student holding his/her breath and placing his/her head into a bucket of ice cold water.
6. Include copies of the results in your lab report.
7. Evaluate the three sets of data in terms of the bradycardia and vasoconstriction. What are the adaptive advantages of these reflexes?

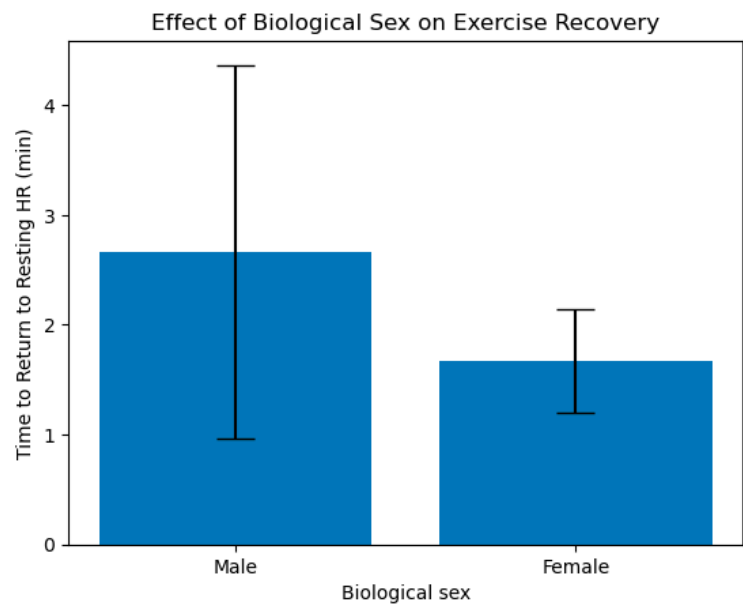
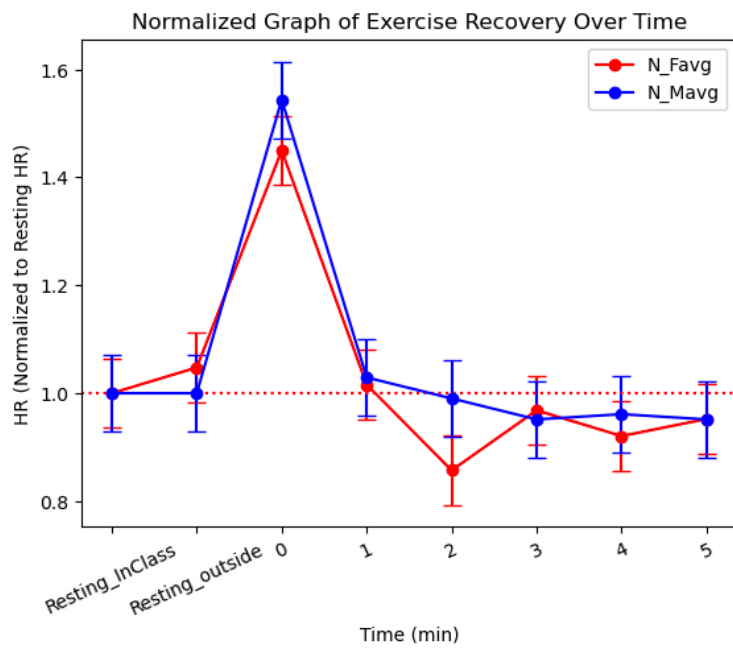
### **Results:**

#### **11-A: Determination of blood pressure:**

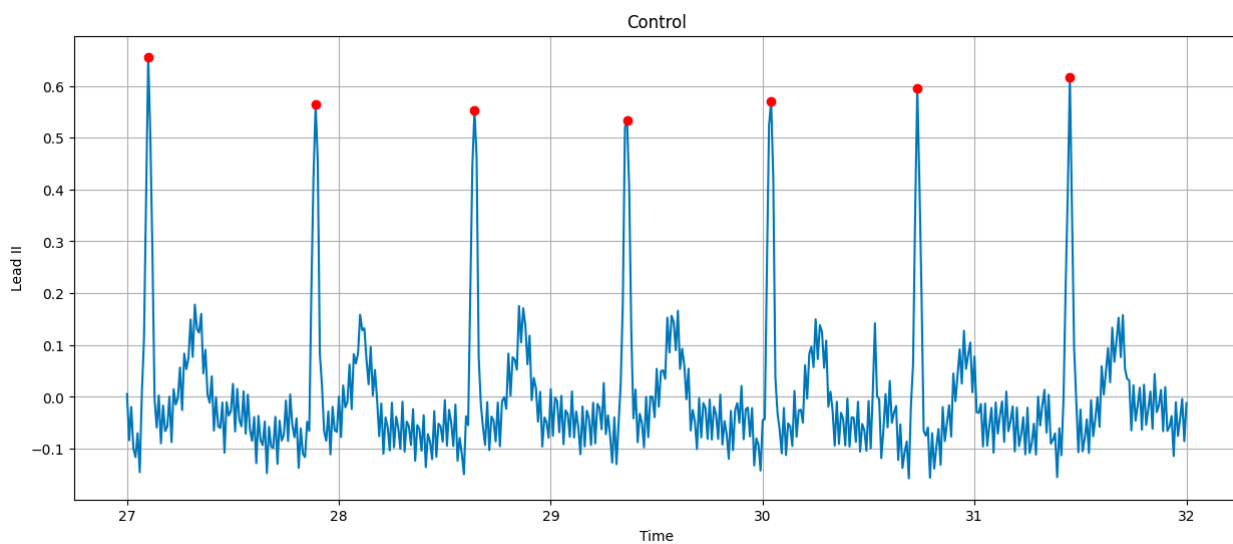
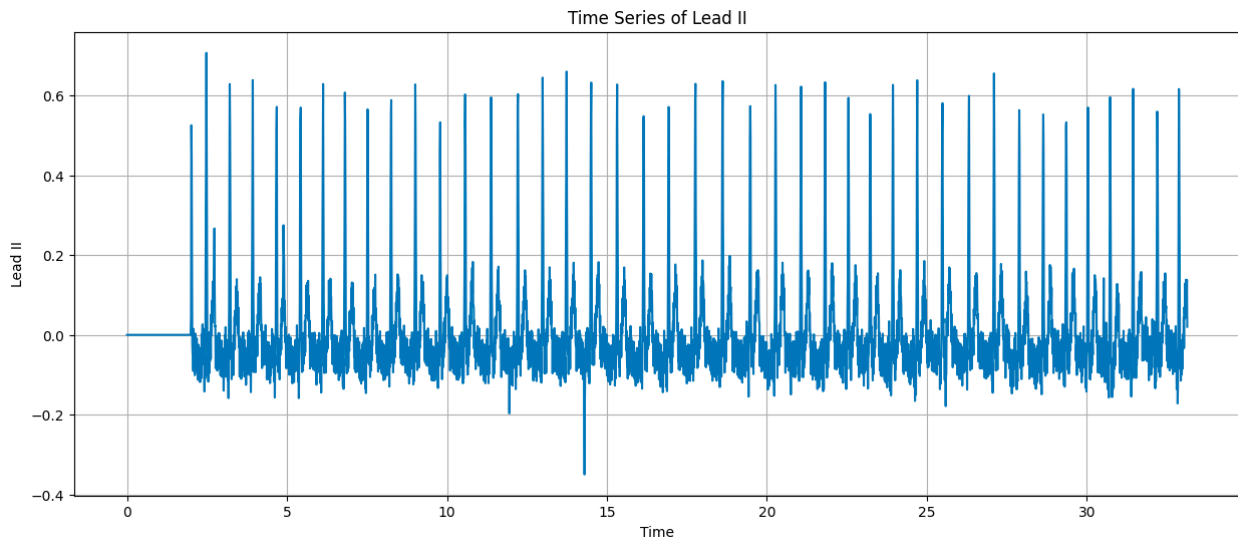
First attempt	120/85
Second attempt	125/90
Third attempt	120/80

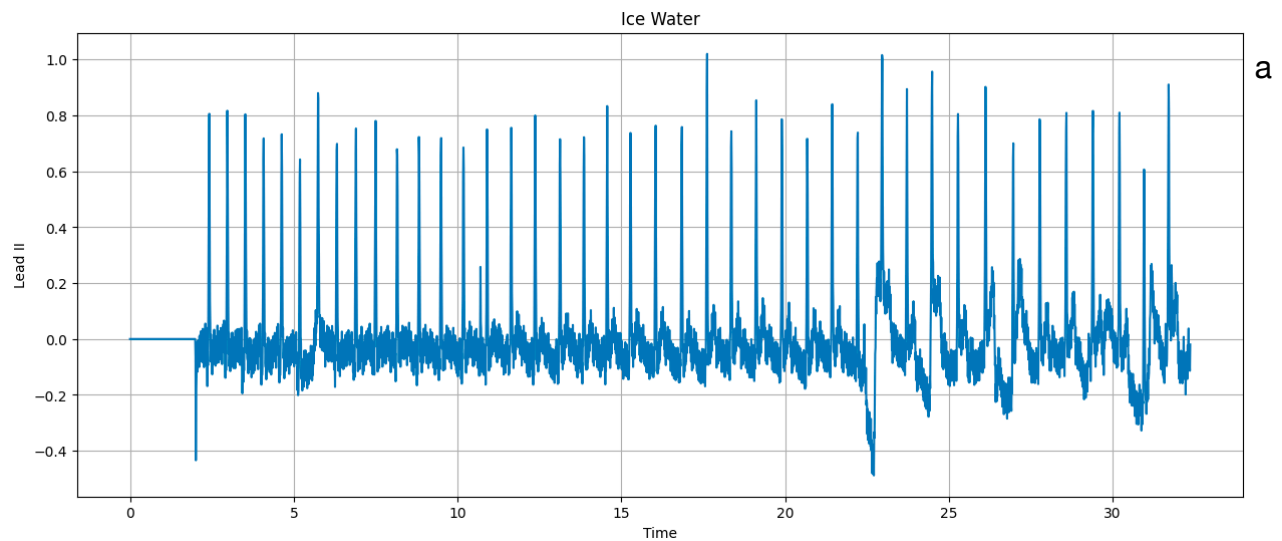
#### **11-B: Demonstration of a measure of physical fitness:**





### 11-C: Demonstration of the diving response:





## **Discussions:**

### **11-A: Determination of blood pressure:**

My initial blood pressure was 120/85. The second attempt was 125/90. I believe that my blood pressure went up because a little bit because I was moving my legs. On the third attempt my blood pressure went back to normal because I was sitting still.

### **11-B: Demonstration of a measure of physical fitness:**

According to the results it takes men 2.5 minutes longer to recover than women. This can be due to a women's quick production of estrogen, which plays an important role in muscle repair.

### **11-C: Demonstration of the diving response:**

Before this person placed his/her face in the cold water their average RR interval in the window: 0.77 seconds, and Heart rate in the window: 77.52 BPM. While their face was in the water the average RR interval in the window: 0.82 seconds, and Heart rate in the window: 72.82 BPM. The cooler the water, the greater the diving response, this means that it makes the our hearts beats decrease, and our blood pressure increases. I believe this happens because our body enters a state of shock, which leads to a lower heart rate.

## **Conclusion:**

In conclusion, in this lab we learned how to properly check our blood pressure. Normal blood pressure should normally be 120/80 mm HG. We also learned that biological sex has an effect on recovery time. Women tend to recover faster because of the natural production of estrogen. (Cool fact that I was unaware of) Finally, in this lab we learned that when someone places their face in ice cold water their heart beats will decrease, and their blood pressure will increase.