Mariah Hall

Bio 125

Tuesday Lab

10/26/2023

Lab 11- Cardiovascular Measurement

Purpose: The purpose of this lab is to learn about other ways to measure different things involving our heart. We learn how to obtain our heart rate and blood pressure and the parameters involved. Measure the effects changes of water temperature and exercise can have on our heart rate and compare to our resting heart rates.

Procedure:

11-A: Determination of blood pressure

Blood pressure (BP) generally refers to the pressure of blood that is applied to the arterial walls. Systolic, the highest, blood pressure results when the ventricles contract. Diastolic, the lowest, blood pressure results when the ventricles relax. Blood pressure is normally expressed as systole over diastole and in millimeters of mercury (e.g. 120mmHg/ 80 mmHg). Pulse pressure is the difference between systolic and diastolic blood pressures. Hypertension, high blood pressure, may affect both systolic and diastolic measurements. Hypertension may result in vascular damage and is especially dangerous when it affects diastolic blood pressure. Blood pressure is measured with a sphygmomanometer. These devices are of three general types: anaeroid sphygmomanometers measure pressure by displacing a spring, mercurial sphygmomanometers by displacing a column of mercury, and electronic sphygmomanometers by increasing electrical resistance.

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.Thefirstsound 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 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

A general measure of physical fitness is the ability to resume a normal resting pulse rate shortly after a brief period of exercise. One is considered to be less fit if increased periods of time are required to regain the resting pulse rate. Fitness may be considered a function of the degree to which the cardiovascular system has been developed. Fitness may be measured in a number of standardized tests; however, we will be measuring the changes in heart rate as it relates to activity and participant's age. We will monitor the change in pulse rate that occurs when a resting student exercises and then attempts to return to a resting pulse rate. We will compare these changes in heart rates between students who exercise regularly and students who do not and determine the target heart rate range for exercise for these students.

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?

11-C: Demonstration of the diving response

Marine mammals are known to experience bradycardia upon becoming immersed in water. This behavior is known as the diving response. Humans may also experience such a response, though, not as pronounced as that of marine mammals. We will attempt to establish a diving response in the following exercise with the help of the computer.

1.Filla 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 20seconds, 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

- 1st reading: 122/76 sitting

- 2nd reading: 116/74 immediate standing

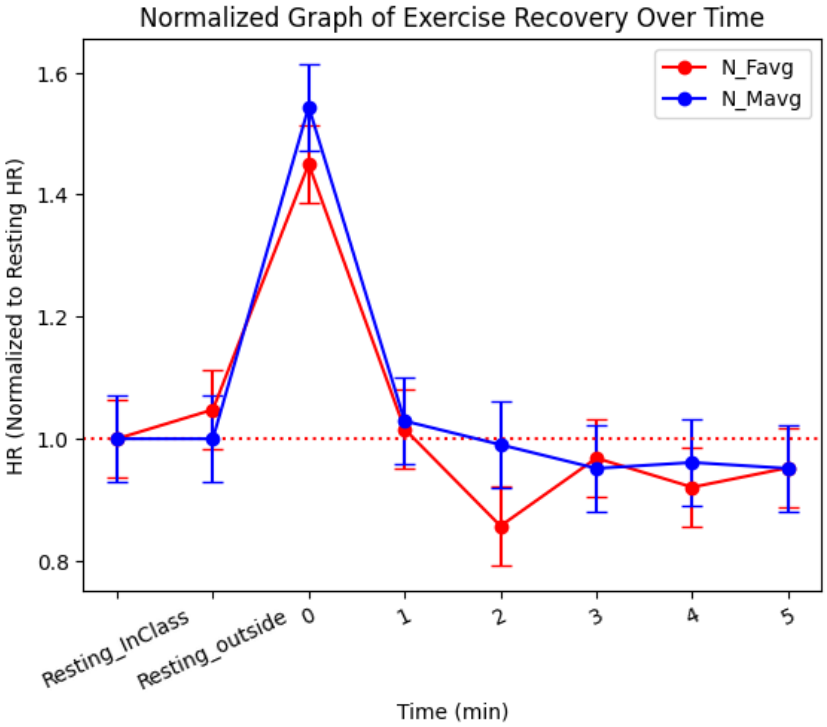
-3rd reading: 124/80 standing for 3 minutes.

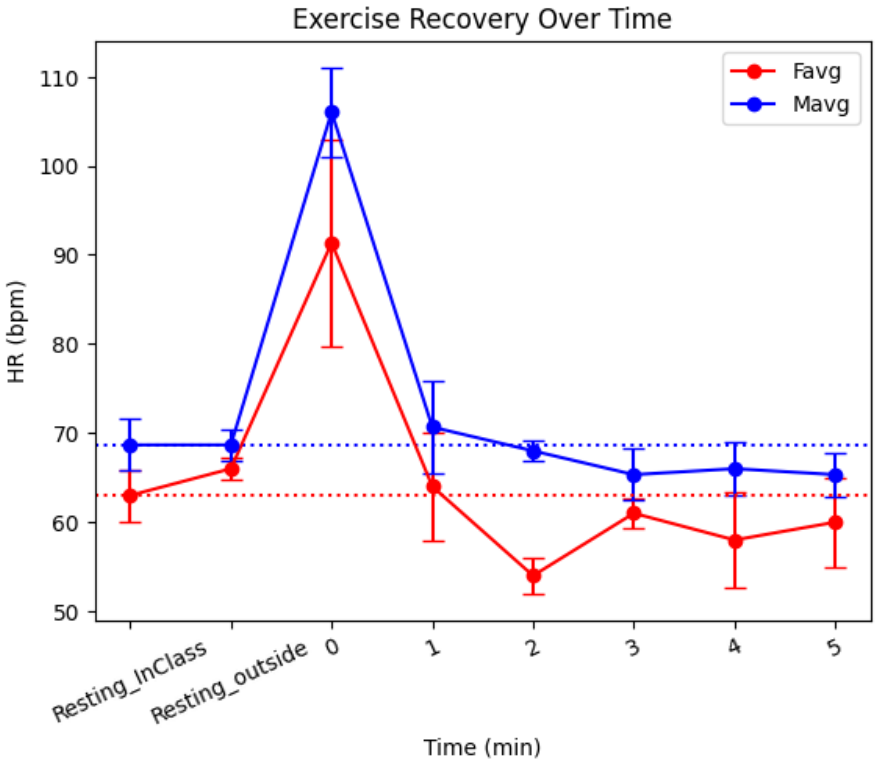
My blood pressure did drop a little lower after going from sitting to standing, after standing for a few more minuets it did come back up.

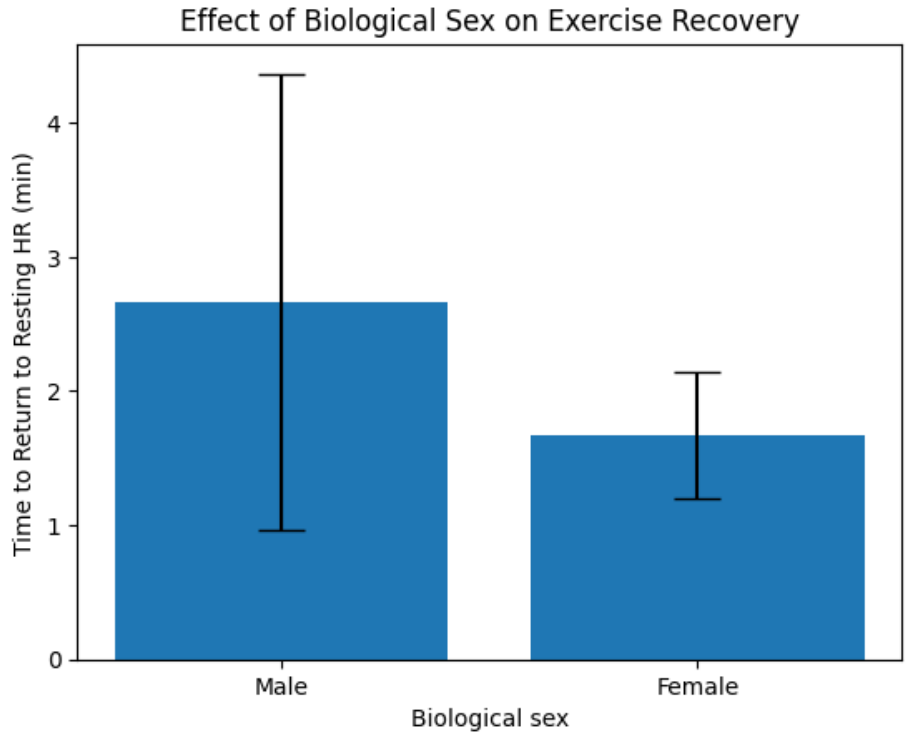
11-B: Demonstration of a measure of physical fitness

Sex	Resting in class	Resting outside	After exercise	1min	2min	3min	4min	5min
Female1	**58**	**66**	**72**	**68**	**56**	**58**	**48**	**50**
Female2	**68**	**64**	**112**	**52**	**56**	**64**	**66**	**66**
Female3	**63**	**68**	**90**	**72**	**50**	**61**	**60**	**64**
Male1	**64**	**66**	**116**	**70**	**68**	**66**	**68**	**64**
Male2	**74**	**72**	**102**	**80**	**70**	**70**	**70**	**70**
Male3	**68**	**68**	**100**	**62**	**66**	**60**	**60**	**62**

Female resting = 63
Male resting = 68.666667


Normalized Graph of Exercise Recovery Over Time
N_Favg
N_Mavg
HR (Normalized to Resting HR)
1.6
1.4
1.2
1.0
0.8
Resting_InClass
Resting_outside
0
1
2
3
4
5
Time (min)

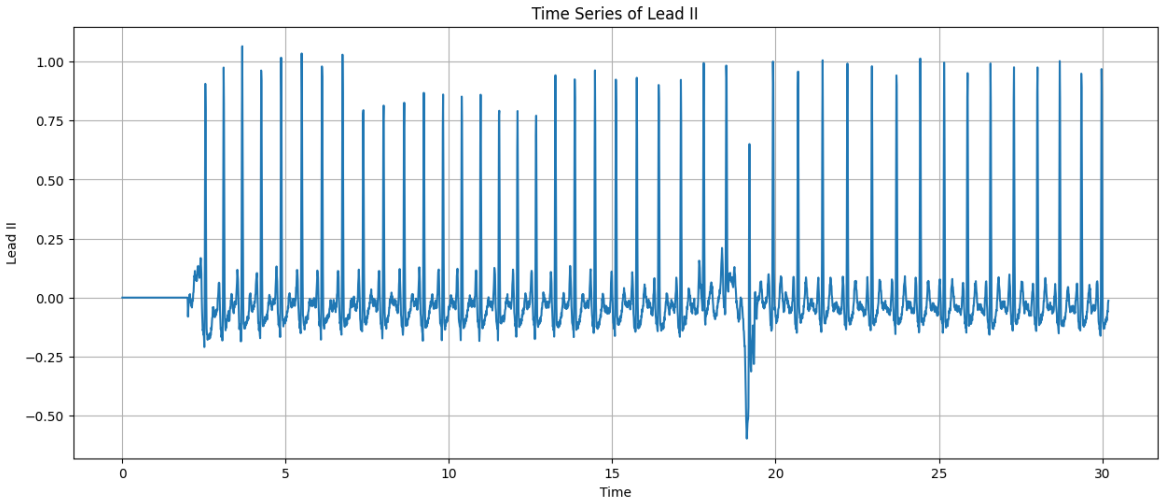

Exercise Recovery Over Time
Favg
Mavg
HR (bpm)
110
100
90
80
70
60
50
Resting_InClass
Resting_outside
0
1
2
3
4
5
Time (min)

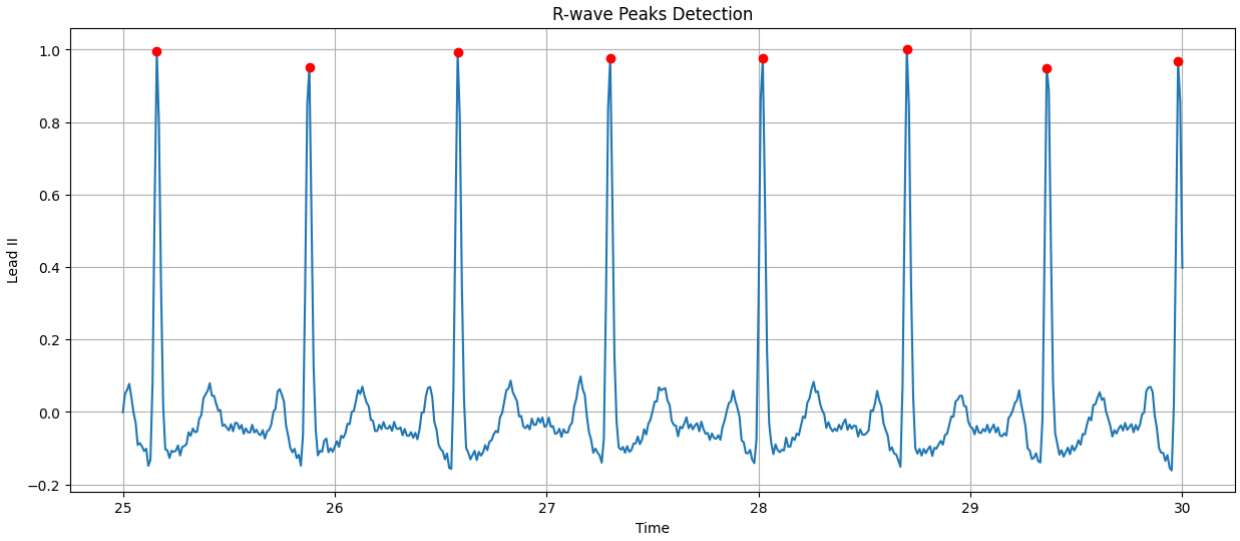


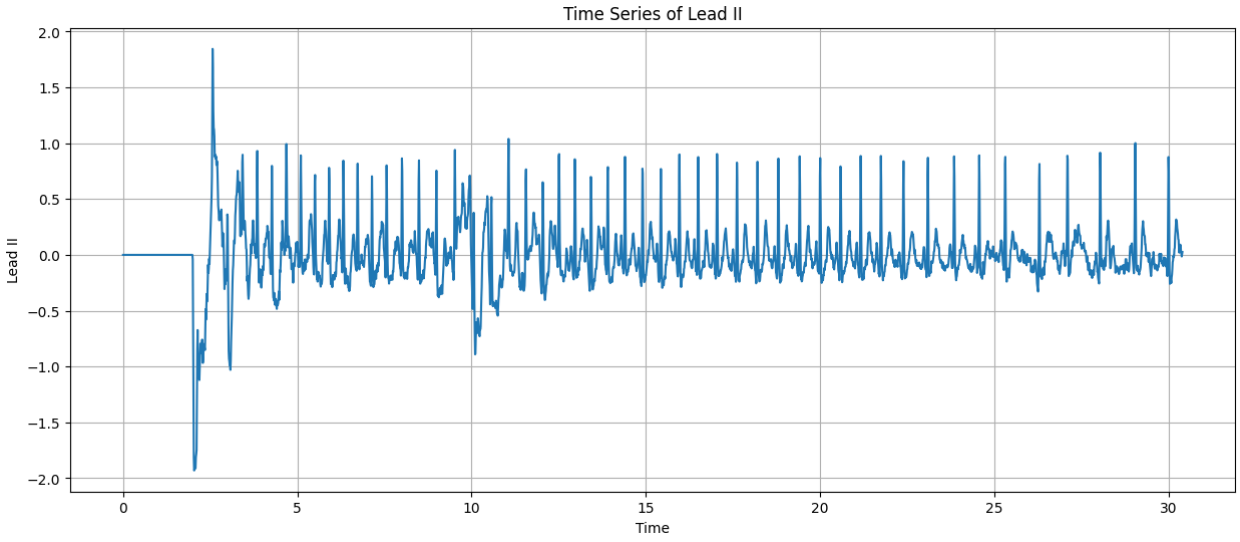
Time to reach ~resting HR (64) for the male 1 was: 5 minutes.
Time to reach ~resting HR (74) for the male 2 was: 2 minutes.
Time to reach ~resting HR (68) for the male 3 was: 1 minutes.
Time to reach ~resting HR (58) for the female 1 was: 2 minutes.
Time to reach ~resting HR (68) for the female 2 was: 1 minutes.
Time to reach ~resting HR (63) for the female 3 was: 2 minutes.

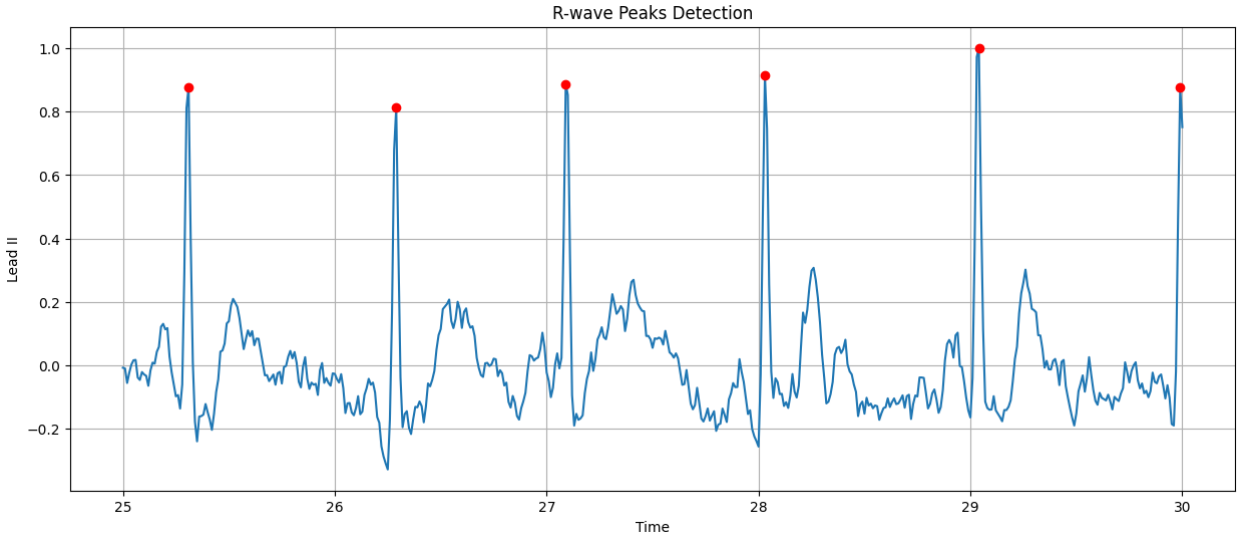
11-C: Demonstration of the diving response

-HR dropped from 87 to 64




R-wave Peaks Detection
Lead II
Time


Time Series of Lead II
Lead II
Time


R-wave Peaks Detection
Lead II
Time

Discussion:

This lab was kind of interesting. I didn't volunteer for either experiment, so it wasn't as exciting. But it was fun to cheer on my lab partners during the exercise portion and I was very thankful I didn't have to submerge my face into that ice water. However, I was surprised to see the females have much lower heart rate average than the males, I thought it would be the other way around. I say this because of the people that volunteered, the males appeared more physically in shape than some of the females that participated. I was also surprised to hear from the classmate that submerged her face, that it wasn't as bad as the experiment we did a couple labs ago submerging one hand in ice water and the other in warm.

Conclusion:

-Based of the diver's reflex, HR does drop when you hold your breath and submerge your face into cold water.

-This reflex creates a parasympathetic response.

-HR increases with exercise.

-It takes time to have HR return to resting after exercise.

-Normal resting HR is 60 to 100 beats a minute.

-Normal blood pressure is 120/80

-Changes in blood pressure can occur with different position changes, standing can cause a drop in blood pressure because gravity cause blood to pool in your lower body.