Blood Glucose Regulation Lab Report Grading – updated March 6, 2023

- In general, ½ pt off for every spelling error and major grammatical error.
- ½ pt off for not labelling the sections as Abstract, Introduction, Methods, Results, Discussion (or Conclusion is fine), and Literature Cited.

Title = 1pt

- ½ pt for actual title of paper (that it's there)
- ½ pt for name and "Department of Biology, Francis Marion University, Florence SC" (as per the lab report guidelines)

Abstract = 2 pts

- 1 pt for summarizing what was done (examined changes in blood glucose at time 0, 30, and 60 min after drinking either a sugar-free or full sugar beverage). 1 pt for summarizing findings (found that blood glucose increased at time 30, but decreased at time 60 for full-sugar beverage drinkers, while blood glucose did not change over time for sugar-free beverage drinkers).

Introduction = 8 pts

- 5 pts - MUST have background on negative feedback of how blood glucose regulated. [2.5 pts for what happens when stimulus of blood glucose is too low (what is the sensor, integrating center, and effector, what is secreted, and what it does to increase blood glucose) and 2.5 pts for what happens when the stimulus is blood glucose is too high (what is the sensor, integrating center, and effector, what is secreted, and what it does to decrease blood glucose.)
- 1 pts for including purpose of experiment
- 1 pts for including hypothesis of experiment
- 1 pts for including a properly cited reference (as numerical superscript) for the background. As a bare minimum, you must cite from the Wiki textbook.

Methods = 8 pts

- 1 pts for including the total number of people in each group of the experiment.
- 5 pts total for including the experimental design: Measured blood glucose (in mg/dl) using a 28-gauge lancet in a lancet holder, glucose test strip, and a blood glucose meter. Blood glucose measured at 0, 30, and 60 min.
- 1 pts for including the beverages, and volume consumed, for each group.
- 1 pts for stating that data was entered into and summarized using Excel, and was data was analyzed using t-tests.

Results = 8 pts

- 1 pts for reporting the average blood glucose at time 0 for water and lemonade drinkers
- 1 pts for reporting average blood glucose at time 30 for water and lemonade drinkers
- 1 pts for reporting average blood glucose at time 60 for water and lemonade drinkers
- 2 pts for reporting P-value for blood glucose t-test for water drinkers between time 0 & 30, and between 30 & 60 min.
- 1 pts for reporting P-value for blood glucose t-test for lemonade drinkers between time 0 & 30, and between 30 & 60 min.
- 1.5 pts for stating that blood glucose increased at time 30 but decreased at time 60 for lemonade drinkers, and blood glucose did not change over time for water drinkers.
- 0.5 pts for including data sheet (this can be embedded within Results or simply stapled at the end of report)

Discussion = 6 pts

- 4 pts for explaining WHY blood glucose increased at time 30 but decreased at time 60 for lemonade drinkers, and WHY blood glucose did not change for water drinkers over time.
- 2 pts for giving a possible source of experimental error.

Literature Cited = 1 pts

A numerical list of your citations. A citation from the Wiki textbook is required. You can have supplemental sources, but if they are online you must cite the http address. Sources must be listed in numerical order in which they were found in the introduction.

1. Wikibooks Contributors, Human Physiology 2006. http://en.wikibooks.org/wiki/Human_Physiology (Pg. _____)

See example lab report below.

The Effect of Exercise Duration on Heart Rate

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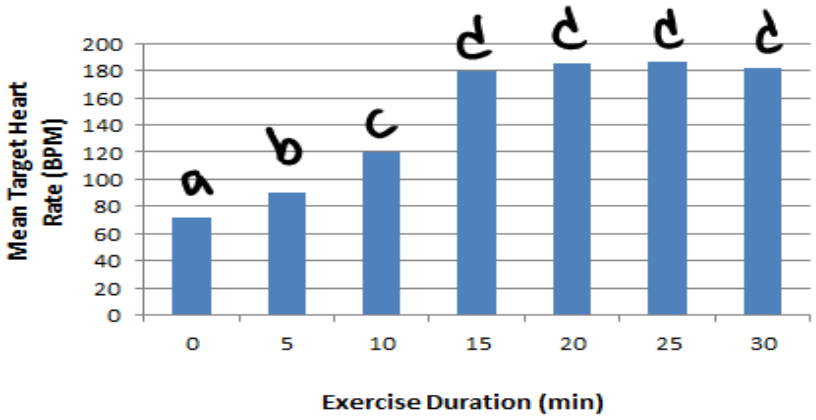
Abstract
In our experiment, we measured changes in heart rate, in 38 student athletes between the ages of 20 and 22 years old, in response to changes in exercise duration by manual palpation of the radial pulse. We found that heart rate increased proportionally with exercise duration up until 15 minutes of exercise, where-after heart rate remained steady for the remainder of the 30 minutes. These results indicated that, in student athletes of similar age, cardiovascular performance in exercise-conditioned individuals resulted in an increase in mean target heart rate during the first 15 minutes of exercise, followed by no additional increase in heart rate for the remaining time intervals.

Introduction
Heart rate changes in response to many factors, including exercise, stress, fear, cardiovascular health, pharmacological agents, and changes in blood pressure, among many other reasons.[1] For example, if a person's activity levels increase, their muscles and brain will increase their demands for oxygen (O2) and glucose in the bloodstream in order to fuel the activity. As activity levels increase, the skeletal muscles and brain start using up available blood O2 faster, resulting in a momentary drop in blood O2 levels. In response to lower O2 levels in cerebral spinal fluid and blood, chemoreceptors for O2 in the medulla oblongata, and in the aortic arch and carotid sinuses, sense the change, and the medulla responds with a sympathetic stimulation to increase heart rate.[1] The increased heart rate increases cardiac output so that more blood reaches the lungs, where it picks up O2. More O2 is then available for skeletal muscles and the brain to sustain the exercise.[1] This elevated heart rate continues as long as the O2 demand, by muscles and the brain, remain high.[2] One of the most common ways to measure the body's demand for O2 during exercise is by determining the target heart rate.[3] In this study, I will examine the target heart rate of 40 student athletes, ranging in age from 20 – 22 years old, in response to varying exercise durations. I propose that as exercise duration increases, target heart rate will increase proportionally.

Methods
Forty student athletes, from Francis Marion University, Florence, S.C., ranging in age from 20 – 22 years old, participated in the experiment. This sample size consisted of 20 male and 20 female participants with no known health problems. Heart rate was measured through manual palpation of the radial artery pulse. For each subject, maximum heart rate was calculated by the standard formula of 220 bpm minus the subject's age. At various time intervals of exercise, target heart rate was calculated as 50% of the maximum heart rate. Following resting measurements (time 0), subjects exercised on a stationary bicycle for 5, 10, 15, 20, 25, and 30 minutes. Upon reaching each time interval their heart rate was measured, the target heart rate calculated, and data entered in an Excel spreadsheet. After all of the subject's data was collected for all time intervals, the data was analyzed using a one-way ANOVA followed by pair-wise contracts to determine if heart rate changed between the intervals.

Results
Mean target heart rate was 72, 90, 120, 180, 185, 186, and 182 bpm for exercise durations of 0, 5, 10, 15, 20, 25, and 30 min respectively. The One-Way ANOVA P-value was <0.00001, indicating that heart rate was different among the time intervals. Pair-wise contrasts showed that mean heart rate increased significantly from 0, 5, 10, to 15 minutes, but then remained consistent between 15-30 minutes.



Discussion

My results indicate that, in athletic students between the ages of 20 – 22 years old, there was an increase in mean heart rate during the first 15 minutes of exercise, followed by a plateau of heart rate for the remainder of the exercise duration. This shows that the target heart rate increased during the early stages of light exercise and then remains high, without significant further increase, for the remaining time. Physiologically, the body has met its overall demands for O2 within the first 15 min of light exercise. This indicates that, at this particular level of exercise intensity, mean target heart rate plateaus at approximately 180 bpm. Future studies could elaborate on these findings to show whether target heart rate increases above 180 bpm in response to greater exercise intensity over time. As with any experiment, there were possible sources of error, which could include inaccurate measuring of heart rate, or variation in the intensity of how individual subjects exercised. For example, some subjects could have bicycled more slowly over the entire duration while others might have engaged in more strenuous bicycling.

References

1. Fox, SI, Human Physiology Biol 236, 1st ed. New York, NY, McGraw-Hill Co. 2015. (Pg. 270-272)

2. Science Buddies Sweaty Science: How Does Heart Rate Change with Exercise? 2014. Retrieved 23, Aug. 2017 from https://www.scientificamerican.com/article/bring-science-home-heart-rate-excercise/

3. Exercise Intensity: How to Measure it. Mayo Clinic. 2017. Retrieved 23, Aug. 2017 from http://www.mayoclinic.org/healthy-lifestyle/fitness/in-depth/exercise-intensity/art-20046887?Pg. 2