



CALIFORNIA STATE SCIENCE FAIR 2016 PROJECT SUMMARY

Name(s) Lauren P. Takiguchi	Project Number 36816
Project Title The Effects of Various Concentrations of Sotalol and Caffeine on the Heart Rate of Daphnia magna	
Objectives/Goals The purpose of discovering the effects of sotalol and caffeine on the heart rate of Daphnia magna is to observe if these substances actually have an effect on heart rate. Abstract Methods/Materials This research project was conducted by testing ten specimens of Daphnia magna in three concentrations of sotalol, three concentrations of caffeine, and a control group with Arrowhead spring water for both studies. Each specimen was individually inundated in an aqueous solution of the concentrations of sotalol and caffeine. Then, each Daphnia magna was pipetted onto a microscope slide, to be viewed under the lowest power setting of a Flinn Scientific microscope. The number of heartbeats was counted for fifteen seconds, and then multiplied by four to retrieve the recorded number of beats per minute for each specimen. Results All three means for the solutions with concentrated caffeine had higher average heartbeats than the mean of the control group of Daphnia magna. The control group averaged 140 heartbeats per minute, the 2.80% caffeine concentration averaged 170 BPM, the 5.63% caffeine concentration averaged 188 BPM, and the 11.20% caffeine concentration averaged 205 BPM. The average deviation for all of the test groups was less than 6%, which indicated a relatively high level of precision. For the most part, the means for the solutions with sotalol resulted in a lower amount of heartbeats per minute than the control group. The control group averaged 141 BPM, the 2.36% sotalol concentration group averaged 146 BPM, the 4.72% group averaged 137 BPM, and the 7.29% sotalol concentration group averaged 116 BPM. Although the average deviation for each group was less than 5%, the groups did not indicate a significant difference in number of heartbeats per minute until the 7.29% sotalol concentration group. Conclusions/Discussion Overall, the data collected in this experiment supported the hypothesis that increased concentrations of caffeine would cause the heart rate of Daphnia magna to increase, while increased concentrations of sotalol would cause the heart rate to decrease. An inference based off this outcome would be that caffeine is potentially harmful since it causes the heart rate to increase rapidly, which puts immense strain on the heart muscle. An inference based off the sotalol data would be that sotalol functions as a prescription drug should because it decreases heart rate gradually as the concentration increases.	
Summary Statement My experiment showed that caffeine increased the heart rate of Daphnia magna significantly, but sotalol only decreased the heart rate in the highest concentration used.	
Help Received My chemistry teacher, Mr. Mike Antrim, suggested using Daphnia magna as test subjects. Other than that, I conducted the experiment in my house.	