The Dangers of Combining Caffeine and Alcohol: Daphnia magna's Heart Rate Reaction to Caffeine and Ethanol Solutions

Strock, Benjamin (School: Hillcrest High School)

Among the partying set of high school students, both alcohol and energy drinks are popular. However, this is a dangerous practice. It would be interesting to know how heart rate is affected by caffeine and alcohol. Since it would not be good to test this on a human or even a vertebrate model, an invertebrate subject was needed. Daphnia magna was chosen because the transparent carapace allows for easy monitoring of heart rate and the fact that their heart is known to be useful for studying the effects of toxins on a human heart. Daphnia magna were used to test the effects of two different solutions, ethyl alcohol and caffeine, on heart rate. It was hypothesized that the ethyl alcohol would bring their heart rate down, the caffeine would bring the heart rate up, and the combined solution of both ethyl alcohol and caffeine would make their heart rate oscillate to the point that their hearts could not handle it, and they would die. The data supports the hypothesis in part, because it was found that caffeine increased the heart rate compared to the control, alcohol individually caused the Daphnia's heart rate to decrease, but the combination did not appear to cause an oscillation in heart rate and instead caused the heart rate to decrease. The effects of caffeine and alcohol alone were not statistically significant using a t-test, but the reduction in heart rate with both substances was significant with a p-value of 0.0014.

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