Effects of Alcohol and Aspartame on the Heart Rate of Daphnia magna

Nafrere, Deeandria (School: Foxborough Regional Charter School)

Alcohol and aspartame are commonly consumed substances. Alcohol, a depressant, is currently the most abused substance today. It slows down bodily functions and can severely damage the heart. Sugar is addictive, like other stimulants where dopamine and opioids are released. In an attempt to lose weight many people use artificial sweeteners such as aspartame which can have negative side effects. Experiments were conducted with the crustacean Daphnia magna, an organism commonly used for toxicological studies which shows a 55% genetic homology with humans. D. magna's exoskeletons are clear so it is possible to watch their hearts under a microscope. The goal was to identify how alcohol and aspartame would impact a Daphnia magna's heart rate. There was a control and three experimental groups: alcohol only, aspartame only and a mixture of alcohol and aspartame. There were 5 trials for each group and different concentrations of each substance mixed with water. The data supported the original hypothesis in two of the three experiments. Using alcohol, Daphnia magna's heart rate decreased with a 14% concentration showing a 46% decrease from 166.8 bpm to 90 bpm. With aspartame, the heart rate increased by 10%. The mixture of both alcohol and aspartame was different than hypothesized with a maximum average 47% heart rate decrease, similar to alcohol. Although Daphnia belongs to a different phylum from humans, this data could be used as a model to show how alcohol and aspartame have potential negative effects on human function and other species.

Awards Won: