



# CALIFORNIA SCIENCE & ENGINEERING FAIR 2018 PROJECT SUMMARY

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<b>Project Title</b> <b>Energy Drinks' Effect on the Heart</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of this study is to investigate what are the acute effects of drinking energy drinks on the cardiovascular system of <i>Daphnia magna</i>, a fresh water crustacea which is semi-transparent and therefore easily visible heart under a light microscope comparing metabolic process to humans that are also biota organisms both multicellular, heterotrophic, and have bilaterian nerves and muscles.</p> <p><b>Methods/Materials</b> <i>Daphnia magna</i>, Microscope (full set), Pipettes, Energy drinks: Monster, Red Bull, Powerade, Gatorade, Coffee (black, no sugar), Green tea (no sugar), Water (the control). Applied few drops of energy drink individually on <i>Daphnia magna</i> and counted their heartbeat under the microscope after one minute and after two minutes for 10 trials using a new <i>Daphnia</i> for each trial, and repeating for each drink.</p> <p><b>Results</b> Monster and Red Bull lowered the heart rate of the <i>Daphnia</i> by 100%, which killed it. Coffee lowered the heart rate of the <i>Daphnia</i> by 5.36%. Gatorade lowered it by 3.95%. Green tea lowered it by 3.22%. Powerade lowered it by 0.89%. Water lowered it 0.46% which is insignificant.</p> <p><b>Conclusions/Discussion</b> The evidence from the trials revealed that those drinks with the highest amount of caffeine, also from herbal additives in the ingredients, namely the energy drinks, acutely caused the most stressful effects on the ability of the heart to function. The significantly higher content of caffeine in energy drinks than in an average cup of coffee is linked to the adverse physiological effects on the heart, hence linking the possible dangers of energy drinks. The implications of this study is to raise awareness to contraindicate energy drinks to youngsters, those with heart morbidities and comorbidities and the elderly at drinking them and to those healthy individuals drinking them in large quantities or combining them with other caffeinated drinks and other substances that cause stress on the heart muscles.</p>	
<b>Summary Statement</b> I showed the association of energy drinks on cardiovascular changes including death, suggesting energy drinks are dangerous without further observational studies to provide suitable regulations.	
<b>Help Received</b> I designed the experiment by formulating which drinks to use, the parameters of the trials and the organism to be studied and used my electric light microscope at home and my teacher reviewed the results I compiled.	