



**CALIFORNIA STATE SCIENCE FAIR  
2016 PROJECT SUMMARY**

<b>Name(s)</b> <b>Rena N. Maduro</b>	<b>Project Number</b>  36542
<b>Project Title</b> <b>The Effects of Stimulants and Depressants on the Roundworm, Caenorhabditis elegans</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> In this study, the effects of stimulants and depressants were tested on the roundworm C. elegans. Animals exhibit a characteristic thrashing behavior when placed in liquid. The frequency of the thrashing behavior can be measured as tail whips per unit time. Drugs that stimulate muscle contractions are expected to increase body movements (stimulants). While depressants, are expected to reduce body movements. However, it is unclear what the effects will be if the drugs are combined. The purpose of the experiment was to determine if certain stimulants or depressants could modify the effects of other drugs.</p> <p><b>Methods/Materials</b> Worms were immersed in solutions containing nicotine, caffeine, and ethanol, alone and in combination. The body movements were measured (timed) over multiple trials from video recordings using an exolabs camera attached to a dissection microscope and capture software written by the camera makers for IPAD .</p> <p><b>Results</b> Both nicotine and caffeine (stimulants) increased the thrashing motion in liquid, as compared to untreated controls (M9). Ethanol (depressant) was found to impair this behavior. Nicotine was unable to overcome the impairment introduced by ethanol treatment, however, caffeine was able to restore the movement, and worms treated with ethanol and caffeine showed thrashing behavior similar to those of untreated controls. Therefore, caffeine can counter the impairment effect of ethanol, whereas nicotine cannot. Also, worms treated with caffeine and nicotine did not have movement consistent with an additive effect.</p> <p><b>Conclusions/Discussion</b> The results showed that the stimulants and depressants had predictable effects on the movement of C.elegans, and therefore this worm is a suitable model for toxicology research. Surprisingly, only caffeine was able to counter the effects of ethanol and nicotine was not. In addition, adding the two stimulants together was not additive, as the movement did not increase as compared to each drug added individually. In conclusion, the nematode, C. elegans is an appropriate model to test the effects of depressants and stimulants, for potential drug interactions.</p>	
<b>Summary Statement</b> I tested the response of a simple roundworm to stimulants and depressants to see if the compounds have additive or opposite effects	
<b>Help Received</b> I read papers about the compounds used and decided what amounts (concentrations) to use for the experiments. I had access to the Maduro Lab at UC Riverside and help from a Research Specialist and Professor	