



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> Zach Magidow; Lauren Waldman	<b>Project Number</b> <b>S2111</b>
<b>Project Title</b> <b>Oxidative Stress Induced by Various Glutamic Acid Concentrations in Carassius auratus auratus</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of this experiment was to detect if prominent alcohol and drug use caused a change in cellular enzyme activity and oxidative stress in fish hippocampus tissue.</p> <p><b>Methods/Materials</b> Feeder fish were subjected to various concentrations of glutamic acid, an excitatory neurotransmitter that is increased when illicit drugs and alcohol are used. Samples were taken out at 24, 48, and 72 hours and the brain tissue was weighed and homogenized. The tissue sample was then analyzed by using data from a catalase calibration curve and the units of catalase were determined by using a gas pressure sensor detecting the average change in kPA due to oxygen production from the catalase reaction.</p> <p><b>Results</b> The brain tissue with the highest concentration of glutamic acid had the lowest concentration of catalase at 0.958 units after 72 hours, compared to the lowest concentration of glutamic acid, which had 15.536 units of catalase after 72 hours.</p> <p><b>Conclusions/Discussion</b> Oxidative stress is defined as a disturbance in the balance between the production of reactive oxygen species, or free radicals, and the coinciding antioxidant defenses. Excess hydrogen peroxide and free radicals can cause damage to cellular lipids, proteins, and DNA without antioxidant enzymes, such as catalase. This free radical damage reflects the biological system's inability to readily detoxify the reactive molecules and repair the resulting damage to cell organelles. Oxidative stress can be caused by catalase deficiency, as shown in this experiment. Catalase deficiency can cause a multitude of disorders, such as type II diabetes, aging, and vision loss. Additionally infantile lipoprotein oxidation is an effect of catalase deficiency and oxidative stress due to maternal use of drugs or alcohol, which can be lethal to babies and small children. This experiment made a clear connection between alcohol and drug abuse and catalase deficiency. This is another reason to teach the general public about the dangers of substance abuse, because it can cause free radical damage due to low catalase activity in tissue and individual cells. Symptoms of free radical damage, such as the aforementioned diabetes, faster aging, and vision loss, and even diseases passed to offspring, can now potentially be symptoms of substance abuse.</p>	
<b>Summary Statement</b> This project tests to see if alcohol and drug use cause changes in enzyme activity and oxidative stress.	
<b>Help Received</b> No help was used.	