



# CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

<b>Name(s)</b> <b>Macy Matsukawa; Edward Segura; Esmeralda Suarez</b>	<b>Project Number</b> <b>S2113</b>
<b>Project Title</b> <b>The Effect of Ascorbic Acid on Alcohol Exposed Bovine Biological Catalysts</b>	
<div><b>Objectives/Goals</b><p>Our experiment was to determine if different durations of ascorbic acid exposure positively affects a liver's enzymatic activity after being previously exposed to alcohol.</p></div> <div><b>Abstract</b><p>The materials used for the experiment were beef liver, isopropyl alcohol (50% concentration), hydrogen peroxide (3% concentration), water, round vial with a rubber stopper, filter paper discs, Vitamin C tablets and a graduated cylinder (100 milliliters). We carried out this experiment by forming a catalase solution in which the liver was macerated after it was submerged in the alcohol and then in the ascorbic acid solution. Then, we soaked the paper discs in the catalase solution and allowed the biological catalysts to react with the hydrogen peroxide within the reaction chamber. The reaction occurred under water. We determined the enzymatic activity based on the oxygen produced from the reaction.</p></div> <div><b>Methods/Materials</b><p>The materials used for the experiment were beef liver, isopropyl alcohol (50% concentration), hydrogen peroxide (3% concentration), water, round vial with a rubber stopper, filter paper discs, Vitamin C tablets and a graduated cylinder (100 milliliters). We carried out this experiment by forming a catalase solution in which the liver was macerated after it was submerged in the alcohol and then in the ascorbic acid solution. Then, we soaked the paper discs in the catalase solution and allowed the biological catalysts to react with the hydrogen peroxide within the reaction chamber. The reaction occurred under water. We determined the enzymatic activity based on the oxygen produced from the reaction.</p></div> <div><b>Results</b><p>The longer the liver was exposed to ascorbic acid, the higher the oxygen volume the liver produced. According to the results, the liver that was exposed to vitamin C for 60 minutes reached an oxygen volume of 43 mL, while the liver that was exposed to vitamin C for 20 minutes reached an oxygen volume of 30 mL. In contrast the liver that was only exposed to alcohol for 60 minutes reached an oxygen volume of 22 mL, and the liver that was only exposed to alcohol for 20 minutes reached 26 mL. This showed that as the exposure to alcohol increased the oxygen volume decreased.</p></div> <div><b>Conclusions/Discussion</b><p>The results of the experiment did support the hypothesis. The liver that had been previously introduced to alcohol and then exposed to ascorbic acid had an enzymatic activity that proceeded at a much higher rate, in comparison to a liver that was less exposed to the ascorbic acid. As the exposure of ascorbic acid increased, the more enzymatic activity the liver was able to perform. Metabolism of alcohol predominantly occurs within the liver and as a byproduct; free radicals are released. As these molecular fragments are released, they interfere with other molecules by denaturing proteins; thus inhibiting enzymes, and interfering with molecular bonds. From our data it was evident that the proteins that denatured due to free radicals had folded back into their native conformation based on the enzymatic activity of the bovine liver from the exposure of ascorbic acid.</p></div>	
<b>Summary Statement</b> <p>To determine if different durations of ascorbic acid exposure will affect a liver's enzymatic activity after it has been exposed to alcohol.</p>	
<b>Help Received</b>	