



# CALIFORNIA STATE SCIENCE FAIR 2016 PROJECT SUMMARY

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<b>Project Title</b> <b>Got Antioxidants? Using Chemiluminescence to Study the Effect of Adding Milk or Sugar on the Antioxidant Level of Tea</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Tea, which is a popular drink, is a great source of antioxidants for the body. Many people put additives like milk and sugar in their tea. The purpose of this project was to find the effect of adding different amounts of fat free milk or sugar on the antioxidant levels of green and black tea. I hypothesized that if I increased the amount of fat free milk or sugar added to green or black tea, then the antioxidant levels would decrease.</p> <p><b>Methods/Materials</b> Tea infusions were made using distilled water. Each of the infusions was divided into seven cups with 100 mL in each cup. The first cup with no milk or sugar was used as control. The amount of fat free milk added to the 2nd, 3rd, and 4th cups was 10, 20, and 30 mL, respectively. The amount of sugar added to the 5th, 6th, and 7th cups was ¼ tsp, ½ tsp, and 1 tsp, respectively. To test the samples for antioxidants, a chemiluminescence reaction was performed using luminol, sodium perborate, copper sulfate, and two drops of the sample. The light produced by this reaction was measured in volts using a light-detecting circuit. The amount of light intensity was used to determine the relative antioxidant levels. Higher light intensity represents a decrease in antioxidants. The entire trial was done three times total each for green and black tea.</p> <p><b>Results</b> According to the data collected, the percentage increase in light intensity from control was, for milk in black tea: 42.67% (10 mL), 65.33% (20 mL), 77.33% (30 mL); for milk in green tea: 29.01% (10 mL), 50% (20 mL), 79.01% (30 mL); for sugar in black tea: 67.33% (1/4 tsp), 79.33% (1/2 tsp), 93.33% (1 tsp); for sugar in green tea: 43.21% (1/4 tsp), 72.84% (1/2 tsp), 89.51% (1 tsp). The results showed that in both the black and green tea samples, with each increase in the amount of milk or sugar added, more light intensity was produced.</p> <p><b>Conclusions/Discussion</b> The hypothesis was supported. When more milk or sugar was added to green or black tea, the amount of antioxidants decreased. This was shown by the percentage increase in light intensity from control, which was the most in the 30 mL milk sample and the 1 tsp sugar sample in both green and black tea. Because antioxidants are important in preventing many diseases, like Alzheimer's disease, Cancer, eye disease, heart disease, Parkinson's disease, and Rheumatoid Arthritis, people should use as little milk or sugar in their tea to get optimum antioxidants.</p>	
<b>Summary Statement</b> The purpose of this project is to find how milk and sugar affect antioxidants in tea, and I concluded that both milk and sugar decrease antioxidant levels.	
<b>Help Received</b> My mother supervised and helped me conduct the chemiluminescence test. My brother helped me set up the circuit. My teacher, Mrs. Mackewicz, let me borrow supplies and provided assistance when I needed it.	