



# CALIFORNIA STATE SCIENCE FAIR 2008 PROJECT SUMMARY

<b>Name(s)</b> <b>Justin G. Lee</b>	<b>Project Number</b> <b>J0407</b>
<b>Project Title</b> <b>Tomatoes, Cell Defenders!</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Antioxidants help defend our body against free radicals from damaging our cells by donating their electrons to the free radicals. Lycopene and Vitamin C are two potent antioxidants found primary in tomatoes. Studies have shown that Lycopene in cooked tomatoes can be absorbed easier by our body. The objective of this project is to find out what tomato products has the highest level of antioxidants and what effect do cooking time and temperature have on the level of antioxidants.</p> <p><b>Methods/Materials</b> Seven tomato products plus fresh tomato were tested through titration analysis to determine the amount of antioxidants in each products. A 1% starch solution was prepared as indicator and 0.1% iodine was used as reagent. Vitamin C tablet was used as reference to calibrate iodine. Distilled water was added into each tomato product to extract antioxidants. Drops of iodine were added to a mixture of tomato solution and starch solution until the solution turned and remained purple color. Half cup of tomato sauce was baked in 9 bowls covered with foil at 325F, 350F, and 375F for 15min, 30min and 45min respectively to test the effect of cooking condition. The same titration tests were preformed on each sauce solution after they were baked. Six sets of trials were done for each solution.</p> <p><b>Results</b> Tomato juice with 9.5 mg of antioxidant and tomato paste with 9.2 mg of antioxidant have much higher levels of antioxidant than the rest of the tomato products which have a range of 2.0 mg to 3.7 mg of antioxidants. The level of antioxidants in tomato product increased at a lower bake temperature and with longer bake time.</p> <p><b>Conclusions/Discussion</b> My hypothesis that ketchup has the highest level of antioxidant was incorrect. Tomato juice has the highest level of antioxidants followed by tomato paste. Ketchup has a similar level of antioxidant as tomato sauce, tomato soup and canned tomatoes.</p> <p>My hypothesis that high temperature and long bake time have the lowest level of antioxidants was partially correct. The level of antioxidants does decrease with higher temperature. However, the level increases with longer bake time. The test shows that antioxidant level of tomato product can be controlled by bake time and temperature.</p>	
<b>Summary Statement</b> My project tested the level of antioxidants in different tomato products and the effect of cooking time and temperature on the antioxidant level.	
<b>Help Received</b> Mother purchased materials (tomato products, iodine, pipettes, and flasks). Chemistry teacher in a local high school lent me the buret and metal stand. Mother helped edit the report. Father provided advice on the layout of the display board.	