



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Nikash D. Shankar</b>	<b>Project Number</b> <b>J0416</b>
<b>Project Title</b> <b>Are You Getting Your Antioxidants?</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The purpose of this project is to study the effect of different cooking methods on Vitamin C content, Lycopene content, and Antioxidant activity in vegetables. Based on my research my hypothesis was: 1) Vitamin C is destroyed in all cooking methods and that boiling vegetables will have a lower content of Vitamin C than steaming. 2) Lycopene levels will increase after cooking red vegetables. 3) Some vegetables will increase their antioxidant activity after certain cooking methods while other vegetables will lose their antioxidant activity. <b>Methods/Materials</b> Vegetable samples were boiled for 10 minutes, baked at 350-degree F for 15 minutes, microwaved for 10 minutes, steamed for 5 minutes, and fried for 10 minutes with oil. 1) Vitamin C level was calculated in 25 mL of liquid vegetable extract by the Redox Titration method using Iodine solution. The procedure was repeated for each of the 9 vegetables (carrots, tomatoes, broccoli, zucchini, potato, spinach, cabbage, red bell peppers, green beans) after the 5 cooking methods and in raw. 2) Lycopene levels were determined in the 3 red vegetables. 2 mL of vegetable extract was placed in a spectrophotometer to analyze the absorbance at 503 nm. 3) The Total Antioxidant activity was measured using the DPPH radical assay. 1.5 ml of 0.1 nM DPPH radical in methanol was added to 0.5 ml of the vegetable extract in methanol. Decrease in the absorbance of DPPH was measured at 517 nm and the percentage inhibition of DPPH radical was determined. <b>Results</b> In the cooked samples, Vitamin C content reduced between 7% (carrots after baking) and 81% (Spinach after microwaving). My data showed that Lycopene levels increased following certain cooking methods and the range of increase was between 38% (red bell peppers after frying) and 63 % (tomatoes after frying). In certain cooked vegetable samples, the Antioxidant activity increased between 4% (spinach after boiling) and 19 % (cabbage after frying). <b>Conclusions/Discussion</b> The data clearly proved my hypothesis that Vitamin C content was destroyed in all cooking methods, but boiling did not always lower the Vitamin C content than steaming. Also, the Lycopene levels did not increase in all methods of cooking red vegetables. My data showed that certain cooking methods increased the total Antioxidant activity compared to that of the raw.	
<b>Summary Statement</b> My project researched the effect of different cooking methods on the antioxidant levels in vegetables and found that the levels increased in certain methods and decreased in the other methods.	
<b>Help Received</b> Mother helped purchase of vegetables, used lab equipment from Schmahl Science Workshop	