



# CALIFORNIA STATE SCIENCE FAIR 2005 PROJECT SUMMARY

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| <b>Name(s)</b><br><b>Christopher W. Allen</b>   | <b>Project Number</b><br><b>J0501</b> |
| <b>Project Title</b><br><b>Cooking Away the Vitamins</b>  |                                       |
| <p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b><br/>To determine which of the three cooking methods, boiling, steaming, or microwaving, preserves the most vitamin C in vegetables, specifically, broccoli. These cooking methods will be compared to a control of raw broccoli.</p> <p><b>Methods/Materials</b><br/>To do this, an iodine and starch-based vitamin C indicator solution is made, which turns from a dark blue to a lighter blue in the presence of more vitamin C. Using different concentrations of vitamin C supplement powder in water, and adding a constant amount of each to tubes of indicator solution, five different colors from lightest to darkest blue are made. The amount of vitamin C in each is: 2.4mg C/ml water, 2.2mg /ml, 2.1mg /ml, 1.9mg /ml, and 1.7mg /ml. Four ounces broccoli is then boiled, drained, processed with 100-ml water, and the juice is strained. The juice is added drop by drop to indicator solution until it matches the color produced by the 2.2 mg C/ml water concentration, using the other concentrations to aid in the matching. A formula is used to find the mg/oz of vitamin C in the sample of broccoli. Data is recorded. This process is repeated with the other cooking methods and the control of raw broccoli, ten trials each.</p> <p><b>Results</b><br/>I found that steaming the broccoli is the best way to retain vitamin C. The control of raw broccoli had an average of 37 mg C/oz, steaming, 31 mg C/oz, microwaving, 29 mg C/oz, and boiling, 24 mg C/oz.</p> <p><b>Conclusions/Discussion</b><br/>My results support my hypothesis that steaming the broccoli would be able to preserve the most vitamin C in the vegetable. The main factors that cause this are the water-solubility and high reactive properties of the vitamin C. This knowledge is very important. In a society that is very much surrounded by health issues, the need to make our food as healthful and useful as possible, especially concerning one of the most important vitamins, is crucial.</p> |                                       |
| <b>Summary Statement</b><br>My project examines which of three methods preserves the most vitamin C in broccoli during cooking.   |                                       |
| <b>Help Received</b><br>Father helped give second opinions during some of the broccoli sample and indicator concentration matchings and ideas during one brainstorming session, research information was obtained from Mary Dalporto, a dietician, and Mary Tanga and John Mirsalis from Stanford Research Institute.   |                                       |