



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

<b>Name(s)</b> Arjun A. Suri	<b>Project Number</b> <b>S1425</b>
<b>Project Title</b> <b>The Anti-Oxidative Effects of Curcumin on Memory Curves of Planaria: A Model for the Treatment of Alzheimer's Disease</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Curcuma longa has been known as an anti-biotic and anti-inflammatory agent in Ayurvedic medicine for 3000 years. Derived from the herb, turmeric, it is now being discovered as an anti-oxidative agent 300 times stronger than Vitamin E. Curcumin has been proven in many cases to suppress tumor-growth; meanwhile, demographic statistics show that South Asian populations have the lowest rates of Alzheimers. The objective of my study is to determine whether curcumin delays the degradation of neurons, or neural apoptopsis, demonstrated by the decline in the conditioned response of planaria, using this as a model for the pathology of neurodegenerative diseases, such as Alzheimers. My hypothesis states that there will be a direct, dose-related improvement in the retention of memory of the planaria.</p> <p><b>Methods/Materials</b> In my first experiment, I created 6 concentrations of curcumin and placed 20 planaria in each concentration: 100, 250, 500, 1000 and 2000 ppm (parts per million). After removing planaria with genetic predispositions to swim in one direction, I conditioned them to turn left in a T-maze through use of an electric shock. I measured this sustained response over a seven day period. I repeated the experiment with lower dosages, including 25, 50, 100, and 200 ppm concentrations.</p> <p><b>Results</b> The results show a steady dose-related response in lower doses of curcumin, from 25 ppm to 200 ppm concentrations. The 500 ppm group outperformed the control group, although higher doses negatively affected the planaria. The linear regression done on experiment 2 shows a very high correlation between concentration and memory retained, with a correlation coefficient of .97. Also, the Two-sample T-Test suggests that the results are statistically significant.</p> <p><b>Conclusions/Discussion</b> The plausible mechanism to explain my results suggests that curcumin acts as a scavenger of free radicals and oxidants that lead to the deterioration of neurons, a pathology postulated to occur in Alzheimers and other neurodegenerative conditions. This study suggests that curcumin may be used as a compound for the treatment of Alzheimers disease, possibly more effective than Ibuprofen, the leading anti-inflammatory agent, as evidenced by its ability to delay the process of memory loss in planaria. Curcumin may be studied as either a preventative or delaying treatment of Alzheimers disease through future studies conducted on elderly populations.</p>	
<b>Summary Statement</b> The objective of my study is to determine whether curcumin improves memory curves in planaria, using this as a model for the degradation of the nervous system in the pathology of neurodegenerative diseases, such as Alzheimers disease.	
<b>Help Received</b> Mr. Garabedian assisted in purchasing the planaria and providing laboratory equipment for my experiment; Manik Suri provided access to the Harvard database for my research; Dr. Hiremath at Harvard University gave me advice in choosing a species for my study.	