CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
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Project Number
S1701

Project Title
The Effects of Curcumin on the Memory Curves of Planaria: A Model of the Treatment of Alzheimer's Disease

Abstract

Objectives/Goals
The purpose of my study is to determine whether the Indian herb, curcumin, delays the degradation of neurons demonstrated by the decline in the conditioned response of the flatworm, planaria. This can be used as a model for the pathology of neurodegenerative diseases, such as Alzheimer#s disease which affects millions of patients in the United States today. My hypothesis states that there will be a direct, dose-related improvement in the retention of memory of the planaria as the grams of curcumin increments in each experimental group.

Methods/Materials
This experiment had six experimental groups and one control group. Each group contained 10 planaria in a petri dish. Each group was given 0g-0.030 grams of curcumin mixed in with its pond water for an hour. After being exposed to curcumin for an hour, each group of 10 planaria will be entered into a Y-shaped maze together under the same setting for 10 repeated trials. An operant conditioning method was used to train the group to turn right in the maze where the liver was placed to be used as a reward.

Results
The results show a steady dose-related response in doses of curcumin from 0.010 g to 0.030g as expected. As the amount of curcumin intake increased, more planaria retained the memory to turn right toward the liver and the average time to complete the maze decreased for each group. As the trials increased, each group lowered the number of turns to the left and increased the number of turns to the right while the number of unfinished maze decreased for each group. The linear regression of minutes taken to complete maze shows a very high correlation between grams of curcumin and memory retained to turn right in the maze toward the reward.

Conclusions/Discussion
In conclusion, curcumin acts as a scavenger of free radicals and oxidants that lead to the deterioration of neurons, pathology postulated to occur in Alzheimer#s. Curcumin#s activity and structure#function relation as a radical scavenger, metal chelator, and antioxidant is the reason why it should be used more often on Alzheimer#s patients. As the curcumin was consumed, it decreased the oxidation and the free radicals that cause the worsening of neurons. This helps the planaria retain their memory of associating turning right with getting a reward. For further research, I want to gain a broader understanding of how curcumin reduces oxidative damage using a more complex maze and model.

Summary Statement
My project is about finding the relationship of curcumin, a herbal spice, and memory retention.

Help Received
Teacher let me conduct the entire experiment in the storage room. Mother helped me buy the planaria and curcumin.