CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

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Project Number

S2115

Project Title

The Effect of Nicotine on Tau Protein in Artemia salina

Abstract

Objectives/Goals

Due to the fact that Tau protein failure has been linked with the disease Alzheimer#s, and in-taking nicotine has become so prominent, this experiment has been designed to better understand if nicotine itself could make the Tau proteins become unstable leaving them without the ability to stabilize microtubules, therefore playing a role in the development of Alzheimer#s.

Methods/Materials

Brine Shrimp Grade A Eggs
Hatching Dish
NaCl
Nicotine 1000 ppm solution
Tubulin Green Fluorescent Protein
Incubation Station + Shaker
Microscope 400X Total Magnification
Microscope Photo Program

Artemia were grown in a standard medium in a hatching dish and were then kept at room temperature in a stable environment for later testing. Samples of the brine shrimp were exposed to different concentrations of nicotine in the range of 0 ppm (our control), 5 ppm, 10 ppm, 20 ppm, 50 ppm, 75 ppm and 100 ppm for different time periods. Nicotine treated samples and control were analyzed under a 10X microscope for microtubule destabilization signifying tau protein change with Tubulin Green Fluorescent Protein.

Results

The increase in nicotine concentration proved to cause the cells cytoskeleton to disintegrate, and seen in these disintegrated cells were green fluorescent spots. These fluorescent patches show that the microtubules had become unstable causing the cytoskeleton to break apart. This expression showed that the tau protein were no longer stabilizing microtubules.

Conclusions/Discussion

Tau proteins job is to stabilize microtubules therefore, the nicotine is preventing them from doing this job showing that nicotine has a negative effect on microtubule stabilization. This research relates to the disease Alzheimer's, when tau protein becomes abnormal they tangle and then fall apart which causes nutrients to no longer move throughout the brain cells causing death to these cells. In this research it was seen that tau protein had become abnormal (possibly causing them to fall apart), leaving the microtubules unstable therefore showing that nicotine could play a role in the development of Alzheimer's.

Summary Statement

This project's purpose is to understand the effects of nicotine on tau protein to determine if intake of nicotine over one's lifetime could potentially lead to the development of Alzheimer's disease.

Help Received

Parents helped purchase necessary materials; Advisor supported the group throughout the project by opening the labs on weekends and more.