CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)

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Project Number

S2304

Project Title

Caenorhabditis elegans Behavioral Effects of Synapsin RNAi Silencing

Abstract

Objectives/Goals

In my project I investigate the behavioral differences that arise from the RNAi silencing of the Synapsin gene ortholog, SNN-1, in the Caenorhabditis elegans nematode worm. I predicted that the silencing of the Synapsin protein in C. elegans causes atypical, detrimental behavior.

Methods/Materials

I assayed dumpy worms (non-N2) to understand their normal behavior. I injected some with RNAi, a 19 nucleotide sequence which would silence the translation of the gene. In the same solution I also injected the worms with transforming DNA, which would transform the dumpy worms into N2 wild-type worms. Worms that became N2 after injection indicated also a successful injection of the RNAi. I assayed these worms, comparing them to the control worms which I only injected with the transforming DNA but not the RNAi. Assays include observing defecation rates and touching the worms with an eyebrow to test knee-jerk response. I used my school's microscopes and ordered the RNAi from the company Millipore Sigma. To inject the worms with RNAi, I needed to use Caltech's micro-injector, which I was not permitted to use, so my mentor Dr. Gonzalez performed the injections themselves. I used the Wormbase to find the nucleotide sequence to order, and WormBook to explore C. elegans research and experimental methods.

Results

Control worms exhibited normal behavior, defecation rates, and touch responses. The worms with the silencing of Synapsin exhibited neurological problems such as insensitivity to touch, jerky movements, inconsistent defecation, lethargy, and lack of eating.

Conclusions/Discussion

The role of synapsin (SNN-1) in the behavior and healthy functioning of the worms is not immediately fatal but does cause severe defects. As an ortholog of Synapsin, a mammalian neural gene, the study of SNN-1 in C. elegans can help further understand the genetic factors behind neurological disorders.

Summary Statement

I investigated the behavioral changes which arise in C. elegans nematode worms after I silence the SNN-1 gene (ortholog of Synapsin).

Help Received

My mentor Dr. Aidyl Gonzalez provided me with the C. elegans worms, and injected the experimental worms at Caltech. She also demonstrated to me how to properly take care of C. elegans worms.