EFFECTS OF GARLIC COMPOUND, SAC, IN ITS ABILITY TO RESCUE PHENOTYPIC DEFICITS IN *C. ELEGANS* MODELS OF TAUOPATHIES DISEASE

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ABSTRACT

Tauopathies are a group of neurodegenerative diseases caused by the aggregation and hyperphosphorylation of the tau protein in neurons, particularly in the axons. The best known and studied tauopathy is Alzheimer's disease. However, there is no effective treatment that prevents, halts, or reverts the pathology associated with tau-mediated neurodegeneration. One potential therapeutic strategy is targeting oxidative stress. The thioallyl structure of the SAC, *S-allylcystiene*, compound in garlic exhibits the ability to increase resistance to oxidative stress in the worm *Caenorhabditis elegans.* The thioallyl structure is shown to have properties such as radical scavenging, chemopreventive activity, hepatoprotective activity, neurotrophic activity, and lipid reducing activity. The goal of the project is to use C. elegans models and the SAC compound to learn about the effects of neurodegeneration and aging. The N2, wild-type, strain of *C. elegans* was used along with the CF1038 strain, a mutant for the daf gene; CK10, a strain that expresses the human tau mutant; CK1044, a strain that expresses the human tau wild type; and MTD, a cross between CF1038 and CK1044. The experiment was done with students to gain opportunities with real-life research and actual model organisms. The project was done in collaboration with Van Andel Institute and Michigan State University Grand Rapids Research Center who provided our high school classroom with the needed materials.

UTILIZING *C. elegans* AS A MODEL ORGANISM

Strain	Mutation
CF1038	mutant for *daf* gene
CK10	expresses human tau mutant
CK1044	expresses human tau wild type
MTD	CF1038 x CK1044

Figure 1. Above strains were used to determine the effects of neurodegenerative diseases.

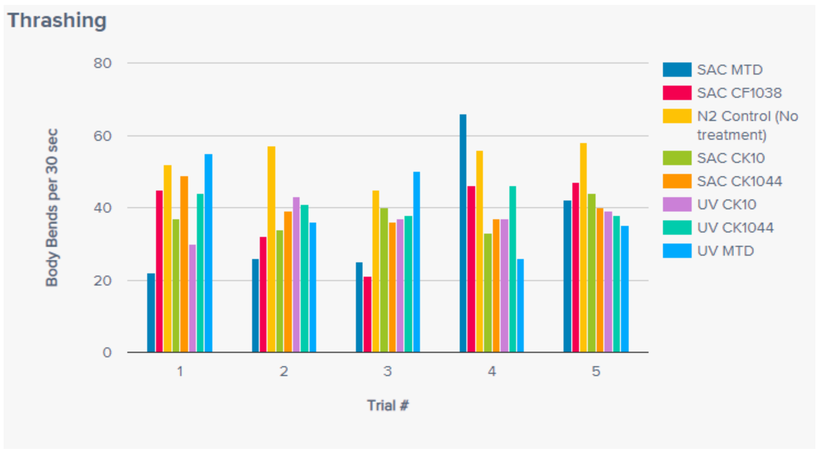

Figure 2. Students performed thrashing assays to relate to the neurodegenerative effects of tauopathies and possible benefits of SAC compound.

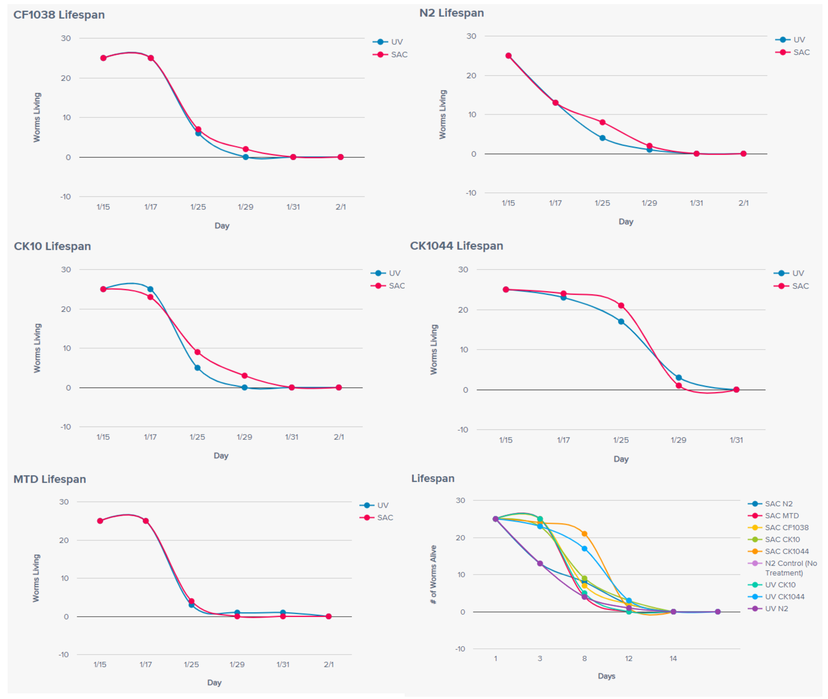

Figure 3. Students performed lifespan assays with UV and SAC to compare effects of the compound against a control.

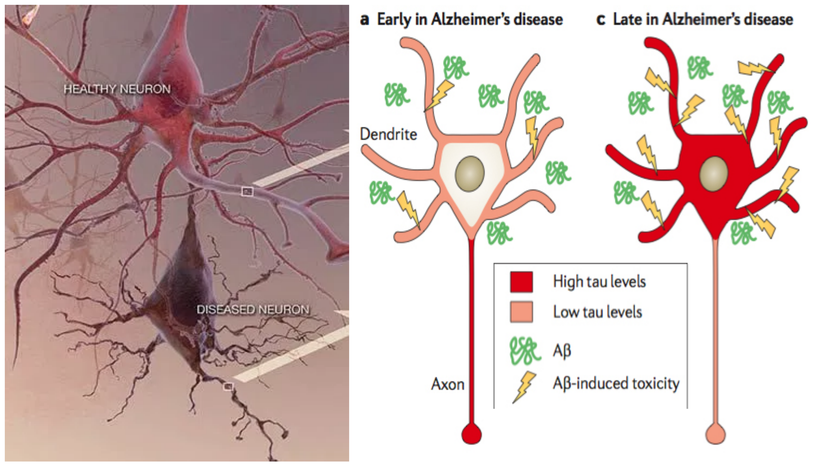

Figure 4. An image comparing a healthy neuron and one affected by aggregated tau followed by a comparison of tau phospohrylation between early and late stages of Alzheimer's disease.

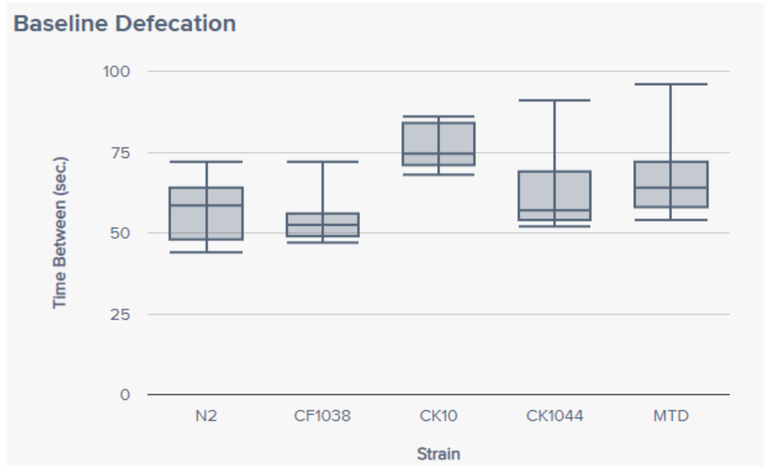

Figure 5: Students observed defecation rates in *C. elegan* worms to practice observing symptoms of neurodegenerative diseases.

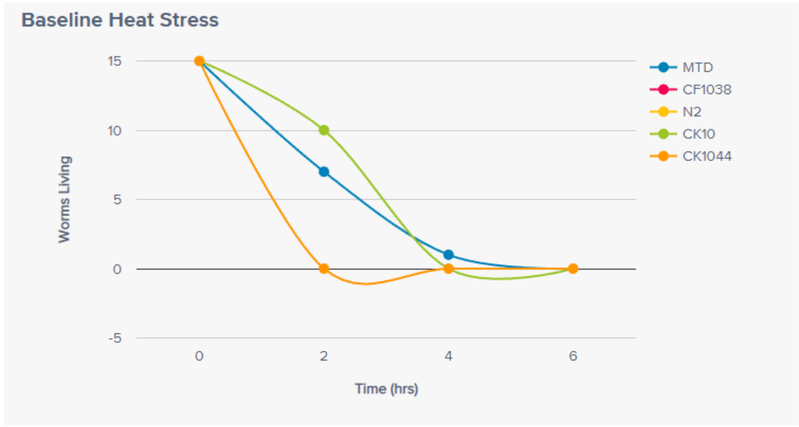

Figure 6. Students performed Heat Stress assays to practice observing resistance to heat and oxidative stress as in neurodegenerative diseases. CF1038 worms followed the behavior of the CK10 worms, and the N2 worms behaved like the CK1044 worms.

CONCLUSION

- **Students used the opportunity of the science research class to gain experience with real-life research. They were able to work with the *C. elegan* model organism and with two world renowned research institutes: Van Andel and Michigan State. The opportunity helped them understand the research process and how real research is performed.**
- **Neurodegenerative diseases affect everyone, and with a natural cure, we can potentially find a way to help people live longer and healthier lives.**

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MTD was developed by Cassandra Wygant
CF1038 was provided by Jeremy VanRaamsdonk
Photos from: labiotech.eu and neurosciencenews