

The Impact of Frequently Used Antihistamines on Memory in Behaviorally Trained *Caenorhabditis elegans*

Eden Anne Bauer
Crossroads Academy, Lyme NH
New Hampshire Academy of Science - 2017

The goal of this investigation was to explore the association between antihistamines and dementia. To study this, antihistamine use and resulting behavior change or memory dysfunction was researched in the nematode *C. elegans*. It was hypothesized that behaviorally trained *C. elegans* that had ceased reacting to vibrations would recommence reacting to vibrations after exposure to antihistamines. To avoid the possibility of differential responses based on larval stage, *C. elegans* were synchronized to the L3 larval stage using a bleaching technique. Groups of ten synchronized *C. elegans* per culture dish were conditioned to stop reacting to exposure of vibrations applied with a standard electric toothbrush to the side of the dish. The toothbrush was touched to the dish 20 times over a span of ten seconds. After the ten second exposure, the *C. elegans* were allowed to rest for one minute and exposed to vibrations again. This process was repeated for a total of 102 minutes over two days, resulting in the *C. elegans* showing signs of becoming accustomed to the vibrating “taps”, as indicated by the decline of the percentage of *C. elegans* responding to the vibrations. After conditioning, diphenhydramine (Benadryl), cetirizine (Zyrtec), or sterile water groups were added to the top of the semisolid medium of the petri dishes at a concentration of 1.3 mg/ml for diphenhydramine or 0.4 mg/ml for cetirizine, to ensure direct exposure of the *C. elegans*. Groups exposed to diphenhydramine and cetirizine exhibited loss of conditioned response of the behavioral training, while the control group retained the conditioned response to the vibration stimulus. The percent of *C. elegans* that was observed to retain their training changed from ~70% to ~20% for the groups exposed to Benadryl in the first experiment, ~8% to ~1% for the Benadryl exposure in the second experiment, ~25% to ~10% for the Zyrtec exposure in the first experiment, and ~25% to ~7% for the Zyrtec exposure in the second experiment. These results suggest a possible link between antihistamines and behavior change or memory dysfunction in the nematode *C. elegans*. Further studies are needed to confirm and elucidate the mechanism of this response.