Behavioral Effects of Oxidant and Reduced Chemorepellents on Mutant and Wild-Type Tetrahymena thermophila

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Abstract

Tetrahymena thermophila, a single-cell eukaryotic organism, belongs to the Protozoa Kingdom and is used to model sensory input and the effects of environmental conditions such as chemicals and temperature. The G37 gene encoding for a particular receptor in mutant cells showed increased responsiveness to most chemorepellents. Investigating the G37 Tetrahymena gene in various test solutions, including ferric chloride, ferrous sulfate, hydrogen peroxide, tetrazolium blue, potassium chloride, and dithiothreitol were performed to determine the role of oxidants and reducing agents with the mutant and wild-type cells to assess the role of the receptor. The oxidants tested include tetrazolium blue, hydrogen peroxide, and ferric chloride. reducing agents were ferrous sulfate and dithiothreitol. Behavioral assays and recordings processed by ImageJ indicated that ferric chloride, hydrogen peroxide, and tetrazolium blue yielded little to no chemorepellent responses from G37 cells. CU427 cells were over-responsive based on the mean percent of cells (>50% ARs). Reducing agents elicited chemorepellent responses from G37 and CU427, along with potassium chloride. Dithiothreitol yielded unexpected results as G37 (37.0% ARs) and CU427 (38.1% ARs) had relatively similar responses and were only responsive and not over-responsive to the reducing agent test chemical solution. Ultimately, the G37 receptor is more interactive with molecules that are reducing agents or

non-oxidant compounds; G37 is unable to sense and respond to oxidants effectively, further elucidating the pathways of the G37 strain and nature of this receptor. This research can be further applied to neuronal influences and how specific compounds may affect human neurons individually.

Biography:

Ananya Govindarajan is currently a senior at Pawling High School and has been accepted and will be attending Barnard College of Columbia University in the Fall of 2022 as a Neuroscience and Behavior major. She currently resides in Upstate New York. She has been awarded Bausch & Lomb Honorary Science Award, Yale Science and Engineering Science Fair Award, in addition to other local science competition awards at the highschool level. She was also accepted into the Metabolomics and Systems Biology, January 2022 in Bangkok. Ananya hopes to further her knowledge and pursue a career in research following her studies at university.

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Poster Presentation