2023 Buck Summer Scholar: Owen Donayre

My name is Owen Donayre and I attend the University of California, Berkeley. I am majoring in Molecular and Cell Biology with an emphasis in Genetics, Genomics, Evolution, and Development with a minor in Marine Science. During the school year, I work in the Harland Lab under Dr. Michael Abrams conducting research to characterize sleep in the jellyfish species *Cassiopeia xamachana.* We have shown that these jellyfish do exhibit sleep-like states upon which a period of cellular growth ensues, just like humans! Because we know that during sleep, humans enter a state of heightened cellular repair and growth, this could be interesting to show how this is an evolutionarily conserved mechanism. At the Buck Institute, I work in the Kapahi Lab with Dr. Kenneth Wilson exploring the effects and mechanisms driving dietary restriction-induced extension of lifespan.

Mustard (mtd), the fly homolog to human *Oxidation Resistance 1 (OXR1)*, plays a crucial role in preserving cellular recycling processes and proper trafficking of proteins and fats. *OXR1* was initially found to be highly involved in protecting neurons from cellular stress but a recent study has shown that its involvement with the retromer complex may better illustrate its involvement in several neurodegenerative diseases such as Parkinson's and Alzheimer's disease. The retromer complex signals proteins for trafficking to either be reused throughout the cell or degraded in the lysosome and the balance of these two processes is important for maintaining proper neuronal health. When we inhibited flies' ability to make this OXR1 protein, we saw there was also a decrease in another protein named *ALDH*, or aldehyde dehydrogenase. *ALDH* plays a crucial role in the metabolization of alcohols both naturally occurring and ingested and is also involved in cellular growth, differentiation, and survival. Dysregulation of *ALDH* leads to harmful effects, such as elevated cellular stress and cell death. Furthermore, decreased *ALDH* levels were seen in the brains of patients with Parkinson's disease. While there is currently no established mechanism connecting *mtd* and *ALDH,* the Kapahi Lab is currently seeking to find the relationship between these two genes. This is an important question to answer as it will help us further understand how our ability to respond to alcohol changes not only with age but with the infliction of neurodegeneration as well.

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