STUDENT RESEARCH FORUM – POSTER ABSTRACT

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Deciphering the Molecular, Cellular, and Brain-Level Impacts of Down Syndrome on Astrocytes.

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Down syndrome (DS) is a genetic disorder caused by triplication of chromosome 21, which frequently results in atypical brain development, learning and memory deficits, and Alzheimer's disease. Astrocytes are non-neuronal central nervous system support cells that play a vital role in processes required for brain function and morphogenesis. A dysfunction in these cells has been observed in neurological disorders such as amyotrophic lateral sclerosis (ALS), epilepsy, and hepatic encephalopathy. In DS, astrocytes have been shown to exhibit higher levels of reactive oxygen species, decreased synaptogenic molecule expression, and overall greater numbers in the brain. However, our genome-wide transcriptional analysis of iPSC-derived astrocytes revealed additional disrupted biological processes. Using human iPSC-derived astrocytes and a DS mouse model (Ts65Dn), our preliminary data suggests that these cells have a dysfunction in endocytosis, glutamate homeostasis, and angiogenesis, processes involved in learning and memory. Previous DS clinical trials have focused on modulating neuron development and function through avenues such as GABA inhibition or myo-inositol suppression. Our results indicate that astrocytes may be a valuable therapeutic target for treating DS.