Autism and Genetics: Understanding the Role of AUTS2 in the Pathology of Autism Spectrum Disorder

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It is estimated that 1 in 6 children in the United States are affected by a developmental disability. These afflictions include Autism, Intellectual disability, and developmental delay, all of which can be characterized by motor, speech cognitive and behavioral dysfunctions and impairment in development of the central nervous system. This study focused on autism, and an associated gene, AUTS2. Previous literature has shown the connection between AUTS2 and autism, but has not made the effect of AUTS2 on neurodevelopment clear. The goal of this study was to create an in vitro model of an AUTS2 mutation causing autism to determine how it would affect the function, maturation and ability of neurons.It is impossible to study this in a human patient neuron sample, therefore the methods for the study utilized human embryonic stem cells, CRISPR editing, and differentiation. An AUTS2 deletion was created using CRISPR editing and a wild type (WT) isogenic cell line was used as a control. Sanger sequencing was done to confirm that the AUTS2 editing occurred. The WT and AUTS2 variant were differentiated into neurons to be observed from a relevant perspective, and then analyzed using immunostaining to identify neuronal markers at several time points. The results of the study show decreased neuron expression and connectivity by variant cells, and are the first to implicate neuron progenitor maintenance as a factor contributing to the deficits in neurodevelopment. This resulted in less mature functional neurons in the AUTS2 variant and give indication to the pathology of this disorder on the cellular level, important for understanding and therapeutic treatment.

Awards Won:
Third Award of $1,000
National Anti-Vivisection Society: Second Award of $2,000
American Committee for the Weizmann Institute of Science: All-expense paid four week trip and scholarship to the Bessie Lawrence International Summer Science Institute