7-31-2023

Methods to Study Activity Dependent Protein Synthesis in Autism Spectrum Disorder

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It is estimated by the World Health Organization that 1 in 100 children have autism spectrum disorder (ASD), a condition characterized by neurological differences that may impact a person's learning or behavior. Clinically, ASD symptoms are alleviated with behavioral or pharmacological therapies, however, not all patients respond to these interventions. Deep brain stimulation (DBS) is a promising treatment of Parkinson's disease that could also be effective in treating ASD. SynGAP1 is a protein involved in neuronal action that is crucial for regulating synaptic plasticity. Mutations in the *SYNGAP1* gene causing haploinsufficiency can result in the manifestation of ASD symptoms. This study aims at gathering information on the potential of using a *Syngap1*$^{+/-}$ mouse model to determine whether DBS can counter neurological differences between mice with haploinsufficiency and wild type littermates. Histology slides were analyzed for lesioning from previous surgeries performed in which electrodes were placed for DBS. To gain baseline data before DBS, behavioral tests were conducted on both male and female wild type and *Syngap1*$^{+/-}$ mice to understand differences. To correlate behavioral results with protein synthesis, labeling of newly synthesized proteins was optimized using azidohomoalanine. Inspection of histology slides showed no evidence of brain lesioning in mice that were to have undergone DBS. Behavioral results revealed increased hyperactivity in mice with haploinsufficiency. Additionally, SDS-PAGE analysis of azidohomoalanine injections revealed more injections administered on subsequent days provides optimal proteomic labeling. With this information, further research can be conducted in which DBS is performed followed by behavioral studies and proteomic analysis.