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Year Two: Immunocytochemical Characterization of Mouse Brain Explants in an In Vitro Model of Schizophrenia

Neurodevelopmental diseases drastically impact the lives of millions. Not only are the lives of these people altered, but it also poses an increasing public health challenge. Finding new measures to prevent and treat such diseases is the main priority of this research. However with the complex circuitry and pathology of the Central Nervous System (CNS), it is difficult to pin-point a specific factor attributed to such diseases. This research aims to study dopaminergic neurons based on qualitative abundance of the tyrosine hydroxylase (TH) protein, and their interactions with the CNS and more specifically with pyramidal neurons. Tyrosine hydroxylase (TH) is an enzyme responsible for the production of a catecholamine called dopamine which is responsible for coordinated body movements. The use of TG-GFP mice allows for the immediate observation of the fluorescent dopamine neurons without having to use immunohistochemistry, thanks in part due to the GFP gene that is also found in fluorescing jellyfish. The fluorescing dopaminergic neuron is made possible because of the GFP protein that binds to the TH protein after translation. Once observed under a microscope under specific lighting, the dopaminergic neurons tagged with GFP protein begin to fluoresce, becoming visible to the observer. Healthy brain slices will provide an abundance of cell fluorescence indicating neuron health, however, must not be confused with protein clumping which indicates cell death. Results of this study are still inconclusive and ongoing. However with our current brain slices, it is possible to culture neonatal brain explants. Primary results of making an experimental disease model for culturing two different brain slices looks promising and is the aim of this stage of the research.