Title: Cerebellar Hypoconnectivity in Schizophrenia

Authors: Haleemah Harris, Sarah Clark, Aral Ahmadi, and Jessica Turner

Faculty Sponsor: Dr. Jessica Turner, Department of Psychology and Neuroscience

Introduction: Insight impairment is commonly experienced by those with schizophrenia. Recent evidence suggests impaired insight in schizophrenia is due to brain irregularity. In addition, studies show that the cerebellum has altered function in schizophrenia, and a theory of cognitive dysmetria has been proposed. This study explores the connection between insight and function of the cerebellum in patients with schizophrenia.

Method: Magnetic resonance imaging data were examined from 91 healthy controls (HC) and 89 participants diagnosed with schizophrenia or schizoaffective disorder (SZ). Participants in the SZ group were categorized with having high ($N=65$) or low ($N=24$) insight based on the Positive and Negative Syndrome Scale (PANSS). Eyes open resting-state images were acquired using a Siemens TIM Trio 3T scanner at the Mind Research Network, New Mexico; images were preprocessed according to standard pipelines. Seed-to-voxel connectivity was performed using a seed identified from a previous study in the right crus 1 of the cerebellum. Voxelwise ANCOVAs were calculated between the HC and the SZ groups and high and low insight groups using age, gender, and PANSS scores as covariates.

Results: HC had greater connectivity between crus1 and the cingulate cortex and precuneus (FWE corrected). Patients with high insight demonstrated greater connectivity on the right superior temporal gyrus, superior frontal gyrus, inferior parietal lobule, and left superior frontal gyrus (clusterwise corrected $p < .001, k=22$). There were no areas where those with low insight or SZ had higher connectivity.

Conclusion: Patients with schizophrenia appear to have lower connectivity between crus 1 areas implicated in the default mode network. Patients with low insight displayed hypoconnectivity compared to patients with high insight in the right parietal lobule, inferior frontal gyrus, medial frontal gyrus, and in the left superior and middle frontal gyri. The seed used in this study was identified using voxel based morphometry in which patients with high insight had higher gray matter concentration that area. This suggests that structure and function of the cerebellum may be related to insight. Results suggest that the cerebellum is not communicating properly causing cognitive deficits; this adds to the theory of cognitive dysmetria.