

Proposal Draft

Title: Analysis of Resting State Network Connectivity in Prodromal and Diagnosed Huntington's Disease

Authors: Elizabeth Fall, Maria Misiura

FACULTY SPONSOR: Dr. Jessica Turner, Associate Professor, Department of Psychology

Introduction: Huntington's disease is a degenerative motor disorder caused by a mutation of the huntington (HTT) gene. Huntington's disease involves dysfunction of the basal ganglia and its related structures. Prodromal Huntington's disease refers to patients who carry the gene mutation, but do not yet exhibit the full range of symptoms. Individuals with prodromal Huntington's disease exhibit progressive aberrant neural activity even before clinical diagnosis. Resting state data analysis examines the functional connectivity, or interconnectedness between spatially separate networks of the brain at rest. Little research has studied the resting state connectivity in patients with prodromal Huntington's disease, which could prove useful in understanding changes that directly precede or contribute to early onset of the disease. Specifically, analysis of resting state data on the basal ganglia could help explain the depressive symptoms associated with prodromal HD (Unschuld et al., 2012). Data from previous research on RSN cingulate cortex connectivity may help guide future research in ways that can help explain the depressive symptoms exhibited by patients with prodromal HD.

Methods: We conducted a literature review on previous research done on resting state connectivity in prodromal HD and diagnosed HD.

Results: Past studies on clinical Huntington's disease patients has shown increased short range resting state connectivity across the cortex (Werner et al., 2014). More specifically, patients with diagnosed HD exhibit an increased connectivity in the cingulate cortex in comparison to controls. Similarly, patients with prodromal HD show an increased connectivity in the cingulate cortex (Wolf et al., 2014).

Discussion: Cingulate cortex connectivity at rest may offer insight into the emotional symptoms experienced by patients with prodromal Huntington's disease. Since the ventral striatum receives input from the cingulate cortex (Haber, 2011), future research on the functional connectivity of the ventral striatum in prodromal HD may offer further insight into clinical symptoms such as apathy and degree of reinforcement.

Keywords: Huntington's disease, cingulate cortex, functional connectivity, resting state network, basal ganglia, ventral striatum