Dr. Lynn A. Raymond

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(Co-investigator: Dr. Timothy H. Murphy, University of British Columbia)

Dr. Lynn Raymond is the Director of the Djavad Mowafaghian Centre for Brain Health. She is also a Professor in the Department of Psychiatry, the Louise A. Brown Chair in Neuroscience, and Clinic Director of the Centre for Huntington Disease. Dr. Raymond is an internationally renowned neuroscientist and neurologist, and her work bridges foundational science and clinical research.

She has more than 170 publications, and her work has been cited more than 11,000 times. She has devoted her career to better understanding the specific roles of altered neuronal circuits and amino acid neurotransmitter receptors in Huntington disease, with the aim of developing disease-modifying therapy. Her work is funded by the Canadian Institutes of Health Research, the John Evans Leadership Fund, and she has held funding from a variety of not-for-profit organizations, including the Cure Huntington's Disease Initiative and Huntington Society of Canada. Dr. Raymond has previously received the HSC Navigator award in 2012, and more recently in 2017 for work entitled "Impaired corticostriatal synaptic plasticity in HD: Investigating a role for aberrant endocannabinoid signaling."

Research Project Title: *Neurofeedback-Driven Restoration of Cortical Connectivity in HD*

Lay Summary: Huntington disease (HD) is traditionally viewed as a disorder of the deep brain (the striatum), but mounting evidence shows that even before clear symptoms appear, HD alters how different parts of the brain communicate, particularly in motor regions. In HD mouse models, neurons in cortical motor areas not only lose connection with other regions but also activate in a disorganized manner, impairing movement control. In our study, we will first confirm these circuit changes and investigate whether and how they correlate with performance in a fine motor control task (pulling a lever for water reward). Then we will test two ways to help them "rewire" the affected motor area: one teaches mice to boost the correct brain signals by giving them water rewards whenever they succeed (neurofeedback training), and the other uses direct stimulation to trigger those same cells on a fixed schedule (optogenetic stimulation). By comparing these approaches, we hope to restore coordinated activity in the affected motor region in the cortex and improve the animal's performance on the motor task. If successful, this could lead to simple, noninvasive brain-training programs for people with early-stage HD.