Comprehensive Research Experience for Medical Students
Summer Research Program 2019

Supervisor/Project Information Form

Due February 20 2019 by email to crems.programs@utoronto.ca

Supervisor Name: Dr. Andres Lozano

Project Title: PPN-DBS for Parkinson's Disease: Clinical and Imaging Analysis

Hospital/Research Institution: Toronto Western Hospital / University Health Network

Email: lozano@uhnresearch.ca

Field of Research (2 keywords): Deep brain stimulation, Parkinson's Disease

Department: Department of Surgery, Division of Neurosurgery

School of Graduate Studies Appointment (IMS, LMP, IHPME etc)? Yes/No: Yes If YES, please name: IMS

Project Title: PPN-DBS for Parkinson's Disease: Clinical and Imaging Analysis

Brief Project Description (‹300 words):

"Deep brain stimulation (DBS) is an established treatment for Parkinson's Disease (PD), with the most common target of stimulation being the subthalamic nucleus (STN). When properly optimized, STN-DBS can produce striking benefits in PD, particularly with respect to symptoms such as tremor and rigidity. However, freezing of gait and other L-Dopa resistant disorders (LDRDs) – symptoms that greatly diminish quality of life for PD patients – may persist or even worsen with DBS of the STN. Accordingly, DBS targeting the pedunculopontine nucleus (PPN) in addition to the STN has been explored as a novel approach to ameliorate these LDRDs and facilitate patient mobility.

This project aims to evaluate a cohort of ~13 PD patients with DBS electrodes implanted in both the PPN and STN at Toronto Western Hospital, and to relate clinical outcomes to brain imaging data. Specifically, the student will use DBS volume of tissue activated (VTA) modelling techniques to define the brain area where stimulation best corresponds to clinical improvement (a probabilistic zone of efficacious stimulation) so that future DBS targeting of the PPN may be rendered more effective in eliciting clinical benefit – specifically reduced freezing of gait and improved axial symptoms. Normative connectomic techniques developed in-house will also be used to explore the functional and structural connectivity of this efficacious zone in order to better understand the neuronal circuitry underlying the potential effectiveness of this alternate DBS target. In addition to gaining valuable experience

working with neuroimaging data and software, the student will also interact clinically with PD patients who have undergone DBS procedures, gaining insight into their debilitating motor symptoms and how these are managed."