Comprehensive Research Experience for Medical Students (CREMS)  
2022 Supervisor and Project Information Form

Please complete and return via email ONLY to crems.programs@utoronto.ca by February 18, 2022.

Supervisor Information

NOTE: CREMS will not support pre-determined pairings of students and supervisors. Supervisors must agree to open their projects to all students and interview all that are interested.

Name:  
Dr. Krista Lanctôt, Dr. Nathan Herrmann, Dr. Shankar Tumati  

Email:  
krista.lanctot@sunnybrook.ca  

Department:  
Department of Psychiatry  

Hospital/Research Institution:  
Sunnybrook Health Sciences Centre  

SGS Department(s) (if applicable):  
School of Graduate Studies, Department of Pharmacology  

ORCID ID (see https://orcid.org/ - If you do not have an ORCID ID we encourage you to sign up for one):  
0000-0001-7024-6637  

Location of Work:  
Sunnybrook Research Institute  

Field of Research (up to 4 keywords):  
neuroimaging; neuropsychiatric symptoms; neural correlates; dementia  

Student contact time (number of hours per week YOU are available to the student for any concerns or to review progress):  
KLL & NH 2 hours per week, ST 37.5 hours per week. Additional hours can be requested.
Project Information

NOTE: If this project is selected, this information will be posted on CREMS website for interested student applicants to view research opportunities.

PROJECT TITLE:
Mild Behavioral Impairment: cognitive profile and brain atrophy in the early stages of neurodegenerative disorders

PROJECT DESCRIPTION:
Including background, aim(s), methodS and significance of the project. **Maximum 300 words.**

Mild behavioral impairment (MBI) assesses emergent neuropsychiatric symptoms indicating underlying neurodegenerative processes and confers an increased risk of developing dementia. MBI is a novel clinical marker that assesses five domains of behavioral disturbances – motivation, affect, impulsivity, social appropriateness, and perception and thought content. The Neuropsychopharmacology Research Group is interested in determining the cognitive and neural correlates of MBI and its individual domains. For this purpose, we are analyzing the COMPASS-ND dataset made available by the Canadian Consortium for Neurodegeneration in Aging. This dataset uniquely includes various neurodegenerative disorders including Alzheimer’s disease, Parkinson’s disease, vascular dementia, Lewy body dementia, and frontotemporal dementia from ~1000 deeply-phenotyped subjects.

In this project, the trainee will be exposed to sophisticated, cutting-edge, automated and semi-automated imaging analysis techniques to determine the association between grey matter atrophy on structural MRI scans and MBI-Checklist total and domain scores. MBI-Checklist data and MRI data are available from >600 subjects currently (with additional data being added) along with other clinical and cognitive assessments. Students will learn methods to analyze raw MRI images using voxel-based morphometry and cortical thickness, and advanced statistical methods to test the association between brain and behavioral measures, potentially leading to publications.

Significance: MBI is emerging as a clinical tool to identify patients at increased risk of developing dementia. The COMPASS-ND dataset contains a large number of subjects assessed with the MBI-checklist, which has so far been limited to small studies. Our study is expected to provide insight into the neural mechanisms of early stage behavioral symptoms.

Is this project remote-capable (in case of new restrictions) or have an alternative remote option?
☒ Yes, remote capable
☐ No
☐ Yes, alternate remote option. Please specify (100 words max): Click or tap here to enter text.

If human subjects are involved, have the appropriate Research Ethics Board approvals been obtained?
☐ Yes
☒ No
☐ Not Applicable

If yes, please list the application submission date:
Do you expect this work will be published?
☒ Yes   ☐ No   ☐ Uncertain / Other
Research Environment and Student Roles and Responsibilities

Please be specific as possible. Please describe the research environment, including availability of required facilities/equipment/expertise, supervisor’s experience and mentorship plans. Please clearly outline the student role(s) and responsibilities related to the project, potential educational value, and indicate who will serve as the student’s direct report for daily oversight (PI, PHD student, technician, etc.). Maximum 300 words.

The proposed research will be carried out at the Neuropsychopharmacology Research Group. As part of the Canadian Consortium of Neurodegeneration in Aging, the PI is a co-lead of a team of experts focused on the neuropsychiatric symptoms in dementia. The PI supervises a team of >20 lab members including a postdoctoral fellow, PhD and graduate students, and research assistants. The student will assist the postdoctoral fellow in conducting the analysis and will be responsible for data preparation and processing (after teaching and with supervision). Depending on the student’s interests, they may choose to focus on a part of the project. Overall, the student will learn how to review scientific literature, design a study, conduct MRI processing and statistical techniques to determine volumetric brain changes associated with behavioral symptoms. The student will report to the postdoctoral fellow for daily oversight, with weekly PI contact. PI will remain available to the student after the summer for ongoing research mentorship.