RESEARCH SCHOLAR PROGRAM – 2018

SUPERVISOR & PROJECT INFORMATION FORM

Please complete and return, via email only (crems.programs@utoronto.ca) by

November 3rd 2017 (forms received after this date will not be posted).

Supervisor Information

Name: Nomazulu Dlamini

Email: nomazulu.dlamini@sickkids.ca

Degree: MD, PhD, MBBS, MRCPCH

SGS Appointment (IMS, IHPME, LMP etc.): IMS

Academic Rank: Assistant Professor

Field of Research: Paediatric Stroke, Clinical Research, Imaging

Research Institution Affiliation (if applicable): The Hospital for Sick Children, the Peter Gilgan Center for Research and Learning

Allocation of student contact time (number of hours per week YOU are available to the student for any concerns or to review progress): The Project Investigator will be available for approximately four hours per week or as needed to support the students research progress and development.

Project Information

Title: **Predicting language outcome in neonatal arterial ischemic stroke using MEG brain connectivity measures**

Description (max 500 words):

The Problem:
Children with perinatal stroke rarely develop aphasia but typically struggle with complex language abilities, which has a negative impact on education, socialization and quality of life. Individual variability in language outcome is poorly understood. Identifying post-stroke neural connectivity patterns and cognitive strategies associated with successful language outcome will assess risk and develop targeted interventions.

Background:
In perinatal stroke, while remarkable resilience in core language skills is observed, individual variability in higher-level language disabilities is not fully explained by lesion characteristics. The proposed study will be the first to identify predictors and correlates of good language outcome in children with perinatal stroke using MEG task-based oscillatory synchronization analysis.

Aims:
This project will identify: 1) predictors of successful language outcome and 2) patterns of neural connectivity subserving good versus poor language outcome for children with early brain injury.

Methods:
The SickKids Pediatric Stroke Registry is one of the largest childhood stroke databases containing clinical and neuropsychological data, allowing unprecedented statistical power to investigate research questions surrounding prognosis, mechanisms and treatment in childhood stroke. We have identified 62 patients meeting our inclusion criteria and plan to target enrolment to 40.

Forty 7-17 year olds with either left or right hemisphere perinatal stroke and no neurological co-morbidities will perform a battery of language tasks in the MEG and undergo neuropsychological tests. Using brain connectivity computations, we will characterize peri- and contra-lesional language networks allowing examination of individual and group differences associated with outcome. This novel use of MEG in paediatric stroke will inform us of the relative role of inherent plasticity and functional vulnerability as they contribute to resilience in the injured developing brain.

Specific goals:
1) Acquire MEG data in children with perinatal stroke
2) Identify patterns of neural oscillatory connectivity and network reorganization
3) Correlate these patterns with cognitive and behavioural outcomes

Outcome of this research:
This research will advance the development of individualized cognitive rehabilitation strategies, thus maximizing efficacy and impacting brain development positively for academic and occupational success in these children.

If human subjects are involved, have Ethics been obtained?

☒YES ☐NO ☐Application Submitted ☐N/A

Do you expect this work will be published within the 20 months?

☒YES ☐NO ☐Uncertain

Student's roles and responsibilities (please be specific)

Please indicate who will serve as the student's direct report (PI, PhD student, technician etc…)

Responsibilities include:
- learn about paediatric stroke and associated language disorders in children
- clinical participant recruitment
- clinical data collection
- transfer imaging data to secure data servers
- enter all data and preprocess into appropriate format for analysis
- analysis of clinical, imaging and MEG brain connectivity data
- regular clinical and neuroimaging meetings for discussion with the supervisor, co-supervisors and team
- presentation of data and updates at Stroke Imaging Lab for Children Science meetings and MEG Lab meetings

Student should have taken courses in cognitive neuroscience as well as have some computer science or programming knowledge.

The student will report directly to the PI.