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:**
E. Ann Yeh

**Email:**
Ann.yeh@sickkids.ca

**Department:**
Pediatrics (Neurology)

**Hospital/Research Institution:**
Hospital for Sick Children, SickKids Research Institute

**SGS Department(s) (if applicable):**
Institute of Medical Science

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

0000-0002-5393-7417

**Location of Work:**
Hospital for Sick Children

**Field of Research (up to 4 keywords):**
Neurology, Pediatrics, Neuroinflammation, Outcomes

**Student contact time** (number of hours per week YOU are available to the student for any concerns or to review progress):
40+. I meet weekly with all students and am available to mentor them through the project during all working hours.
NOTE: If this project is selected, this information will be posted on CREMS website for interested student applicants to view research opportunities.

PROJECT TITLE:
Associations of serum neurofilament light chain with outcomes in children with autoimmune encephalitis

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

Background: Autoimmune encephalitis (AE) is recognized as the most common form of unidentified encephalitis, with one early series identifying an autoimmune etiology, NMDA receptor antibodies (NMDAR-Ab), to account for 21% of encephalitides of unknown etiology. While the diagnosis of AE in children has increased markedly over the last decade, little is known about outcomes in this population, and predictors of outcome are unknown. Importantly, brain MRI patterns do not predict outcome, and while serum and CSF markers may help with diagnosis, they do not predict outcome. A biomarker that can help to predict outcome in AE is therefore urgently needed.

Serum neurofilament light, a marker of axonal destruction, may fill this gap. This serum marker has been shown to have high predictive value for multiple sclerosis relapses and Alzheimer’s disease. Furthermore, our preliminary work suggests that this marker may associate with disability in specific forms of acute neuroinflammation, such as acute necrotizing encephalitis.

Objective/Aims: To evaluate longitudinal associations between neurofilament light (nFL) at onset in AE and (1) grey matter and white matter brain volume and (2) reaction time, as measured using the Flanker test.

Methods: This longitudinal analysis of children with a clinical diagnosis of AE will evaluate serum, MRI and clinical data collected as part of an ongoing study of autoimmune encephalitis in children at the Hospital for Sick Children. Data from 100 children will be included in the analysis, including MRI volumetric data which has been collated and z-scored, and results of serum nFL testing and Flanker testing. Analysis will be performed using JASP.

Significance: This study will be the first to evaluate a serum biomarker, serum nFL, as a predictor of outcome in this population. The results will fill an important treatment and counseling gap in this population.

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 student will join the integrated clinical research program that I direct, the Pediatric Neuroinflammatory Disorders Program at the Hospital for Sick Children. The lab includes approximately 20 members, including research staff and trainees of all levels -- clinical research fellows, clinical fellows, undergraduate students, medical students, residents, post-doctoral fellows, and graduate students, with a high level of team engagement.

My lab has a strong, 15-year history of summer medical student supervision. Most medical students participating in the program have successfully presented their results at national meetings and/or published their results. All summer research projects are drawn from our large preexisting data set, which longitudinal clinical, MRI, visual outcome and questionnaire data on a cohort of over 1000 patients with neuroinflammatory disorders, and a large multi-site observational study on Autoimmune Encephalitis. We also have a rich dataset of accelerometry and sleep data on a select subset of the patients and accelerometry data from a national study which includes over 200 participants with neuroinflammatory disorders.

The student will have full ownership of the proposed project. Medical students are fully integrated into the team and are invited to participate in our neuroinflammatory clinics. In addition to weekly mentorship meetings with myself, students are linked with a research coordinator and post-doctoral fellow, who will provide ongoing support and guidance. The project described in the abstract is one of many that the student can choose from to work on during the summer: initial meetings are devoted to review of the student’s goals and objectives and tailoring the project to the student’s skills and objectives. The student will participate in weekly neuroinflammatory team meetings, specific research team meetings which involve internal and external collaborators (e.g. physical activity research team, visual outcomes, MS, Autoimmune Encephalitis MRI, OMAS/eye tracking etc.), and weekly lab meetings.