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: Micheal McInnis
Email: michEAL.mcinnis@uhn.ca

Department: Medical Imaging
Hospital/Research Institution: Toronto General Hospital

SGS Department(s) (if applicable):
Click or tap here to enter text.

ORCID ID (see https://orcid.org/ - if you do not have an ORCID ID we encourage you to sign up for one):
https://orcid.org/0000-0002-5725-3258

Location of Work:
University Health Network

Field of Research (up to 4 keywords):
Radiology, Computed Tomography, Chronic Pulmonary Embolism, Pulmonary Hypertension

Student contact time (number of hours per week YOU are available to the student for any concerns or to review progress):
I have fully funded academic time all day Thursdays and can meet for 1 hour to formally review progress.
I’m also off clinical duty every Wednesday and am available to check in.
We also have CTEPH clinical rounds each Tuesday 8:15-9:15AM and the student can attend with a quick chat before or after if they’re available.
**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:**
Comparison of CT level of disease with CT obstruction index in chronic thromboembolic pulmonary hypertension.

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

**Background:**
Although most acute pulmonary embolism is effectively treated with anticoagulation, chronic pulmonary embolism can occur. In a small number of patients, this chronic pulmonary embolism obstructing the pulmonary arteries will lead to heart failure as the right ventricle continuously pumps blood through an obstructed pulmonary artery bed. This condition is called chronic thromboembolic pulmonary hypertension (CTEPH). Toronto General Hospital is a center of excellence for curative a CTEPH surgery, termed pulmonary endarterectomy, and we routinely perform computed tomography pulmonary angiography (CTPA) preoperatively to diagnose CTEPH.

Our group was the first to describe the correlation of the CTPA appearance with the postoperative pathologic specimen with a new CT scoring system termed “CT level of disease” (doi: 10.1183/23120541.00461-2020). Other investigators have used the “CT obstruction index” scoring which we believe to be inferior.

**Aim:**
The primary aim of this study is to determine if the CT level of disease is more strongly correlated with pulmonary hypertension (pulmonary artery pressure and resistance) than CT obstruction index in CTEPH. The secondary aim is to correlate the two scoring systems with the pathologic specimen level. The tertiary aim is to compare interobserver agreement for the two scoring systems.

**Methods:**
This retrospective study will involve approx. forty consecutive patients who underwent pulmonary endarterectomy in 2021. Four radiologists blinded to outcome will score the preoperative CTPA for the CT level of disease and the CT obstruction index. Baseline clinical variables will be extracted from the medical record including right heart catheter and echocardiographic measures of pulmonary hypertension.

**Impact:**
Currently, there is no established radiologic scoring system for CTEPH in routine clinical practice. This study will be the first to inform radiologists and clinicians on the best way to stage patients by CTPA.

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**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.

REB approval will be obtained by the PI prior to project commencement. The tasks for the student are as follows:

1. Identification of approximately forty (power calculation tbd) consecutive patients with a preoperative CTPA exam performed at Toronto General Hospital in 2021. I will provide the student with the list of operated patients.
2. Collection of clinical variables from the electronic medical record for the forty patients (mostly already stored in a database).
3. Review of relevant literature for CTEPH, CT level of disease and CT obstruction index (4-5 papers).
4. Development of a scoring sheet in Excel for the two chronic pulmonary embolism scoring systems.
5. Development of a brief training slide deck for prospective radiologists scoring the CTPA exams such that the radiologists are familiar with CT level of disease and CT obstruction index.
6. Run a 30 minute training session with the PI to teach the radiologists how to score the study CTs.
7. The PI will be responsible for following up with the radiologists to ensure that the CTPA exams are read in a timely fashion.
8. Organize the radiologist scoring data and clinical data for presentation to statistician.
9. Statistics will be performed by the Princess Margaret Biostatistics Department.
10. Preparation of an abstract either for the ISHLT meeting (deadline October 2022) or RSNA (deadline April 2023).

The PI will be responsible for daily oversight. The student may work in the Department of Medical Imaging at Toronto General (space available for research student) or at Women’s College Hospital where my office is located. This will be my first CREMS student though we had a CREMS student in CTEPH supervised by a colleague two years ago with a student first author publication, and a second publication by my fellow under review where I’m senior author.