



## RESEARCH SCHOLAR PROGRAM – 2018

### SUPERVISOR & PROJECT INFORMATION FORM

Please complete and return, via email only ([crems.programs@utoronto.ca](mailto:crems.programs@utoronto.ca)) by **November 3<sup>rd</sup> 2017** (*forms received after this date will not be posted*).

#### *Supervisor Information*

Name: CHOW, Chung-Wai

Email: [cw.chow@utoronto.ca](mailto:cw.chow@utoronto.ca)

Degree: MD, PhD

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

Academic Rank: Associate Professor

Field of Research: chronic lung diseases, air pollution

Research Institution Affiliation (if applicable): Toronto General Research Institute

Allocation of student contact time (number of hours per week YOU are available to the student for any concerns or to review progress):

## Project Information

Title: **Health Effects of Air Pollution: The ARENA (Assessment of Respiratory Health in Northern Alberta)**

### **Description (max 500 words):**

Wildfires are occurring with increasing severity, frequency and proximity to populated areas. Increased symptoms, hospitalizations and mortality in the immediate aftermath of wildfires are well known. The geospatial impact is large as plumes travel downwind to affect populations thousands of miles away. However, the long-term health impact of wildfires is not known. There is an urgent need to provide empirical data to allow people to make rational decisions, and civic leaders and governments to develop public health policies and strategies to minimize harm. The proposed study will fill this important knowledge gap.

The 2016 Alberta wildfires were unprecedented in scale, duration and destruction, forcing evacuation of the entire town of Fort McMurray. Analyses of air pollutants during the fires reveal high levels of toxins. However, no guidelines exist for safe inhalation limits; the health risk of ongoing exposure is not known. We are funded by the CIHR for studies to assess the toxicity of ash left behind by the fires and pilot health studies in Fort McMurray and Fort McKay.

We launched the studies in 07/17 with a 3-week field campaign in Fort McMurray. During this field visit, we visited 71 homes in different neighbourhoods in Fort McMurray, and collected dust and ash from different areas of the homes. These dust samples are currently being analysed for chemical composition. All the residents of the 71 homes agreed to the follow-up health study, which will begin once we have ethics approval. During our July visit, we refined the optimal team and field visit structure for future field visits to allow for efficient data collection. We also established an agreement with Northern Light Regional Health Centre, in Fort McMurray, to conduct pulmonary function studies, and collect exhaled breath condensate, blood and urine in study participants. Our target enrolment is 80 participants with follow-up to 5 years.

The **specific research aims** are to:

1. monitor lung function every 3 months
2. assess the chemical composition of home dust samples
3. measure pollutants in exhaled breathe condensate and urine
4. identify the bio-signature profile of individuals at risk of lung function decline.

The project is conducted with Prof. Arthur Chan, Faculty of Engineering and Applied Sciences (UoT). Our complementary expertise in molecular biology and respiratory physiology and cohort studies (Chow) and atmospheric aerosol chemistry (Chan) is a unique combination that allows us to address the stated research aims, while providing a rich multidisciplinary research milieu for trainees.

We have also engaged community leaders and Knowledge Translation (KT) Users/Partners during our July visit. These include Alberta Environment & Parks, Wood Buffalo Environmental Association and Alberta Health. Thus, we have an effective KT networks to translate our findings to policy. The combination of longitudinal lung function data, exogenous and endogenous pollutant characterization and bio-signature profiles offers an unique opportunity to assess causality. Our KT users are also research partners, and will ensure timely dissemination of data to relevant stakeholders.

With wildfires increasing worldwide, our findings will influence global public health policies to minimize harm.

If human subjects are involved, have Ethics been obtained?

YES                       NO                       Application Submitted (currently in revision)                       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)**

The student will be an integral member of the research team, and will play different roles over the course of the study. Our first field visit to Fort McMurray to enroll participants to the health study is scheduled for January 2018. During this visit, we will be enrolling 30-40 participants, collecting blood, urine, exhaled breathe condensate and conducting pulmonary function studies. The second and third field visits are scheduled in April and July 2018, with anticipate enrolment of similar numbers of participants. Collection of biosamples will only occur at the initial visit, while pulmonary function studies are conducted with each follow-up visits at 3-monthly intervals. Health surveys are conducted with each visit. Each field visit to Fort McMurray is 3 weeks long and will be made with a team of 3-4 researchers (PI, study coordinator/pulmonary function techonologist, post-doctoral fellow and student).

The roles of the student for each of the periods of the CREMS programme are outlined:

January –June 2018:

- literature review; laboratory and clinical research safety training and certification
- work with the AReNA research team (post-doctoral follow, graduate student, research coordinator) in data analysis; depending on the interests of the student, these include analysis of pollutants in the biosamples (e.g. metals in urine, exhaled breath condensate) or in the home dust samples (working with the chemical engineers in Prof. Chan's laboratory), or interpretation and analysis of pulmonary function tests and health surveys
- learn and develop skills in running of clinical studies by helping the research coordinator to maintain contact with study participants, and coordinating the appointments of participants for our planned July 2018

June-August 2018:

- full time member of the AReNA research team
- during the 3 week field visit to Fort McMurray, the student will be responsible for conducting the health survey, and under the supervision of the research coordinator (who is also a certified pulmonary function technologist), will conduct pulmonary function studies in participants.
- work with the AReNA research team to conduct data analysis as described above

Fall and Spring 2018-2019 School Terms:

- ongoing data analysis as above
- work with research coordinator in research ethics renewal and learn about the regulations and importance of ethics in clinical research

June-August 2019:

- full time member of the AReNA research team
- the student will be given graduated responsibility during what will be his/her 2<sup>nd</sup> field visit with the team to Fort McMurray; depending on the interest of the student, he/she will be responsible for booking of appointments, conducting the health survey and pulmonary function studies in participants
- ongoing data analysis with the goal of finalizing interim analysis of data for 1 year follow-up
- anticipated abstract submission (to a major meeting such as the American Thoracic Society) by fall 2019 and manuscript submission in early 2020.

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

The student will report directly to the PI and will be supervised jointly by the PI, the research coordinator and a senior post-doctoral fellow.