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:**
Sunit Das

**Email:**
sunit.das@utoronto.ca

**Department:**
Surgery

**Hospital/Research Institution:**
St. Michael’s Hospital/Li Ka Shing Knowledge 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):
0000-0002-2146-4168

**Location of Work:**
St. Michael’s Hospital

**Field of Research (up to 4 keywords):**
Bioinformatics, breast cancer, brain metastases

**Student contact time** *(number of hours per week YOU are available to the student for any concerns or to review progress):*
2 hours/week
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:
Identifying molecular processes involved in early and late brain metastasis in patients with breast cancer.

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

BACKGROUND. Intracranial metastatic disease (IMD) is a serious and mortality-inducing complication in patients with cancer. The development of brain metastases (BrM) has a profound effect on survival in patients with breast cancer. There is a critical need to identify risk for BrM in these patients.

AIMS. In this study, we will identify the molecular signatures that characterizes early and late BrM in patients with breast cancer. We will then determine if these signatures are predictive of metastatic risk by interrogating data on primary tumours from The Cancer Genome Atlas and the MSK-MET cohorts.

METHODS. We have identified a cohort of patients through the St Michael’s Hospital CNS Biobank and Patient Database who required surgical resection of a BrM early (< 3 years from initial diagnosis, n=12) or late (> 3 years from initial diagnosis, n=10) in their disease course. In collaboration with colleagues from OICR, we will perform NanoString analysis of these tumours using a cancer-specific gene panel, in addition to WGS. With these data, we will develop genomic and transcriptomic signatures of early and late BrM in patients with breast cancer. We will then interrogate patient and biologic primary tumour data from The Cancer Genome Atlas and the MSK-MET cohorts to determine if these signatures are predictive of risk.

SIGNIFICANCE: IMD is a serious and mortality-inducing complication in patients with cancer, and imposes a profound effect on survival in patients with breast cancer. Our work may allow us to identify patients with breast CA who are at risk of developing BrM, and could facilitate attempts at prevention and early treatment.

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.

I have developed highly productive research teams in population research and bioinformatics. Much of this work has been driven by medical students at Temerty through participation in the GDipHR program and CREMS. This group functions as a unit into which the proposed new recruit would integrate. The student will be responsible for performing analysis of the NanoString and WGS data and to perform predictive and validatory analysis using TCGA and MSK-MET. These studies should allow the student a strong foundation in bioinformatics and population health research. I will take a direct role in mentoring the student and will meet with them in both the group setting and individually on a weekly basis. My past students have been very productive and many have used our time together as a springboard toward an academic career in medicine. This work should produce a publication in a high-impact journal, on which the student will be listed as a primary author.