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:**
Nir Melamed

**Email:**
Nir.melamed@sunnybrook.ca

**Department:**
Obstetrics & Gynaecology

**Hospital/Research Institution:**
Sunnybrook Research Institute

**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):*
0000-0002-2704-1385

**Location of Work:**
Sunnybrook Health Sciences Centre

**Field of Research (up to 4 keywords):**
Obstetrics, Pregnancy, Diabetes, Prediction

**Student contact time** *(number of hours per week YOU are available to the student for any concerns or to review progress):*
50 hours
**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:**
Prediction of birthweight and risk of macrosomia in pregnancies complicated by diabetes

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

**BACKGROUND**

Diabetes in pregnancy is associated with rapid fetal growth and macrosomia (birthweight >4000g), which might result in severe complications such as shoulder-dystocia and fetal and maternal trauma.\(^1\)\(^-\)\(^4\) Therefore, cesarean delivery is often recommended when macrosomia is suspected in pregnancies with diabetes.\(^5\)

Sonographic fetal weight estimation (sEFW) is the most accurate tool to predict birthweight. However, an up-to-date sEFW is often not available before birth,\(^6\)\(^,\)\(^7\) either due to limited resources or because of the general recommendation that sEFW should not be repeated in intervals of less than 2-3 weeks. This may result in failure to predict macrosomia, especially in pregnancies complicated by diabetes where care providers tend to underestimate fetal growth rate.\(^8\)

The aims of the current project are to develop prediction models for macrosomia in pregnancies complicated by diabetes, and to design an interactive web-based tool based on these models to support care providers when counselling patients regarding the risk of macrosomia.

**METHODS**

*Participants:*
Patients with a singleton pregnancy complicated by diabetes followed at our center between 2011-2020.

*Predictors and outcomes*
Predictor variables will include type of diabetes, parity, information from the most recent ultrasound exam (sEFW, head/abdomen circumference z-score), abdominal growth velocity, and interval between ultrasound exam and birth.

The primary outcome will be macrosomia.

*Model development and performance*
The probability of macrosomia will be estimated using multivariable logistic regression models. Predictors will be chosen using stepwise regression with p-value criteria for retention set at 0.20.
Model discrimination and calibration will be assessed using AUC and Brier scores, respectively. Internal model validation will be performed using the bootstrap resampling technique with 500 bootstrap replicates.

**Clinical significance**

An interactive web-based tool will be developed based on the model, and will allow care providers to get an estimate of the risk of macrosomia and optimal timing of delivery when counselling patients with diabetes.

**REFERENCES**


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.

Setting
The student will be located in room next to my office, which will ensure my availability to support the student during most of the day, 5 days a week.

Student roles and responsibilities
(1) **Data collection** – the data are available in existing databases; the student will be responsible to merge and edit the datasets.

(2) **Statistical analysis** – The student will perform basic descriptive and comparative data analysis, as well as be involved in the development of the prediction models.

(3) **Development of the interactive web-based tool** – the student will be involved, together with an experienced website designer/JAVA programmer, in the development of the interactive web-based tool that is based on the prediction models. The extent of student involvement will depend on previous experience in website design and programming.

Educational value
As part of this project, the student will gain the following experiences:

(1) **Learn about topics relevant for this project** - including diabetes in pregnancy, labour and delivery risks related to macrosomia, and principles of obstetric ultrasound and sonographic fetal weight estimation. This will be achieved through reading of relevant papers and scheduled meetings as part of the orientation for the project.

(2) **Working with large datasets** – the student will gain experience in working with large databases, including merging and ‘cleaning’ datasets, handling missing values.

(3) **Statistical analysis** – The student will learn basic concepts of biostatistics, receive training on a statistical software (SPSS), and gain experience in basic descriptive and comparative analysis. The student will be involved, together with an experienced biostatistician, in the development of the prediction models.

(4) **Clinical experience** – the student will be offered to shadow clinical activity in the obstetrical ultrasound unit and diabetes clinic, to experience fetal weight estimation is performed, and how patients with diabetes in pregnancy are being followed and counselled.

Supervisor experience
I have authored over 200 peer-review papers involving clinical research and supervised over 60 research projects led by trainees, nearly all of which resulted in peer-review publication and presented as abstracts in conferences.