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PART I:

Name of Schulich faculty member who will supervise the project	Robert Hegele
Supervisor's Schulich, Western, Hospital or Lawson Email	hegele@robarts.ca
Schulich Department	Medicine

PART II - Project Description

Title of Project	Next-generation DNA sequencing in dyslipidemia management

Background

Since 1997, we have collected data and blood samples from patients with dyslipidemia. Our archive includes >5,000 samples, including 2,600 from the Lipid Genetics Clinic at University Hospital. Patient information is stored in several different secure computer databases, including: 1) physical and clinical features; 2) carotid ultrasound results; 3) LipidSeq findings for small DNA variants; 4) and for large DNA variants.

The clinic database has records for 2,600 patients referred from 1,150 doctors and has been maintained since 1997. Patients who consent for genetic research have a subject ID assigned and this ID is used in the genetic and other data sets. The clinic database is kept separate from other data structures to comply with privacy and safeguard patient information. As the patient transitions to be a research subject, the ultimate power is to be able to merge these dimensions into one data source. Over the last few years, we have migrated clinical and genetic data to two SQL databases with a Microsoft Access front end. The final phase of development is to integrate the disparate data sources to allow for cross-database queries and report generation.

Hypothesis

The genomic architecture of dyslipidemia along with clinical and demographic data from our research subjects will allow for cohort based analysis of these well-characterized data sets. The hope is that these analyses can be used to inform more precise and expedited treatment plans than the current standard of care for these patients.

Proposed Methodology

The project for the SRTP fellow will be to:
1. Stress testing and simulated data queries of the dyslipidemia database.
2. Perform statistical analysis including association with disease phenotypes. Parametric and non-parametric multivariate and univariate association statistical analysis. Specifically we will perform ANOVA, regression, survival analysis, ROC, and descriptive statistics in clinical phenotype and genetic data.
3. Using the dyslipidemia database to identify patients for approved projects for national and international disease registries.
4. Using the dyslipidemia database to select patients for upcoming clinical trials.
5. Prepare draft of a manuscript with a goal to submit to a peer-reviewed medical journal.

Expected Outcomes

Expected Objectives/Accomplishments for Student for Year 1:

Completion of statistical analysis of patient clinical and genomic data sets.

Expected Objectives/Accomplishments for Student for Year 2:

Analysis and interpretation of results from year 1. Preparation of a manuscript for publication.

Research Environment – Description of the number of research personnel, primary location of research, size of lab, etc

Dr. Hegele operates his own laboratory and is also Scientific Director of the London Regional Genomics Centre (LRGC) DNA sequencing Core Laboratories. There are 6 full time members of the lab team and 2 full time members of the LRGC team. The Hegele laboratory is situated in the fourth floor of the Robarts Research Institute and occupies 1,200 ft2 and the LRGC labs occupy 1,800 ft2. Dr. Hegele maintains a fast paced, leading edge research environment and there are excellent opportunities for advanced training in human molecular genetics, statistics and bioinformatics research.

Names and titles of other individuals who will be involved with the research project?

Adam McIntyre BSC, Research Technologist
Jian Wang MD, Research Associate
Ericka Simon BSc, Clinical Assistant
Brooke Kennedy BSc, Clinical Trials Coordinator

Can this project be done remotely?	Yes
Duration of Project	Two Summers

Expected Objectives/Accomplishments for Student for Year 1?

Completion of statistical analysis of patient clinical and genomic data sets.

Expected Objectives/Accomplishments for Student for Year 2?

Analysis and interpretation of results from year 1. Preparation of a manuscript for publication.

PART III - Certifications

If the project will require any certification approvals from one or more of the following offices, please check the appropriate box below.	- Human Ethics - Biohazard
Human Ethics: If you have the protocol information, please enter it below (or enter the status of the approval).	REB 0379
Biohazard: If you have the protocol information, please enter it below (or enter the status of the approval).	BIO-RRI-0006

Note: certification approval should be obtained prior to the start of the summer. Projects without this approval will not be a priority for funding.