Undergraduate

Summer Research Studentships 2016

Listing of CLS Researcher Projects Available*

*Applications for summer studentships are not restricted to the projects on this list.
Name of Supervisor: Dr. Isolde Seiden Long
Phone Number: 403-944-3993
E-mail Address: Isolde.SeidenLong@cls.ab.ca
Title of Project: Improving Specimen Stability for Ammonia testing

Brief Description of the project:
Ammonia is an unstable analyte which is synthesized in humans as a product of amino acid metabolism. In the adult population, ammonia levels can be elevated during liver failure or impairment, urinary tract infection, gastrointestinal bacterial overgrowth, due to various medications e.g. valproic acid, chemotherapy, and in-patients on total parenteral nutrition. In the paediatric population, blood ammonia levels can be increased in inherited defects of the urea cycle, organic acidurias, disorders of fatty acid oxidation, other illness in babies e.g. sepsis, asphyxia, Reye’s syndrome and transient hyperammonaemia of the newborn. When blood samples are taken for ammonia measurement deamination continues in vitro, therefore the ammonia concentration in the sample increases over time. To maintain stability and avoid reporting false-high results, samples are collected on ice and run within 1 hour from collection. Historically, this has meant that ammonia testing could only be offered in larger urban centers where the testing can be run within 1 hr. This project aims to test different sample preservation strategies to determine if these samples can be stabilized for longer distance transportation. Ultimately, the goal of this project is to make access to ammonia testing available to rural hospitals where transportation time is >1 hr.

Where the project will be conducted: Foothills Hospital Chemistry Department

Any prerequisites the student should have:
- First/Second year Chemistry/Biochemistry courses
- Knowledge of Microsoft excel
- Access to a car and valid driver's license are an asset

Name of Supervisor: Dr. Isolde Seiden Long
Phone Number: 403-944-3993
E-mail Address: Isolde.SeidenLong@cls.ab.ca
Title of Project: Analysis of Toxic Alcohols by gas chromatography using headspace sampling

Brief Description of the project:
The Foothills Hospital Chemistry lab provides testing for toxic alcohols (Ethylene Glycol, Methanol, and Isopropanol) for the Calgary zone, as well as for all of Southern Alberta. Ingestion of Ethylene Glycol, Methanol and Isopropanol initially presents similarly to Ethanol (alcohol), but they are rapidly metabolized into toxic compounds if medical intervention is delayed. Methanol and Ethylene Glycol poisoning result in severe metabolic acidosis followed by blindness (Methanol) or renal failure (Ethylene Glycol), and ultimately death. The lab plays a critical role in treatment by identifying the alcohol ingested and monitoring the patient during treatment. Toxic alcohol tests ordered in the emergent care setting require results to be reported within 4 hours to establish an effective treatment regimen. Timely reporting of toxic alcohol levels is therefore imperative to prevent adverse consequences to patients in the emergency department. For this project, the summer student will assist in moving our current liquid injection method for toxic alcohols to a faster, lower maintenance, headspace sampling method which would improve turnaround time for the test.
Where the project will be conducted: Foothills Hospital Chemistry Department

Any prerequisites the student should have:
- Analytical Chemistry Course covering fundamentals of chromatography (eg. CHEM 315)

Name of Supervisor: Dr. Noureddine Berka
Phone Number: 403-770-3655
E-mail Address: Noureddine.berka@cls.ab.ca
Title of Project: Clinical Relevance of C3d-binding Donor-Specific anti-HLA Antibodies on outcomes of kidney allograft transplantation

Brief Description of the project:
Antibody mediated rejection (AMR) is one of main complication of kidney transplantation, which has direct affects on allograft survival. The hallmark of AMR is the ability of Donor specific anti-HLA antibodies (DSAs) to initiate fixation and activation of complement cascade. Nevertheless, not all DSAs have similar harmful effects, as different characteristics of different antibodies such as timing, specificity, strength, and complement-fixing ability may initiate different immune responses. The aim of the study is to evaluate the clinical relevance of C3d-binding DSAs in kidney transplant patients.

Where the project will be conducted: CLS DSC and HSC

Any prerequisites the student should have:
- Basic science course work that includes biology, chemistry, math, and physics
- Good English writing skills
- Previous research laboratory exposure is an asset

Name of Supervisor: Dr. Tarek Bismar
Phone Number: 403-943-8430
E-mail Address: Tarek.Bismar@cls.ab.ca
Title of Project: Histological features and Tissue Microarray (TMA) database of Prostate Cancer: Implications for biomarker development

Brief Description of the project:
Tissue microarray (TMA) was developed for the purpose of rapidly characterizing a large number of cancer samples with immunohistochemical methodology on a single slide. This technique does not only save considerable time but also reduces significantly expenditure. We utilized tissue sectioning to construct multiple TMA cohorts from prostate cancer (PCa) tissue samples. These cohorts are coupled with detailed clinical and pathological outcome. Currently, we, along with multiple institutes, are building detailed and tailored cohorts to facilitate rapid assessment of potential molecular markers for PCa. Therefore, this will significantly accelerate our knowledge of PCa biology, as a result, better translation to clinical medicine.
Where the project will be conducted: Prostate Cancer Center at RockyView Hospital

Any prerequisites the student should have:
- Time management and critical thinking skills
- Organizational skills
- Teamwork and communication skills

Name of Supervisor: Dr. S.M. Hossein Sadrzadeh
Phone Number: (403) 770-3759
E-mail Address: Hossein.Sadrzadeh@cls.ab.ca
Title of Project: Development of a liquid chromatography-tandem mass spectrometry for the measurement of immunosuppressants using whole blood and dried blood spots

Brief Description of the project:
The immunosuppressants cyclosporine, tacrolimus, sirolimus and everolimus are vital for transplant patients. These drugs are highly toxic and their blood levels must be monitored carefully. Liquid chromatography-tandem mass spectrometric (LC-MS/MS) is the gold standard for monitoring these drugs. Dried blood spots (DBS) are ideal for patients, especially children living far from the lab. This project involves the development of LC-MS/MS methodology for the quantification of these drugs in both DBS and whole blood using 96 well plate technologies.

Where the project will be conducted: Diagnostic Services Centre – Calgary Laboratory Services

Any prerequisites the student should have:
- Strong background in analytical chemistry and laboratory techniques is required
- Applied experience with LC-MS/MS desirable

Name of Supervisor: Dr. S.M. Hossein Sadrzadeh
Phone Number: (403) 770-3759
E-mail Address: Hossein.Sadrzadeh@cls.ab.ca
Title of Project: Development of a liquid chromatography-tandem mass spectrometry for the measurement of Δ9-tetrahydrocannabinol (THC) in dried blood spots

Brief Description of the project:
Cannabis is the most widely abused illicit drugs in the world; however its (anticipated) legalization in jurisdictions will lead to increased levels of impairment and complicate addiction treatment. Measurement of Δ9-tetrahydrocannabinol (THC) and its metabolites within dried blood spots (DBS) has the capability to provide information on the early stages of impairment. Combining the close correlation of DBS THC concentrations with plasma samples and enhanced THC stability provides a rapid and simple method that is suitable for detection of recent cannabis usage. The proposed project involves the development of a liquid chromatography-tandem mass spectrometry methodology for the quantification of THC and its metabolites within DBS that may be used to distinguish between acute and chronic exposure to cannabis.
Where the project will be conducted: Diagnostic Services Centre – Calgary Laboratory Services

Any prerequisites the student should have:
- Strong background in analytical chemistry and laboratory techniques is required
- Applied experience with LC-MS/MS desirable

Name of Supervisor: Dr. S.M. Hossein Sadrzadeh
Phone Number: (403) 770-3759
E-mail Address: Hossein.Sadrzadeh@cls.ab.ca
Title of Project: Liquid chromatography-tandem mass spectrometry measurement of Δ9-Tetrahydrocannabinol (THC) in oral fluid

Brief Description of the project:
Cannabis is the most widely abused illicit drugs in the world; however its (anticipated) legalization in jurisdictions will lead to increased levels of impairment. Symptoms of cannabis intoxication are difficult to assess, which makes measurement of cannabinoids and their metabolites within saliva a valuable tool for practitioners to assess cannabis intoxication. Additionally, the collections of saliva samples provide an easier collection method that eliminates the potential for sample adulteration. The proposed project involves the development of a liquid chromatography-tandem mass spectrometry methodology for the quantification of cannabinoids and their metabolites within saliva that may be used to for the assessment of actual Cannabis intoxication states.

Where the project will be conducted: Diagnostic Services Centre – Calgary Laboratory Services

Any prerequisites the student should have:
- Strong background in analytical chemistry and laboratory techniques is required
- Applied experience with LC-MS/MS desirable

Name of Supervisor: Dr. Lawrence de Koning
Phone Number: 403-955-2277
E-mail Address: Lawrence.dekoning@cls.ab.ca
Title of Project: Specimen biobanking and risk profiling in patients with coronary artery disease

Brief Description of the project:
This project will involve the collection, storage, organization and testing of biospecimens in support of a biobank for patients undergoing invasive cardiac procedures in Calgary. The successful candidate will assist in specimen collection from patients who have undergone coronary catheterization. Specimens will be obtained, identified, stored and analyzed using conventional and novel biochemical techniques. Test results will be used to help identify high-risk vs low-risk patients using statistical analysis.

Where the project will be conducted: Laboratory work will be conducted at the Alberta Children’s Hospital Research and Development lab and a research lab at Foothills Medical Centre.
Any prerequisites the student should have:
- Experience performing laboratory-based research and proficiency in laboratory techniques and data analysis
- Strongly motivated
- Third year student preferred

Name of Supervisor: Dr. Lawrence de Koning
Phone Number: 403-955-2277
E-mail Address: Lawrence.dekoning@cls.ab.ca
Title of Project: Validation of chemistry tests for breast milk

Brief Description of the project:
There exists a great deal of public interest in the nutritional quality of human breast milk. While biochemical tests are available in clinical laboratories, few have been fully evaluated for use on these specimens. This project will involve the development and validation of laboratory tests for nutritional status, antibody concentration and infectious disease markers in breast milk. The successful candidate will work closely with a clinical biochemist and laboratory staff to define the imprecision, accuracy, and other performance metrics of these tests in this unique specimen type.

Where the project will be conducted: Laboratory work will be conducted at the Alberta Children's Hospital Research and Development lab, and the Diagnostic and Scientific Centre.

Any prerequisites the student should have:
- Experience performing laboratory-based research and proficiency in laboratory techniques and data analysis
- Strongly motivated
- Third year student preferred

Name of Supervisor: Dr. Lawrence de Koning
Phone Number: 403-955-2277
E-mail Address: Lawrence.dekoning@cls.ab.ca
Title of Project: Developing a test for exchangeable copper to better diagnose Wilson's Disease

Brief Description of the project:
Wilson's disease, or hepatolenticular degeneration, is a disease of hepatic copper accumulation and overload. Measurement of non-protein bound (exchangeable) copper may provide a highly sensitive and specific marker for early diagnosis. However this test is not clinically available.

Where the project will be conducted: Laboratory work will be conducted at the Alberta Children's Hospital Research and Development lab and a research lab at Foothills Medical Centre.

Any prerequisites the student should have:
- Experience performing laboratory-based research and proficiency in laboratory techniques and data analysis
- Strongly motivated
- Third year student preferred