

# Project: LC-MS clinical chemistry validation and machine learning studies in gastroenterology

Project type: Laboratory: Human blood, urine and tissue preparation, chromatographic separation

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A new UPLC-MS instrument was recently installed to analyze new analytes for clinical chemistry applications. Emphasis is gastroenterology, our subject area, but other biomedical areas can be considered. Our main research areas involve intestinal barrier function and motility in the context of inflammatory bowel disease, irritable bowel syndrome, and inflammatory bowel disease and motility disorders. Analytes are numerous, ranging from established routine clinical chemistry analytes to completely novel analytes for basic research. Other techniques such as gold standard methods, will be used for comparison as needed. As assays are validated, human, animal and other samples will be analyzed as part of basic, preclinical and clinical studies. The student will learn about processing biological specimens (e.g., blood, urine, probiotics), operating and analyzing UPLC-MS, plate readers, etc, as well as details of validating a new method. As there are a number of different projects of varying sizes, initiation and completion dates and number of credits can be negotiated. Applicants would most likely be in a biomedicine, chemistry or bioinformatics program. Ability to calculate concentrations and use pipettors is an absolute requirement and will be checked prior running experiments. A new project has been initiated to pursue machine learning of LC-MS scan data to identify new biomarkers. Candidates for the machine learning projects must display a strong interest and aptitude in bioinformatics and R programming. This work will involve peak detection from large data sets and working with data arrays and finally machine learning to differentiate subgroups of patients. This project will begin with a smaller data set with obvious differences to test algorithms. We are open to collaborations with other groups as shared supervisors for those needing access to an UPLC-MS, as our instrument is not currently heavily occupied. Because we work with human patients, we urge anyone joining us to explore vaccination for hepatitis B. We look forward to seeing some of you choose gastroenterology for your projects.