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Quantifying the Citric Acid Cycle intermediates in the plasma of Glucose intolerant rats

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RCEU20-CH-SLR-03

Project Description

Prediabetes and insulin resistance are key physiological changes that lead to Type 2 diabetes. Our lab has identified a novel model of age induced glucose intolerance that appears to be due to the expression of a type 1 diabetes, kidney disease, and cancer susceptibility gene. Our lab is currently characterizing the metabolic phenotype of this model and one area of need is in the analysis of the serum in this model. The objective of this project is to measure the shifts in glucose metabolism analytes related to the citric acid cycle in this rodent model.

Student Duties, Contributions, and Outcomes

Student's duties: The student will be responsible for assisting with the measurement and analysis of serum Nuclear Magnetic Resonance spectra for the TCA cycle intermediates citrate, alpha ketoglutarate and succinate. The student will be responsible for organizing the data received from the software into a spreadsheet and using GraphPad prism to run descriptive statistics on the tabular data. The student will also use GraphPad prism to create graphs. The student will create a standard operating procedure and methods section to compliment the data. The student will also be responsible for reading relevant literature and presenting one Journal Club for the lab group during the summer.

Tangible contributions: The data from this project will help to support a manuscript in preparation. The student will also be encouraged to submit an abstract to the Southeast Regional American Chemical Society meeting.

Specific Outcomes: The student will learn the application of NMR to biological samples as an introduction to bioanalytical chemistry and metabolomics. The student will learn how to organize data and run simple descriptive statistics. The student will also learn how to prepare a methods section, abstract, poster, and journal club presentations.

Student Selection Criteria

The student must be a rising sophomore, junior, or senior who has taken CH121 and BYS119. Students who have taken CH 331, CH332, BYS 215, CH/BYS 361 or PY300 will receive special consideration. A student from Chemistry or Biology with the respective minor or double major will be considered as long as they meet the minimum requirements.

Faculty/Research Staff Mentorship

The student will primarily be mentored by Dr. Vogler, Dr. Love-Rutledge and a Ph.D. student in our labs, Quiana Vidal. The student will be trained on the NMR analysis software by Dr Vogler, the data analysis software by Dr. Love-Rutledge and will be assisted in developing the methods, standard operating procedures, and graphs by Mrs. Vidal. In the early weeks of the project the student will work together daily with Dr. Vogler and Mrs. Vidal, but as the summer progresses, these weeks will shift to weekly progress meetings.