According to the American Diabetes Association, approximately 1.25 million Americans are living with type 1 diabetes(T1D) which equates to roughly 40,000 new cases each year. The Centers for Disease Control released a report that showed that the incidence of T1D in youth is increasing. T1D is an autoimmune disorder characterized by the presence of autoantibodies (proteins that target and label native proteins for destruction) and the inability of the pancreas to produce insulin. This process is complex; the disease triggers and changes that occur during the initiation of the disease remain unclear. Because of this complexity, the progress toward non-autoimmune specific blood-based biomarkers has stalled, and T1D incidence is only increasing. The Love-Rutledge lab studies a T1D susceptible rodent model to study specific metabolism-based differences in that model that make it prone to develop the disease. Dr. Love-Rutledge previously observed that there are increases in a class of lipids (fats) called triglycerides in the cluster of cells in the pancreas (islets of Langerhans) that contain the cells that produce insulin, the beta cell. This increase was also observed in the blood of the rodents. This increase in triglycerides, fat storage molecules, might be playing a role in increasing susceptibility to disease by interfering with cellular health. This observation led to the need to understand globally how an increase in blood and islet triglycerides is being regulated by the pathways responsible for metabolizing triglycerides.

One way to understand the shifts in the processing of these lipids is to measure changes in the intermediates of the pathways responsible for their metabolism. One of the catabolic (breaking down complex molecules) pathways is called the citric acid cycle. This cycle uses the product of the second process involved in breaking down triglycerides to make cellular energy or precursors for proteins and other macromolecules, acetyl Co-A. It is unclear if specific shifts in metabolism are occurring in this animal model during disease induction. A graduate student in Dr. Love-Rutledge has compiled a set of plasma samples from the rodent model and a control model during disease induction. Using analytical chemistry techniques, I will validate a method in development to measure the concentrations of these pathway intermediates in an artificial serum sample. I will then translate this method from artificial serum into plasma samples to determine if this method will properly work in the plasma. This is critical to ensure that our results are accurate. The long term goal is to accurately access if there are shifts in this pathway at that specific time point prior to the onset of T1D.

Experimental Timeline
Week 1-2: Familiarization with LC-MS and NMR
Week 3-4: Building of reference data files, establishing concentration curves
Week 5-6: Familiarization with data analysis software
Week 7-8: Analysis of data sets
Week 9-10: Refine measurements
Week 11-12: Prepare the poster and write up results

The mentor has read and agreed on the final version of this document.

Sharifa Love-Rutledge

Digitally signed by Sharifa Love-Rutledge
DN: cn=Sharifa Love-Rutledge, o=UAH, ou=Chemistry, email=str0012@uah.edu, c=US
Date: 2020.01.17 14:21:33 -06'00'

Signature of Mentor Date