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Understanding the impact of Fat10 overexpression on liver metabolism

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Obesity is said to increase risk for many chronic diseases, such as diabetes, cancer, and heart disease. However, not all obese persons develop these diseases. To address this fact, researchers have recently begun to assess the differences in obesity between patients who develop disease and those who remain metabolically normal, with metabolically normal meaning someone who maintains the markers of appropriate metabolic function, such as normal insulin sensitivity, normal glucose tolerance, and normal glycated hemoglobin.

The patients that develop diseases are referred to as pathologically obese, and they often show signs increased ectopic lipid deposition, insulin resistance, and impaired glucose tolerance. Ectopic lipid deposition is the increase of lipids in organs like the liver and heart, rather than in less harmful areas, such as the subcutaneous lipid deposits in the fat pads in the lower abdomen. A disease that is associated with these conditions is the non-alcoholic fatty liver disease, and within a patient that has this disease, excess lipids are stored within the liver. The disease pathology of non-alcoholic fatty liver disease is unclear, but it may have a genetic component. Therefore, my project will study the impact that the increased expression of a gene that is routinely overexpressed within NAFLD liver patients has on glucose metabolism and insulin sensitivity in liver cells.

To better understand the foundation of the metabolic questions that I will be studying, I will also participate in the evaluation of a metabolism-based biochemistry education project. To appropriately develop my targets, I will first work on assessing the effectiveness of a learning activity centered on learning and integrating metabolic pathways with Dr. Love-Rutledge and Dr. Johnson (UNA). After completing my training for this project, I will then work with Dr. Love-Rutledge to apply my understanding of glucose metabolic pathways to assess the impact that my gene of interest has on glucose metabolism in liver cells. We hope to use techniques in molecular biology to increase the amount of our target created by the cells, and then determine if it has an impact on glucose metabolism by examining activation of protein targets in the glucose metabolic pathway.

As for the timeline of this project, I am looking to spend the first two weeks both assessing glucose metabolism pathways in the biochemistry education project and completing the lab safety training. During weeks three and four of the project, I plan to grow the liver cells. From week five to week eight, I plan stimulate and harvest multiple replicates of the cells. For weeks eight, nine, and ten, I plan to process the samples and analyze the data collected. Finally, in weeks eleven and twelve, I plan compile my data and conclusions and create my poster.