Jainee Lewis Researches Chagas Disease - Analyzes the Lipolytic and Apoptotic Pathways in Acute T. cruzi Infection in the Mouse

Over the summer at Albert Einstein College of Medicine I worked under the mentorship of Dr. Herbert Tanowitz and Dr. Nagajyothi in the Department of Pathology. This laboratory focuses on the pathogenesis of Chagas disease, caused by the protozoan parasite Trypanosoma cruzi. T. cruzi is endemic in Mexico, Central and South America, where it causes significant morbidity and mortality. This infection is a major cause of heart disease in endemic areas. Obesity and diabetes is an emerging problem in the tropical world. This observation has raised questions regarding the interactions of the parasite and adipose tissue. Previous work done in the laboratory demonstrated an upregulation of cytokines, chemokines, MAPKs, TLRs, components of the Notch pathway and cyclins in cultured adipocytes and in adipose tissue obtained from infected mice. These are important observations because it demonstrates the role of glucose metabolism and the fat cell in the pathogenesis of both acute and chronic Chagas disease.

My project was to investigate a cause for the reduction in fat mass in infected mice by analyzing the lipolytic and apoptotic pathways in acute T. cruzi infection in the mouse. An immunoblot (Western blot) is an analytical technique used to detect specific proteins in a given sample of tissue homogenate. I probed for proteins that were involved in either the lipolysis or apoptotic pathway in the adipose tissue obtained from mice 15 days post infection with the Brazil strain of T. cruzi. I demonstrated that lipolysis is a major contributor to the reduction of fat mass than the apoptotic pathway. Along with conducting research I also had to be able to manage my time in order to finish all of my duties in regards to my research project.

One of the many challenges that I encountered while performing research has been time management. I was a very busy scientist this summer as I had to conduct research, engage in activities with Einstein students and SURP students alike, and manage two high school students. Everyday that I came in I was managing two high school students which took up a lot of my time, but this has allowed me to become more confident in my scientific communication and mentoring skills. SURP had also prepared for us many outside activities allowing us to explore New York City and the surrounding area. This was important because it allowed for me to see the many attractions of New York City along with the opportunity to interact with graduate students in the PhD program as well as the other SURP students. I can honestly say that during this summer I was living the life of a graduate student, which has given me even more motivation to go for the PhD. If given the opportunity to do this all over again, I would not change anything.

The other area I would have liked to explore more if given extra time in the program is the contribution of the apoptotic pathway in the reduction of adipose tissue in our model. The technique that would have allowed for me to perform this experiment is the TUNEL assay, which is a common method for detecting DNA fragmentation that results from apoptotic signaling cascades. The assay relies on the presence of nicks in the DNA which can be identified by terminal deoxynucleotidyl transferase, an enzyme that will catalyze the addition of dUTPs that are secondarily labeled with a marker. This would have been a better way of looking at DNA fragmentation instead of using immunoblot analysis.

Overall this experience has been life changing as it has opened my eyes to another pathogenic disease that affects millions in Latin America. Before joining the Tanowitz laboratory I had never heard of Chagas disease, nor was I aware that it was linked to the increased rate of diabetes and obesity in Latin America. Therefore, I believe that the questions examined by the Tanowitz laboratory are important because they explore the mechanisms by which the parasite persists in different organs. As more research is done to explore these mechanisms, the closer researchers can come to finding a vaccine that will protect all of Latin America against Chagas disease.