I have been fortunate to have the opportunity to gain research experience in very different settings and areas, thus providing me with a range of skills that have been crucial for my development as a scientist and will benefit my long-term career goals. My first research experience was in 2013 in Dr. Kalpna Gupta's laboratory at the University of Minnesota. Dr. Gupta conducts research on vascular biology and molecular mechanisms of angiogenesis. Although I had few laboratory skills and was relatively ignorant about the day-to-day practice of research, I worked on examining the impact of morphine on the activation and abundance of tumor-associated mast cells within mouse models of breast cancer. I gained experience in tumor extraction, immunostaining and confocal microscopy. I also had the opportunity to present my research project to a scientific audience for the first time. The results of my work revealed that morphine increased mast cell number within the mammary tumors, suggesting that administration of this pain medication might promote cancer-associated inflammation and angiogenesis. These important contributions earned me co-authorship on a manuscript that was published, my first peer-reviewed research article.

That same year, I joined a plant molecular biology and biotechnology lab at the University of Puerto Rico in Mayagüez. Dr. Dimuth Siritunga leads a research program to identify DNA barcodes within plant species. These uniquely patterned DNA sequences are characteristic to each living organism and can be used to identify species and determine phylogenetic relationships. I worked on characterizing Bamboo DNA barcodes, specifically determining barcodes that are still unavailable in databases, in an effort to collaborate with scientists throughout the world that perform research with this economically important plant. This research experience provided me the opportunity to work on a long-term project as an essentially independent undergraduate researcher, while at the same time working closely with peers who were identifying DNA barcodes in other plant species. My responsibilities included designing experiments, analyzing data, troubleshooting protocols, and communicating my findings with regards to my independent research. In addition, I also had the opportunity to teach fellow researchers techniques, protocols, and software usage essential for their independent projects. These

experiences have greatly contributed to my training, mostly by developing my identity as an independent scientist and exposing me to being a mentor and leader to others. As a result of my work, a paper is expected to be published with the novel DNA barcodes found in Bamboo as elucidated by my research.

In 2014, I worked in the lab of Dr. Jayanta Debnath at the University of California in San Francisco. Dr. Debnath's research focuses on understanding the role of autophagy in epithelial homeostasis and cancer. My project involved testing the requirement for a Golgi structural protein, GRASP55, in matrix detachment-induced apoptosis. To dissect the role of GRASP55 in apoptosis, I learned tissue culture, short-hairpin RNA knockdown using lentiviral vectors, immunoblotting, and immunofluorescence microscopy. I also performed a challenging assay to test the ability of human mammary epithelial cells to form colonies in soft agar, a measure of anchorage-independent growth and transformed phenotypes. Remarkably, depletion of GRASP55 in non-tumorigenic cells promotes resistance to matrix detachment-induced apoptosis and the formation of small colonies in soft agar assays. These intriguing data identify GRASP55 as an effector of detachment-induced apoptosis and suggest that loss or inhibition of GRASP55 may contribute to cellular transformation and pro-tumorigenic phenotypes. This experience taught me the dedication and creativity required to carry out leading-edge research. I was accorded a best presentation award for my oral presentation at UCSF.

In September 2015, I started my graduate studies at Yale University. I recently joined Dr. Rodeheffer's Lab which investigates the cellular and molecular mechanisms that control adipose tissue mass under normal and disease states. I was quickly involved in an on-going research program studying how the adipose tissue microenvironment contributes to adipogenesis, the process of cell differentiation that gives rise to adipocytes, in specific fat depots and how this process is affected by sex hormones. I was very intrigued by this question and contributed with the data analysis, earning me co-authorship in my second peer-reviewed research article. This publication elucidated for the first time the plasticity of adipocyte precursor cells, as we show they respond to molecular cues within the adipose tissue microenvironment, and how estrogen is essential for adipogenesis in the

inguinal subcutaneous depot. I will be continuing these studies during my PhD, with hopes of elucidating the molecular mechanisms driving differential adipogenesis patterns between the sexes. These findings may lead to novel therapeutic strategies to manipulate the healthier subcutaneous adipose tissue expansion over the more detrimental visceral adipose tissue expansion.

Scholarly Contributions:

- Jeffery, E., Wing, A., Holtrup, B., Sebo, Z., Kaplan, J., Saavedra-Peña, R., Church, C., Colman, L., Berry, R., and Rodeheffer, M. (2016). The Adipose Tissue Microenvironment Regulates Depot-Specific Adipogenesis in Obesity. *Cell Metabolism,* (24); 1-9.
- Nguyen, J., Luk, K., Vang, D., Soto, W., Vincent, L., Robiner, S., Saavedra, R., Li, Y., Gupta, P, and Gupta, K. (2014). Morphine stimulates cancer progression and mast cell activation and impairs survival in transgenic mice with breast cancer. *British Journal of Anesthesia*, 1-10.

2016 - (1) *Exploring the role of p53-regulated mouse lincRNA-p21 in the transcription of p21* **(2)** *Cellular Mechanisms Driving the Development of Adipose Tissue and Metabolic Disease* **(3)** *Assessing interplay between Translesion Synthesis proteins REV3L and RAD9B in the Fanconi anemia pathway.* Oral presentations at Yale University.

2015 - *The Role of GRASP55 in Matrix Detachment-Induced Apoptosis*. Oral presentation at Beta Beta Beta District Conference, Carolina, Puerto Rico.

2014 - *The Role of GRASP55 in Matrix Detachment-Induced Apoptosis*. Poster and oral presentation at Summer Research Training Programs Symposium, University of California San Francisco. Poster presentation at Beta Beta Beta District Conference, Aguadilla, Puerto Rico

2013 - *The Role of Morphine in Mast Cell Activation in Tumors*. Poster presentation at Annual Biomedical Research Conference for Minority Students, Nashville, Tennessee. Oral and poster presentation at Summer Undergraduate Research Symposium, University of Minnesota-Twin Cities