

## **ANUSHA SIVAKUMAR ('17)**

### **BIOMEDICAL ENGINEERING**

#### **Project**

*The Role of Central Transient Receptor Potential Vanilloid Type 1 Action on Whole Body Glucose Homeostasis Through Pre-Autonomic Hypothalamic Neurons*

#### **Faculty Mentor**

*Andrea Zsombok, Ph.D.*



Paraventricular Nucleus (PVN) in the brain is an important integrative autonomic center that controls the glycemic balance and regulates glucose homeostasis by means of controlling the liver. The importance of studying the significance of PVN in the brain-liver neural pathway is key in coming up with therapeutic methods to treat type two diabetes mellitus in addition to already existing pharmacological interventions. In order to understand this brain-liver pathway fully, the PVN in the brain hypothalamus is analyzed using Biocytin staining, Texas-Red labeling and retrograde viral labeling to identify liver-related PVN neurons.

This information is then used to trace the neural pathway to the transient receptor potential (TRP) channels in order to determine if specific TRP (transient receptor potential) channels such as TRPV1 (Vanilloid Type 1) and TRPA1 (Ankyrin 1) have specific effects in the regulation of liver-related PVN neurons. This is done so by analyzing quantified excitation action potential values of the liver related PVN-neurons via electrophysiology. This study is focused on finding the distinct effects the TRPV1 and TRPA1 channels have with regards to liver-related PVN-neurons which in turn control glucose metabolism. The PVN-neuron and TRPA1 relationship in specific is understudied and further studies are required to establish a quantifiable relationship linking them, which can be applied to therapeutically approach glucose metabolism dysfunction. Further studies are needed to delineate these results and quantify how TRPV1 receptors affect whole body glucose metabolism. Further research can also be carried out using various other neuromarkers such as neuropeptide Y in place of TRPV1 receptors.