

1125-92-2176

**Mary Aronne, Samantha Clapp and Soohwan Jung\***, jusohwn@ucla.edu, and **Abigail Kramer, William Wang, Janita Patwardhan and Bradford Peercy**. *The Interaction of Calcium and Metabolic Oscillations in Pancreatic  $\beta$ -cells*.

Diabetes is a disease characterized by an excessive level of glucose in the bloodstream, which may be a result of improper insulin secretion. Insulin is secreted in a bursting behavior of pancreatic  $\beta$ -cells in the islets of Langerhans, which is affected by oscillations of cytosolic calcium concentration. We used the Dual Oscillator model to explore the role of calcium in calcium oscillation independent (CaI) versus calcium oscillation dependent (CaD) modes as well as the synchronization of metabolic oscillations in electrically coupled cells. We observed that voltage and calcium coupling result in increased synchronization and are more effective in CaD modes. Also increasing voltage coupling results in greater synchronization. Furthermore, we studied heterogeneous cellular bursting arrangements in the islets and their effects on synchronization. Calcium coupling has a larger impact on synchronization than voltage coupling, in the heterogeneous bursting scenarios. To better represent an entire islet, we altered previous code by further optimizing run-time and memory usage to allow for a greater number of cells. (Received September 19, 2016)