P.U.R.E. Symposium (Program for Undergraduate Research Experience)
Francis Marion University, Florence, South Carolina
April 17, 2007

3:45-3:55 pm:
Different Substrate Conditions Can Be Used to Maintain Membrane Potential in Mitochondria Isolated from Mouse Liver
Presenter: J Shupe
Mentors: Drs. Kirk Dineley and Latha Malaiyandi, FMU Biology

Mitochondria play a vital role in the life and death of a cell. They generate ATP, reactive oxygen species (ROS), and sequester calcium. Each of these functions is dependent on mitochondrial membrane potential. Using a spectrofluorophotometer-based assay with the potential-sensitive probe Safranin-O, we monitored membrane potential in mitochondria isolated from mouse liver. Three different substrate conditions were tested: glutamate/malate, succinate, and pyruvate/malate. This study suggests that each of these conditions can be used to support a robust and stable membrane potential over a 10-20 minute period of observation.

4:00-4:10 pm: ***A Comparison of ROS Production in Mitochondria Isolated from Mouse Brain and Liver***
Presenter: Callie A. Norris
Mentors: Drs. Kirk Dineley and Latha Malaiyandi, FMU Biology

In eukaryotic cells mitochondria have several important functions dependent on their transmembrane potential. They are the source of most energy (ATP), and they also buffer calcium. Mitochondria regulate programmed cell death, and are a major source of reactive oxygen species (ROS), including free radicals. ROS function in cell signaling and may be beneficial at low levels; however, high ROS production is implicated in neurodegenerative disease and cancer. This study compares ROS production in murine mitochondria isolated from adult brain and liver. Using the indicator Amplex Red in a spectrofluorophotometer-based assay, we measured ROS production under varying substrate conditions. Our results show that in both tissues ROS production varies with different substrate conditions, and can be manipulated with selective mitochondrial inhibitors.

4:15-4:25 pm: ***Feasibility Study of Fuel Ethanol Production from Sugar Cane Grown in South Carolina***
Presenter: Kirsten ("Kitty") Hiortdahl
Mentor: Dr. Greg Pryor, FMU Biology

In this study, locally-grown sugar cane was fermented with a special strain of yeast (*Saccharomyces cerevisiae*) and then distilled to yield solutions of up to 96% ethanol. To measure the percentage of ethanol in the distillate, gas chromatography/mass spectrophotometry and an alcohol hydrometer were used. A final solution of 100% (anhydrous) ethanol was produced using a molecular sieve to adsorb the remaining water. This ethanol could be blended with 15% gasoline to make E85, an alternative automobile fuel that can be used in many modern vehicles. This ongoing study provides evidence that South Carolina can produce fuel ethanol from locally-available agricultural crops other than corn, and help to reduce our dependency on foreign oil for our transportation needs.

4:30-4:40 pm: ***Effect of PKC on the RNA Polymerase III Initiation Complex***
Presenter: Lindsey Harte
Mentor: Dr. Tim Shannon, FMU Biology

RNA polymerase III (pol III) transcription is essential for protein synthesis and eukaryotic cell growth, primarily through synthesis of tRNAs. In general, cancerous cells tend to express high levels of pol III products to support their rapid proliferation. Specifically, several proteins in the initiation complex, like TATA-binding protein (TBP) and B-related factor (hBrf), are required for pol III recruitment and successful transcription. Protein Kinase C (PKC) inhibits pol III transcription by modifying a protein in the initiation complex, though its mode of action and specific impact on complex formation remains unknown. It is of interest to determine if PKC inhibits pol III transcription by sequestering TBP and hBrf making them unavailable for the complex, or if a completely different complex is formed. Electrophoretic mobility shift assays (EMSA) will be used to identify differences in complex formation before and after PKC activation. Additionally, they will be useful in determining if PKC targets the complex directly or indirectly by phosphatase activation. It is expected that PKC indirectly triggers a modification in the pol III initiation complex, thus preventing successful transcription.

The Department of Biology at FMU strongly encourages student participation in research activities. We offer many opportunities for undergraduates to assist in faculty research or develop their own independent research projects. Students can earn academic credit through Special Studies (BIOL 497) and Honors Independent Study.

If you are interested in learning more about P.U.R.E. or available research opportunities, please visit our website at: *http://www.fmarion.edu/academics/Biology* and click on the 'Research' link. You can also contact Dr. Barbeau (tbarbeau@fmarion.edu) or Dr. Pryor (gpryor@fmarion.edu), the coordinators of P.U.R.E. We can answer any questions you might have and get you started on a research project!