Education Posters

E-2000

The Role of Hypoxia on Rac1b Localization and Cell Multinucleation. T. HSIA, A. Simi, and C. M. Nelson. 1West Windsor-Plainsboro High School South, 346 Clarksville Road, West Windsor, NJ 08550; 2Department of Chemical and Biological Engineering; and 3Department of Molecular Biology, Princeton University, Princeton, NJ 08544. Email: tiffaney.hsia@gmail.com; celesten@princeton.edu

Despite an astounding improvement in breast cancer detection and treatment, breast cancer continues to rank as the second most common cause of death in American women. Today, cancer treatment encompasses radiation and chemotherapy. While there is relative success in these treatments, a reoccurrence of the original tumor occurrence of a new primary tumor remains an ominous threat to cancer patients. The growth and sustenance of cancer cells against immune system attack or prescribed therapy is dependent on the microenvironment outside of the cell. Current research shows that Rac1b and hypoxia influence genomic instability, an enabling characteristic that promotes the hallmarks of cancer (Lee, K.A., et al. (2012); Hanahan, D., Weinberg, R.A. (2011)). It remains unclear how Rac1b and hypoxia integrate in promoting genomic instability. We investigated the effect of a hypoxic microenvironment on Rac1b localization and multinucleation (MNC). MNC results in genomic instability which is characterized by random mutations within the genome. Here we show that Rac1b expression influences multinucleation, but varying levels of oxygen in the microenvironment only affect Rac1b localization.

E-2001

Platelet Bioenergetics as a Potential Novel Marker for Nonsteroidal Anti-inflammatory Drug (NSAID) Related Bleeding. MIHIR A. LIMDI, Saranya Ravi, and Victor Darley-Usmar. 1The Altamont School, 4801 Altamont Road South Birmingham, AL and 2Department of Pathology, University of Alabama at Birmingham. BMR2 312, 901 19th Street South, Birmingham AL. Email: milimdi@gmail.com

Nonsteroidal anti-inflammatory drugs are widely used. They increase the risk of bleeding by 2-fold. When such injury occurs, to limit blood loss, platelets aggregate and a clot is formed. We hypothesize that indomethacin causes mitochondrial dysfunction in platelets, decreases the ability of platelets to aggregate to form a clot, thereby increasing bleeding risk. Platelet exposed to thrombin in addition to indomethacin, show a decrease in aggregation ability. We hypothesized that this could be due to the effects of indomethacin on metabolism. To test this we measured mitochondrial function by measuring the oxygen consumption rate (OCR), its influence on glycolysis by measuring the extracellular acidification rate (ECAR). Platelet bioenergetic profiles were determined using the Seahorse XF96 analyzer after exposure to indomethacin (25uM and 50uM) and thrombin (0.5unit/ml). Basal OCR, ATP-linked OCR, proton leak, maximal OCR, reserve capacity and non-mitochondrial oxygen consumption processes were determined by injecting oligomycin, FCCP and Antimycin-A in sequence. Results were normalized to protein concentration and JMP-8 software was used for statistical analysis. Both indomethacin and thrombin significantly increase proton leak, decrease ATP-linked OCR, maximal and reserve capacity. Platelets pretreated with indomethacin show a decrease in glycolytic function. These effects are dose dependent with indomethacin 50uM having a greater effect than 25uM concentration. Comparing these results with results from NS398, a COX2 specific inhibitor, suggests that the effects of indomethacin on platelet bioenergetics are mediated through its effects on COX1. Indomethacin affects the ability of platelets to aggregate in response to thrombin (injury). The effects are mediated through COX1 pathway and may be a mechanism through which indomethacin increases bleeding risk. With further research platelet energetic profile can be developed into a useful test to identify patients at increased bleeding risk.

E-2002

Inhibitory Effect of the Compound EO-OPE-DABCO on E. coli-k-12 Cell Growth. H. S. LIU and N. Bolanos. Department of Chemical & Biological Engineering, MSC01 1120, 1 University of New Mexico, Albuquerque, NM 87131. Email: lius160@aa.edu

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A new biocidal compound that may be more effective in inhibiting *E. coli* growth than conventional ways is End Only OPE-DACO, which has already been tested to be effective in killing *E. coli* at various concentrations; however, little research has been conducted on how this compound interacts with the normal growth phase of the bacteria\(^1\). This research is a further investigation on how EO-OPE-DABCO affects *E. coli* growth. Various concentrations of EO-OPE-DABCO were added to *E. coli* growing in a nutrient broth solution. The solutions were tested periodically with a spectrometer for optical density (O.D.) and compared with the O.D. of a control of just *E. coli* incubating in the nutrient broth. The result of the experiment showed that EO-OPE-DABCO was highly effective in inhibiting the cell growth of *E. coli* during incubation. The lowest concentration where 90% of the control value was inhibited was at approximately 2.5 \(\mu\)g/mL. When analyzing the results of this experiment, a mechanism that EO-OPE-DABCO possibly uses to inhibit *E. coli* was proposed: the cell membrane is damaged through penetration from the EO-OPE-DABCO that interferes with the normal metabolism of the cell\(^2\), leading to cell leakage and the consolidation of DNA. These findings may be helpful in preventing or treating *E. coli* infection in the future by using EO-OPE-DABCO in pharmaceutical developments. If this experiment was going to be repeated, it is recommended that all of the experiments be conducted under a chemical hood to lessen the chances of any contamination.

**E-2003**

Pry-1 Vulva Tissue Overgrowth: The Effect of Tobacco Cembranoid Inhibitors on Excessive Vulva Induction. A. LOPERFITO\(^1\), K. El Sayed\(^2\), and C. Gissendanner\(^2\). \(^1\)Saint Joseph High School, 800 Montana Avenue, Natrona Heights, PA 15065 and \(^2\)University of Louisiana at Monroe, School of Pharmacy, Department of Basic Pharmaceutical Sciences, 700 University Avenue, Monroe, LA 71209. Email: alloperfito16@saintjosephhs.com

Tobacco cembranoids are naturally occurring organic compounds found in the cuticular wax of tobacco leaves. They have recently exhibited biological activity, including antimicrobial activity (El Sayed, 2013). This activity led researchers at the University of Louisiana at Monroe to believe that these natural products could potentially have an effect on tissue overgrowths similar to tumors. The objective of this research was to determine if the most abundant tobacco cembranoid, the 4R, could be used to reduce the occurrence rate of excessive vulva induction, or vulva tissue overgrowth. In collaboration with the University of Louisiana at Monroe, this particular research utilized the *C. elegans* mutant pry-1 which exhibits this phenotype. After seventy-two hours, the *C. elegans* were examined and the phenotypes were observed under a dissecting microscope. An ANOVA statistical test and T-test supported the results showing that the cembranoid did reduce the occurrence rate of the excessive vulva induction phenotype.

**E-2004**

A Study of the Evolutionary Polymorphisms of the Mitochondrial DNA of Acellular Slime Mold *Physarum polycephalum*. SMEET MADHANI\(^1\), \(^2\) and Rohan Gopal\(^1\), \(^2\). \(^1\)University of Texas at Dallas, Molecular and Cell Biology, 800 W. Campbell Rd., Richardson, TX 75080 and \(^2\)Plano East Senior High School, 3000 Los Rios Blvd., Plano, TX 75074. Email: smeetmadhani@gmail.com

This experiment investigated how evolution and selective pressures have affected the mitochondrial DNA of different strains of *Physarum polycephalum*. To assess this, primers made from one strain’s mtDNA were used in PCR of another strain. Next, the similarity of the sequence and structure of the gene was observed through gel electrophoresis and Sanger sequencing methods. Specifically, the significance of the differences that occurred in the non-transcribed regions (i.e. open reading frames) of the gene was examined. The results supported that a ~2KB deletion exists in the “C” strain of *P. polycephalum* relative to the “J” strain of *P. polycephalum* in an area of non-transcribed genes. This is concurrent with the hypothesis that stated the majority of the polymorphisms will exist in areas of non-transcribed genes due to the lack of selective pressure on these genes. As a result of the deletion, the site of homologous recombination in the “C” strain must occur within a range of three nucleotides due to the overlap of these nucleotides by sequences flanking the deletion site. Thus, this experiment advocates evolutionary theory because the fact that between two of the same species of an organism there exist relative polymorphisms without phenotypic or functional differences raises questions about how these changes occurred over time. This study hopes to expand to other areas of genetic comparison not only among slime molds but also among other organisms because only will broadening the scope of the experiment allow for the true extent of the observed phenomena to be determined.

**E-2005**

The Effect of Acid Rain Levels on Local Plants. Abstract for a Science Fair Project Presented at Intel-Affiliated Savannah River Regional Science and Engineering Fair. Aiken, SC. L. STEWART. Aiken, SC. Email: lleylanna@gmail.com

Researchers suspect that acid rain may cause the slower growth of forests. Acid rain does not usually kill trees directly, it weakens the trees by damaging their leaves and limiting the
nutrients available to them. The roots of the plants are damaged from the acid rain, causing the growth to be stunted, or even death. Nutrients in the soil are destroyed by the acidity. Microorganisms are killed off by the acid rain also resulting in less nutrients for the plants. It damages their waxy layer on the leaves making it vulnerable for diseases. This project tested all of these factors for six weeks by exposing three plants to three different pH levels of water via the roots, and through direct showering. The experiment clearly showed that any pH levels of 5.5 or below are harmful to the plants’ health, and that pH levels below 3.5 virtually ensure the plants’ death.