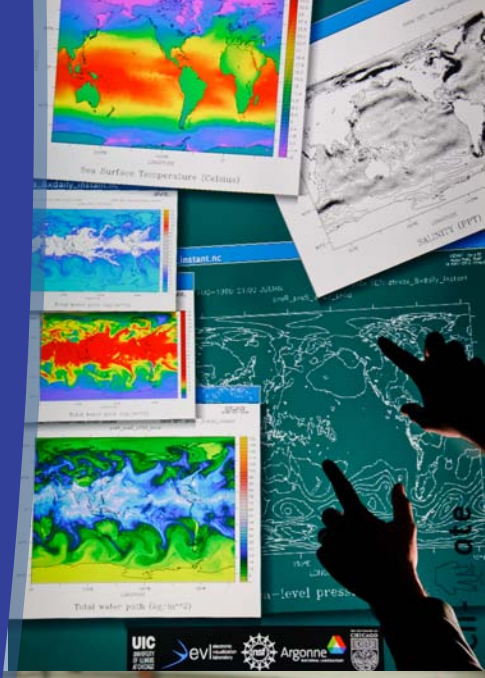
2011

UIC | STUDENT RESEARCH FORUM

Undergraduate • Graduate • Professional

April 19th, 2011
1:00 PM - 5:00 PM
UIC Forum
725 West Roosevelt Road
Chicago, IL 60608



STUDENT RESEARCH FORUM
APRIL 19, 2011

Schedule

12:00 to 1:00 pm	Judge and Student registration and set-up
1:00 to 3:00 pm	Poster viewing and judging session
3:00 to 4:00 pm	Reception
4:00 to 5:00 pm	Arlene Norsym, Associate Chancellor, University of Illinois Alumni Association
	Bette Bottoms, Vice Provost for Undergraduate Affairs and Dean, Honors College
	Brenda Russell, Executive Associate Vice Chancellor for Research
	Joe G.N. Garcia, Vice Chancellor for Research
	Awards presented by Vice Chancellor Garcia
5:00 pm	Adjourn

AWARDS FOR UNDERGRADUATE AND GRADUATE STUDENTS IN EACH CATEGORY:
LIFE SCIENCES
PHYSICAL SCIENCES, ENGINEERING AND COMPUTER SCIENCE
AND HUMANITIES, SOCIAL SCIENCES AND BUSINESS PRACTICES

First Place	$300
Second Place	$200
Third Place	$100

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Cli-mate, Edward Kahler, Computer Science
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Natural Pigment Solutions, Andrew Newsome, Pharmacognosy

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1. Aba-Omer, Omer and Watson, Karriem S.

The Importance of Clinical Trials to Underrepresented Minorities

Undergraduate – Biological Sciences

Historically underrepresented minorities have not participated in clinical trials. This lack of participation results in reduced opportunities for discovering effects that are important to these groups. The inequitable distribution of benefits and risks in clinical trials contribute to the healthcare disparities among this population. This explanatory research study focuses on the enrollment of underrepresented minorities in clinical trials at the University of Illinois Medical Center (UIMC) by using systematic literature reviews and comparative analysis. Based on our findings, we recommend using a community-based participatory model (CBPR) to create an advisory council to address the issues of enrollment and engagement of underrepresented minorities in clinical trials. Furthermore, we will generate a policy to create a form of minority recruitment enhanced grants. In the future, we plan to interview key informants from the UIMC as well as conduct several focus groups to engage the community. The hope of this research is to increase enrollment of underrepresented minorities in clinical trials through awareness and community engagement.

2. Adamo, Daniel

Does Diskography Lead to Disc Degeneration: A Cadaveric Study

Graduate – Medicine

Discography is a diagnostic technique used by spine surgeons and interventionalists to determine the presence of concordant symptomatic discogenic pain. In the process, normal healthy intervertebral disks are injected with dye as controls. Only one clinical study has been published showing discography as a possible etiology of disc degeneration, but how and whether the procedure initiates the degenerative cascade remains controversial. In this study we examine the effects of discography via and a cadaveric spine model. We hypothesize that minute mechanical changes occur which lead to altered dynamics over time. We utilized 5 cadaveric lumbar spine specimens and fixed them to endplates. Using an Instron compression machine, we applied forces up to 800 N, before and after placement of a 22-gauge needle to inject 1.5-2.5mL of saline into the intervertebral disk. During each force application, we collected displacement data using markers on each specimen.

3. Aiello, Daniel; Jarosz, Andrew; Cushen, Patrick and Wiley, Jennifer

How an Implicit Learning Task Influences Performance on a Subsequent Creative Problem Solving Task

Undergraduate – Psychology

There is a general assumption that a more controlled or focused attentional state is beneficial for most cognitive tasks. However, recently there has been a growing realization that there may be tasks for which a more passive approach is useful. Some examples are creative problem solving tasks, including the Remote Associates task (RAT) in which successful solution relies on activation of distant associations in memory. If this is the case, then performing other tasks that prime a more passive mind-set, such as an Artificial Grammar Learning Task, could potentially improve performance on the RAT. Success at Artificial Grammar learning tasks depends on detection of patterns in a set of stimuli without explicitly being told to notice them.

Thus, successful performance is contingent upon incidental learning processes, which occur best in passive mind-sets. The purpose of the present study was to explore the relation between performance on these two tasks, with the hypothesis that individuals who complete an Artificial Grammar Learning task before the RAT should be better at creative problem solving on the RAT, than when tasks are given in the opposite order. Seventy-six undergraduates who were native English speakers participated in this study. All participants completed both tasks, with order counterbalanced. Participants who completed the Artificial Grammar Learning task before the RAT did significantly better on the RAT than those who completed the RAT before the Artificial Grammar task ($t(74)=2.21$ $p < .03$). These results suggest that a passive mind state, primed via the artificial grammar task, benefits performance on a subsequent creative problem-solving task.

4. Ali, Haroon

Effect of Missing Frm1 Protein on Neurogenesis in Knockout Mice

Undergraduate – Neuroscience

Fragile X mental retardation syndrome is the most common form of mental retardation in humans. Affected humans experience a macroorchidism, craniofacial abnormalities such as long face and large jaw, and progressive mental retardation. Fmr1 knockout mice have been shown to be a reliable model for studying Fragile X mental retardation syndrome. Knockout mice display many of the characteristic symptoms of Fragile X (decreased learning ability, macroorchidism), however they also display some deficiency in smell. The combination of deficiencies in learning as well as smell suggested a problem in neurogenesis, as these activities are localized in areas where neruogenesis occurs in adults. Using immunohistochemical analysis of 10 fmr1 knockout mice, it was observed that proliferation of new neurons in the dentate gyrus was significantly reduced in the knockout mice relative to normal. The percentage of differentiation in newly proliferated cells, however, was not affected. Assuming similar patterns in humans, decreased neurogenesis in the human dentate gyrus could be the underlying cause of mental retardation that results from fragile x. Thus, this data suggests a strong correlation between adult neruogenesis and learning and memory, a correlation that has been long suspected but for which little empirical evidence is available.

5. Allawirdi, Grace and Malchow, Robert Paul

Zinc: A Modulator for Neural Communication

Undergraduate – Biological Sciences

There is mounting evidence that zinc released from glutamatergic nerve terminals serves as a neuromodulator at synaptic sites within the retina and other areas of the central nervous system. However, it has proven difficult to reliably measure zinc release and reuptake at such synapses. I have been working to develop zinc-selective microelectrodes that can be used in a self-referencing format to detect release & reuptake of zinc from vertebrate photoreceptors. Zinc ionophore I (cat# 96491 from Sigma Chemical, the same ionophore previously employed as a zinc-selective macroelectrode by Kojima et al. 1994) was mixed (10% by weight) with 2-nitrophenyl octyl ether (o-NOPE) (89%) and potassium tetrakis (4-chlorophenyl)borate (1%). A small quantity of this mixture was drawn into glass micropipettes (tip diameter ~ 2-4 μm) that had previously been backfilled with 100 mM Zn2+Cl-2 and 10 mM HEPES. These electrodes were placed in solutions containing different concentrations of zinc chloride ranging from 100 mM to 0.1 μM. We successfully measured electrical potentials in the pipettes containing the zinc ionophore that increased as the concentration of zinc was increased. The signal was significantly and progressively reduced by the addition of increasing amounts of the divalent chelator EDTA to the bath. These results suggest that the microelectrodes we have prepared can indeed detect the presence of zinc and may be useful

in detecting and measuring zinc release and uptake from the synaptic terminals of vertebrate photoreceptors and other nerve cells. I am currently examining these zinc-sensitive electrodes to determine their relative sensitivity to physiological levels of sodium, calcium and potassium.

6. Alowibdi, Jalal

Scienceartificial Neural Network for Recognizing Handwritten and Machine Printed Type Alphanumeric Arabic Characters

Graduate - Computer Science

The objective of this work is to propose an efficient system for recognizing the Handwritten type of the Alphanumeric Arabic Characters and the machine printed type of the Alphanumeric Arabic Characters using the Artificial Neural Network. Recognizing the Alphanumeric Arabic Characters is a subcategory under the pattern recognition. There are many ways in recognizing the Alphanumeric Arabic Characters, among them, is to use the Artificial Neural Network and features extraction. Based on the training sets and the features extraction, we could perform the recognition of the Alphanumeric Arabic Characters that result around 90% to 98% accuracy for the Machine printed Type Training sets and almost around 60% to 90% accuracy for the Handwritten Training sets. The proposed technique is divided into four major steps: first step is to train the system using Artificial Neural Network with datasets and have the system to memorize all the possible ways of the Alphanumeric Arabic Characters. Second step is to digitize each Alphanumeric Arabic Character and represent them as 5 by 7 grid of Boolean values. Third step is to perform the input data for the system to start digitize all the input and represent them as 5 by 7 grid of Boolean values. Fourth step is to compare and match from the Network and have the result up.

7. Andriano, Jenna

Unconscious Masculine Protest in the Sex Binary: Violent Masculinity, Feminism and the Maintenance of Rape Culture in Post-1970s America

Undergraduate – Gender and Women's Studies

This thesis examines the role of the sex-gender dichotomy in the construction of a sexually violent masculinity in the United States following the height of the feminist movement in the 1970s. Despite significant efforts by feminists to empower women in all aspects of life, including sexuality, rape continues to occur at higher rates in the U.S. than any other nation in the industrialized world. The prevalence of sexual violence rates among men regardless of race and class indicates that violence against women continues to be encoded in masculinity even as women continue to challenge traditional constructions of femininity. This paper argues that feminists' differentiation between sex and gender, while once rhetorically useful, maintains the binary construction of humanity upon which inequality is constructed. The hierarchical nature of binaries fails to encourage a critical examination of masculinity while the oppositional construction of binaries implies that as one subject expands the other contracts. Thus as femininity expands beyond its traditional construction, those behaviors which qualify as purely masculine have grown more limited and young men pressured to achieve a masculine identity do so through violent displays of sexuality. Through the exploration of feminism's past attempts to address sexual violence and the examination of the sex-gender dichotomy I suggest that a deconstruction of the rape culture requires not only a critical analysis of masculinity but also an evaluation of the inequality inherent in the construction and maintenance of binaries.

8. Angle, Siddhesh; Sena, Kotaro; Sumner, D. Rick; Virkus, Walter W. and Virdi, Amrjit S.

Combined Use of LIPUS and rhBMP-2 to Enhance Bone Formation in a Critical Sized Defect

Graduate – Bioengineering

About 10% of all fractures undergo delayed healing or become non-unions if not treated. Other than the conventional method of bone grafting, numerous biological and bio-physical interventions, including the use of rhBMP-2 and LIPUS, are known to enhance bone regeneration. It is likely that rhBMP-2 and LIPUS may work through analogous yet distinct mechanism, raising the possibility that their combined use might be more effective than the use of either one alone enhance bone regeneration in a model system simulating the more difficult scenarios in orthopedic traumatology. In an IACUC approved study, the left femur of 96 male SD rats were internally stabilized, a 5-mm mid-diaphyseal segment of bone was removed and replaced with rhBMP-2 (0, 1.2, 6 or 12μg; N=24) loaded on absorbable collagen sponges (ACS). 12 animals from each group received daily LIPUS treatment while all others received sham LIPUS exposure. Radiographs were obtained weekly and after the femurs were harvested. The radiographs were scored by two independent blinded observers according to a previously developed scoring system. All femurs underwent micro computer tomography (μCT) scanning to calculate bone volume (BV), bone volume/total callus volume (BV/TV). All doses of rhBMP-2 showed an increased radiographic healing as compared to Sham and LIPUS-only controls. Non-union was observed in control groups (0μg, ± LIPUS). The combined use of LIPUS and rhBMP-2 (1.2 and 6μg) significantly increased the BV as compared to the use of rhBMP-2 alone. The combined use of LIPUS and rhBMP-2 (1.2 and 12μg) showed a reduction in callus size, thus increasing the BV/TV significantly as compared to the use of rhBMP-2 alone. With the findings from the current study we are able to state that LIPUS is not only capable of enhancing cellular reaction in the initial proliferative and osteogenic phases of healing but also in the final remodeling phase. The addition of LIPUS is able to enhance rhBMP-2-induced bone formation and could be applied clinically to prevent non-unions and alleviate concerns regarding the use of high doses of rhBMP-2.

9. Arbel, Vered; Growe,Meghan; Rudd, Adam; Muszczynski, Emily; Marone, Jane and Bareither, Mary Lou

Improving Understanding of Human Anatomy Using Haptic Learning through Clay Modeling

Undergraduate – Kinesiology and Nutrition

Understanding 3D relationships in anatomy can be difficult for students. Recognition of students' learning preferences and implementation of different teaching methodology may be beneficial to this understanding. The VARK assessment categorizes learning preferences as: Visual (V), Auditory (A), Read/write (R), or Kinesthetic (K). Studies suggest that hands-on (haptic) learning using clay modeling is effective for studying anatomy. The purpose of this study was to determine if clay modeling would improve student learning and if improvement would vary between learning preferences. 40 students enrolled in cadaver dissection completed the VARK and a pre-assessment exam. Students were randomly divided into 3 groups. The Clay and Module Groups participated in a weekly 1-hour class using either clay models (*Manikens®*) or answering written questions on anatomical relationships, respectively. The Control Group received no intervention. All groups completed a post-assessment and retention exam. A student perception survey was administered to both intervention groups. Two variables were defined (Δ^1, Δ^2) representing the exam score differences, interpreted as the amount of leaning, between pre and post-assessment exams and retention of learning between the post-assessment and retention exams respectively. The Δ^1 for the Clay and Module groups vs. Control group was significantly higher (21.46 vs.15.70, $p \leq 0.05$ and 21.31 vs. 15.70, $p \leq 0.05$, respectively). The Δ^2 for Clay and Module groups vs. Control group was significantly higher (-6.09 vs. -8.80, $p \leq 0.15$ and -5.73 vs. -8.80, $p \leq 0.15$, respectively). Statistical significance in learning was not demonstrated in the learning

styles due to small sample size; however, plotting Δ^1 between learning styles demonstrated that K/V learners performed better using clay than other learning styles. The R/W group improved most overall, suggesting that read/write testing used for assessment, may benefit this type of learner. Student surveys indicated that clay modeling was more engaging and beneficial to students and to their understanding of anatomical relations.

10. Ashbeck, Alan; DeHaan, Samantha; Greene, George and Mustanski, Brian

Predictors of Post-Traumatic Stress Disorder in a Chicago-Area LGBT Population

Undergraduate – Psychiatry

A multiple regression model was developed to analyze victimization and social support relations as predictors of post-traumatic stress disorder(PTSD) in a Chicago metropolitan area sample of lesbian, gay, bisexual, transgender, and queer(LGBTQ) youth (n = 246). Specifically, we examined if lifetime victimization would emerge as a positive predictor of PTSD, and the presence of a significant person and the ability to talk with friends about problems would be negative predictors of PTSD in the sample. The results show that the model was significant ($R^2 = .04$, $F(3,245) = 3.47$, $p < .05$), but individual predictors were no significant, except for participants having the ability to talk to their friends about their problems ($b^* = -.17$, $p < .05$). Conflicting evidence between this study and the literature calls for further investigation into positive and negative predictors of PTSD in LGBTQ youth populations.

11. Atsawasuwan, Phimon

Ameloblastin Affects Cranial Suture Closure by Regulating MSX2 Expression

Graduate – Orthodontics

Introduction: Deformities of cranial sutures such as craniosynostosis and enlarged parietal foramina greatly impact human development and quality of life. One of the factors involved in cranial suture closure is muscle segment homeobox factor 2 (MSX2). It has been shown that MSX2 expression is affected by an extracellular enamel matrix protein, ameloblastin (AMBN) and that AMBN is expressed in cranial bones. This study is to determine the effect of AMBN on cranial suture closure and MSX2 expression. Methods: Transgenic mice with human keratin 14 promoter-driven *Ambn* (n=25) and control mice (n=36) were used as *in vivo* models, and mouse calvarial osteoblastic (MC3T3-E1) cells were used as *in vitro* models. Mice were genotyped and Ambn protein levels were compared by immunoblotting. Alcian blue/alizarin red and hematoxylin/eosin staining, and skulls were compared between transgenic and control mice. MC3T3-E1 cell proliferation and differentiation in the presence of 0.25 μg/ml Ambn were investigated using RT real-time PCR. Results: *Ambn* transgenic mice showed delayed cranial bone development at embryonic day 18.5 and defective posterior frontal suture closure at postnatal day 60. Defective suture closure in postnatal day 35 transgenic mice was confirmed histomorphologically. Ambn addition to MC3T3-E1 cells resulted in reduced proliferation and p21 upregulation significantly whereas Msx2 expression was significantly reduced compared to controls. Conclusion: These data suggest that AMBN affects cranial suture closure via MSX 2 suppression, leading to defective proliferation and differentiation of calvarial osteoblasts and patency of cranial sutures in mice.

12. Azimi, Mahdis

"Sister, rise up after your freedom, why are you quiet?"-A Study of Gender Law and Women's Rights in Iran

Undergraduate – Political Science

The Islamic Republic of Iran is one of the few countries in the world that follows Sharia law to the letter. Sharia law is also known as Islamic law and is characterized as a divinely ordained code of law that is derived from the Koran and from the Hadith, which are the two primary texts of Islam. It is highly regarded by Muslims as "God's Law" and has been widely interpreted by scholars of varying beliefs and dogmas. These different interpretations have led to differing views on the various aspects of law. One highly contested field in Iran is that of gender law, which is widely thought to discriminate against women. In fact, even with Iran's seat on the U.N. Women's Rights Commission, there is much press and attention over the alleged human rights violations towards women in this country. As a woman and an Iranian, I have been witness to many of these laws. However, even as a member of the Islamic faith, I did not grow up with much knowledge on the teachings of this religion. Out of this lack of knowledge on these topics that are intertwined with my life, I decided to dedicate myself to research on the comparison of the text of the Koran and the Hadith and that of the current laws in Iran, along with the code of human rights that is in place today. I decided to narrow my focus on the most disputed topics of polygamy; legal standing and punishments; marriage, divorce, and custody laws; reproductive rights; and the hijab or veil.

13. Bak, Aleksandra

Forensic Accounting – The Investigation of the Profession

Undergraduate – Business Administration

One of the most significant business-accounting events from the past few decades was the collapse of Enron. Since then, the entire business environment, whether in a private or public setting, has had to make numerous changes regarding business practices in order to prevent such business catastrophes from future occurrence. However, the most emphasis has been placed on the accounting profession, which has been making recent improvements.

The most attention since the downfall of Enron has been focused on fraud detection and forensic accounting techniques. As the need for forensic accountants continually increases, it is important to determine what forensic accounting is, how it reduces risk of business failures, and how it is applied across industries. Forensic accounting deals with the growing problems of white-collar crime, which accountants are becoming more and more responsible for investigating and documenting. Forensic accounting is being increasingly implemented in order to serve not only businesses but also the public. By reacting more forcibly to white-collar crime, business collapses like Enron can be avoided and millions of investors are exposed to higher protection.

This examination begins with a brief history of forensic accounting and how it has emerged over the years. The next step in gaining a better understanding of forensic accounting is to study the practical aspects such as the steps and methods of forensic accounting, the types of fraud that forensic accountants face, and the services that are provided through the discipline. Principles of forensic accounting such as theories of fraud, criminology, and litigation services are of great importance to this study.

14. Bakharba, Maimona

Convergence of IFRS and U.S. GAAP, in Three Major Standards

Undergraduate – Business Administration

International accounting standards board (IASB) is the major proponent of convergence of accounting standards globally. There is much debate from companies worldwide. Convergence is favored during the financial crisis, as management has more leeway to interpret the 'principles-based' approach. The corporate finance sector see it as a threat since it results in adverse tax consequences, and fewer benefits to companies without considerable foreign operations. Large firms are proactive on the move towards convergence, by publishing differences between international financial reporting standards (IFRS) and U.S. generally accepted accounting principles (U.S. GAAP), industry specific conversion process, practice-tested methods and tools for IFRS implementation. Auditors' are less liable for the limited application guidance by the 'principles-based' IFRS. U.S. GAAP has evolved to 'rules-based' standards with specific application guidance. IASB aims at global accounting standards that will enhance transparency and comparability in the financial statements. Investors can diversify, and companies can raise capital globally with the help of uniform accounting standards. IFRS is a move away from historical cost accounting to fair value accounting. Goals associated with the change are to present a cohesive picture of the firm's activities, easy prediction of future cash flow, and easy assessment of the firm's liquidity and financial flexibility. Therefore, three important international accounting standards are compared with the U.S. GAAP codification:

1. Accounting for Leases
2. Provision, Contingent Liabilities, and Contingent Assets
3. Income Taxes

The similarities, differences and possible convergence is the focus of the study.

15. Banerjee, Amrita and Önyüksel, Hayat

Circular Dichroism and Lyophilization Studies of Pancreatic Polypeptide in a Novel Formulation

Graduate – Biopharmaceutical Sciences

We have recently prepared and characterized a lipid-based formulation of human Pancreatic Polypeptide (PP) in Sterically Stabilized Micelles (SSM) for treatment of diabetes. Previously, our laboratory showed that amphiphilic peptides associated with SSM adopt alpha-helical conformation (desirable for receptor interaction). Since conformation of peptides can change with pH, the purpose of this study was to compare the changes in secondary structure of PP at different pHs when incubated with or without SSM. To improve stability of the final product for its future clinical use, we have also determined the feasibility of lyophilizing SSM-PP aqueous solution and the optimum lipid:peptide ratio for lyophilization.
Methods: SSM comprising disteroyl phosphatidyl ethanolamine-PEG2000 (DSPE-PEG2000) was prepared as previously described in our laboratory. Peptide in buffers of different pH (5, 6.5, 7.4 and 8) were added to SSM solutions of corresponding pH and equilibrated. Peptide conformation was determined using circular dichroism. For lyophilization studies, varying amount of peptide in pH 7.4 buffer were added to SSM to obtain different lipid-peptide molar ratios; and samples were equilibrated and lyophilized. Size distribution and fluorescence emission of the samples were analyzed before and after lyophilization.
Results: PP was found to possess alpha-helical conformation with or without SSM at all pH and association of PP with SSM led to further stabilization of the alpha-helix. In lyophilization studies, elegant freeze-dried cakes were obtained. Size distribution remained similar before and after lyophilization. Fluorescence emission of PP decreased after lyophilization but the decrease was not significantly different

for lipid: peptide ratio 100:1 and above. *Conclusion*: This study indicates that alpha-helical conformation of PP is stabilized in SSM irrespective of surrounding pH. The study also demonstrates feasibility of lyophilizing SSM-PP above 100:1 molar ratio. We suggest that SSM-PP should be further developed as a novel nanomedicine for diabetes.

Funded by: NIH grant CA121797.

16. Bergan, Tessa

Complementary District Wellness Policies Address Variables Which May Affect the Quality of Consumption in NSBP And NSLP

Graduate – Institute for Health Research and Policy

Aims: Research indicates participation in the National School Lunch and Breakfast programs positively affects students' quality of life. Assuming all districts participating meet minimum nutrient requirements for a reimbursable meal, environmental factors surrounding these programs affect the quality of meal consumption by students. While impossible to pinpoint all variables affecting quality of consumption, this study was designed to determine whether school districts participating in these federal meal programs have complementary district-level policies directly affecting the eating environment. These policies include: strategies to increase participation in school meal programs; recess before lunch; providing adequate time to eat; marketing/promoting healthy choices, and restrictions on marketing of unhealthy items. *Methods*: District policies were compiled by the Bridging the Gap Program at UIC as part of the largest, annual nationwide evaluation of congressionally-mandated school wellness policies. For purposes of this analysis, focus was on wellness policies collected and analysed for three school years beginning with 2006-07. Approximately 1800 districts were included in the total sample and all data were weighted to reflect public elementary districts nationwide. For each item, policies were coded to assess the presence and strength of policy language. *Findings*: Over time, three of five variables showing a significant increase in strong policy language or decrease in no policy/provision included: strategies to increase participation (strong language 15.63% to17.12%; no policy/provision 61.04% to46.68%), providing adequate time to eat (strong 12.15% to13.79%; no policy 52.36% to 36.95%), and marketing/promoting healthy choices (strong 5.15% to7.79%; no policy/provision 76.14% to67.69%). Restrictions on marketing of unhealthy items showed no significant change over the three-year analysis. The recess before lunch variable was coded beginning in the third year of collection so could show no change over time. *Conclusion*: Elementary school district wellness policies are increasingly addressing factors in the meal environment, which may affect the quality of meal consumption.

17. Bobko, Aimee; Langston, Amber; Rybczynska, Alexandra and Vicich, Amanda

Treating Lower Respiratory Infections in Developing Countries With Mechanically-Powered Nebulizers

Undergraduate – Bioengineering

Nebulizers are important for the treatment of respiratory diseases, primarily lower respiratory infections. Since lower respiratory infections are the second leading cause of death in low income countries, the availability of these devices in third world countries is crucial. Barriers that hinder the distribution include economic, technological, and geographical factors. The initiative for this proposal is the improvement of the accessibility, appropriateness, and affordability of a nebulizer device within developing nations. The nebulizers on the market are too costly for low-income nations obstructing patients from treatment.

Nebulizers are powered by a constant supply of electricity during use. This is unlikely due to the unavailability and/or unreliability of electricity in many underdeveloped countries. Battery-powered nebulizers are too expensive to consider as an option. To create an efficient yet accessible nebulizer, the device must be able to function without electrical power, be durable in various climates, and have minimum manufacturing costs. It must meet the target performance requirements of a constant air flow rate of 5 L/min. This is the average flow rate necessary for the vaporization of the medicine. The design is composed of four parts: a bike pump, a hollow container, a connector cap, and the mouth piece unit. The bike pump and container replace the electric air compressor, eliminating the need for a power source. This nebulizer can then be powered independently by the patient. The impact of this device could contribute to decreasing the rate of lower respiratory infections.

18. Bosman, Mitchell

Different Levels of PBDEs in Soil Samples From France and China

Undergraduate – Dentistry

Cancer is a deadly disease that affects individuals of every race and ethnicity. For this reason, the research is focused on finding genes that are differentially expressed in oral cancer and non-cancerous oral sores. Specifically focusing on tobacco and betel nut users, both of which are major risk factors for oral cancer. By finding genes, which are differentially expressed between the two types of cells, it is hoped that this will lead to the discovery of genes that can definitively tell us whether a cell is cancerous or not. We used oral brush cytology to obtain cells from oral lesions. These cells were then used to supply RNA for gene expression analysis. This differs from the typical invasive approach of using surgical biopsy to obtain tissue. The cells obtained with the brush were subjected to RNA purification techniques and then reverse transcription PCR was done to measure levels of specific mRNAs in each sample, 12 oral cancer samples, and 20 non-malignant lesion samples. Expression of three different genes, B2M, KRT17 and CYP1B1 were all earlier identified as showing changes in expression levels when Oral Squamous Cell Carcinoma genes were measured. BRB array tools, a statistical package available from the National Cancer Institute, was used to identify the gene expression of each sample. The results were subjected to a class-based classifier to differentiate tumors versus nonmalignant lesions, which showed 81% accuracy. Current efforts are to include the analysis of over 18 more prospective OSCC marked samples to increase the accuracy of this classifier.

19. Bulatovic, Marija and Hoot, Bradley

Varying Patterns: Focus Identification by Means of Main Stress in Monolingual And Heritage Speakers Of Spanish

Undergraduate – Hispanic and Italian Studies

Consider the following dialogue:

(1) Who bought the newspaper?
  (a) John bought the newspaper.
  (b) John bought the newspaper.

To native speakers of English, it's evident that the first response to the question is acceptable, stressing the word *John*. In English, stress is used to identify the focus of a sentence. Foci are considered new

information, which are also usually responses to question words. In this example, *who* is the question word which the focus, *John*, is stressed in response to.

Consider the same example in Spanish:

(2) Who bought the newspaper?
  (a) Juan compró el periódico.
    Juan bought the newspaper.
  (b) Compró el periódico Juan.
    bought the newspaper Juan

In contrast to English, it is generally accepted that in Spanish, the focused constituent appears rightmost, where the main stress is canonically assigned, as in (2b) (Zubizarreta, 1998). However, some argue that (2a), with stress shifted to the focused constituent, is also acceptable (Gabriel, 2010). This project brings empirical evidence to bear on this debate by using an experiment to evaluate these completing claims, seeking an answer to the question: Do Spanish speakers accept main stress shift as a way to mark presentational focus?

The experiment involves speakers of Mexican Spanish judging the compatibility of sentences with different word orders and stress patterns placed in various contexts. They will use a five point Likert scale to rate the compatibility of a response to a question after listening to a specific context. Two groups of participants are used for the experiment, monolinguals and heritage speakers of Spanish. The monolingual group consists of Mexicans that were born and educated in Mexico, while the heritage speakers are U.S. born English dominant Spanish/English bilinguals. With the data collected from this study, new information about focus realization in Spanish may be obtained.

20. Butler, Erica

Measuring Medical Risk Attitudes

Undergraduate – Medical Education

Background: Perceptions of, and attitudes toward, medical risk vary greatly from patient to patient. The Domain-Specific Risk Taking scale (DOSPERT; Blais and Weber, 2009) is a widely used instrument that measures perceived risk and benefit and attitude toward risk for activities in several domains, but does not include medical risks. *Objective*: To refine items to support the development of a medical risk subscale for DOSPERT. *Methods*: Sixteen candidate risk items were developed through expert discussion. We conducted cognitive telephone interviews and an online survey to reduce and refine the scale.
Participants: Eights patients recruited from UIC medical center waiting rooms participated in 45-minute cognitive interviews. Thirty Amazon Mechanical Turk "workers" completed the online survey (11 men, 19 women, aged 18-58, median age 35). *Results*: On the basis of cognitive interviews, we eliminated five items due to poor variance or participant misunderstanding. The online survey suggested that two additional items were negatively correlated with the scale, and we removed them as well. The interitem reliability of the final set of 9 items was acceptable (Cronbach's α=0.60 for risk perception, 0.84 for benefit perception, and 0.75 for risk taking). Scores did not differ substantially between men and women or older and younger respondents. The final set of items included such activities as donation (kidney or blood), daily medication use (for allergies or asthma), surgery (for back pain or knee replacement), general anesthesia, clinical trial participation, and radiation therapy for cancer. *Conclusion*: We refined a set of items to measure risk and benefit perceptions for medical activities. Our next step will be to add these items to the complete DOSPERT scale and conduct a large-scale survey in a representative population to determine whether medical risks constitute a psychologically distinct domain, and to characterize individual differences in medical risk attitudes.

21. Butler, Sheila

The Fair Trade Coffee Chain

Undergraduate – Anthropology

For my LASURI assistantship, I worked with Dr. Molly Doane. Dr. Doane is researching the fair trade coffee chain by looking at both the producers and the consumers involved in the system. Fair trade is a private system of regulation intended to guarantee living wages for farmers. The fair trade coffee chain includes many types of organizations that are all invested in the fair trade system, but not for exactly the same reasons. My research project involved analyzing data from informants on the "consumer" side of the coffee chain. Consumers include roasters, charities and non-profits that promote fair trade, and student activists seeking to increase the effectiveness of the system. I read transcribed interviews and coded them by selecting keywords that point to recurring themes in the interviews. Coding reveals the patterns that unify and differentiate the different actors in the system. For example, some roasters that sold fair trade coffee were invested in the fair trade system primarily as a means of stabilizing the supply of gourmet coffee, and only secondarily because it was beneficial for the producers. In contrast, students involved in fair trade were mostly interested in the humanitarian aspect of the system, explaining that they wanted to advocate for better conditions for the producers. Many of the church groups had similar feelings about bringing better conditions for the farmers. My presentation will show how data coding using keywords can help to highlight the significant trends in the fair trade system, and it will briefly present what some of these differences are.

22. Calcaterra, Megan

Rehabilitation and the Criminal Justice System

Undergraduate – Political Science

Rehabilitation is one of the major goals that incarceration is intended to achieve. In the latter half of the 20th century, rehabilitation began to lose the attention of the criminal justice system. Along with rehabilitation, deterrence is another goal of incarceration. However, recidivism rates in the U.S point to the suggestion that the criminal justice system is failing at achieving both these important goals. Public support and funding for rehabilitation programs fluctuates but has a substantial effect on recidivism rates. By looking at both of these factors, the criminal justice system can make improvements and combat recidivism.

23. Calderon, Esther; Sinkevicius, Kerstin; Laine, Muriel; Greene, Geoffrey L.; Levin, Ellis R. and Prins, Gail S.

Estrogen-Dependent ERα Activation is Required for Normal Branching Morphogenesis of the Mouse Prostate Gland

Graduate – Physiology and Biophysics

Estrogens acting through estrogen receptors (ER) play an important role during prostate gland development and abnormal growth associated with prostatic diseases such as BPH and cancer. Studies using ER knock-out mice have shown that developmental effects of estrogens on the prostate gland are mediated through ERα (Prins et al, *Can Res* 2001). Recent studies using ACTB-Cre/ERα$^{-/-}$ mice demonstrated reduced branching morphogenesis of the prostate glands suggesting a critical role for ERα in this process (Chen et al,

Endocrinology 2001). ERα actions can be mediated through both estrogen-dependent and estrogen-independent activation. The present study sought to determine whether cell membrane estrogen-dependent and/or ligand-**independent actions of ERα are involved in prostate gland development.** To do so, we examined the prostate glands of peri-pubertal (day 30) male membrane only ERα (MOER) and estrogen nonresponsive ERα knock-in (ENERKI) mice. Prostate lobes from day 30 male MOER and ENERKI compared to either *background* or *wild type* (*wt*) mice, respectively, were analyzed morphologically for branching and differentiation endpoints. Branch tip number in microdissected ventral prostates was significantly increased from 160.3 ± 8.4 in *background* mice to 194.0 ± 1.5 in MOER males ($p<0.05$). In contrast, branch tip number in microdissected ventral prostates in ENERKI mice was significantly reduced from 155.70 ± 8.7 in *wt* mice to 131.27 ± 3.08 ($p<0.05$). While histologic inspection in the ENERKI mice revealed normal epithelial cytodifferentiation, the lumens were markedly enlarged. In total, these findings suggest that estrogen dependent ERα activation that includes membrane-initiated signaling is involved in branching morphogenesis and planar cell division controlling circumferential growth of the prostatic ducts.

(Supported by DK40890 and CA89089)

24. Cardenas, Salvador; Aguinaga, Susan and Marquez, David D.

Barriers and Facilitators to Walking in Older Latina Women Living in South Chicago

Undergraduate – Kinesiology

Background: Older Latinos are not physically active at recommended levels and are at high risk for chronic health conditions. Research has shown that older Latino adults prefer activities such as walking, but little is known about factors that influence their participation in walking. The aim of the current study was to identify perceived barriers and facilitators to walking in older Latina women living in South Chicago. *Methods*: We conducted two focus groups, one with Spanish-speaking Latina women (n = 5; M age = 66.4) and another with English-speaking Latina women (n = 7; M age = 74.6) living in South Chicago to identify perceived barriers and facilitators to walking in their neighborhood. Focus groups discussed attitudes and personal views towards walking in older age; walking barriers; and walking facilitators. Quantitative analyses of demographic data and qualitative analyses of focus groups were conducted. *Results*: Women identified their health conditions and lack of safety as the most common barriers to walking in their neighborhood. The most common facilitators of walking were health benefits, social interaction, and aspects of the built environment (e.g., parks). *Conclusions*: The current study can help with the development of future walking interventions for older Latina women. A walking program could include a social group of older adults who motivate each other and enjoy walking to parks or other commercial destinations that are near the area. Local city officials can help by advocating for increased patrols during common walking hours. Also, well-lit and well-paved walking routes with available benches and water fountains may help.

25. Carlson, David

Back to the Drawing Board: Analyzing the Renegotiation of Bilateral Investment Treaties

Undergraduate – Political Science

Bilateral Investment Treaties (BITs) are an important factor in understanding both the economic relations between contracting country-pairs and international relations more broadly. The treaties help shape the environment for Foreign Direct Investment (FDI) by providing a regulatory and structural backdrop. FDI is

investment within the territorial boundaries of a nation other than the nation in which the commercial enterprise is owned. The popularity of the treaties has increased exponentially, bringing the total number of BITs worldwide to over 2,600, incorporating nearly every country in the world. Recently, there has been a noticeable increase in the number of BITs undergoing renegotiation. This study analyzes this relatively unexplored trend in an attempt to better understand who is renegotiating, why they are renegotiating, and what is being changed in the process. A fairly exhaustive list of BITs which were renegotiated was compiled to gain insight into any broad trends. Then, to gain a more precise understanding, the renegotiated and non-renegotiated BITs between Spain and Latin American countries were studied, with specific attention given to the cases of the renegotiated BITs between Spain and Mexico, and Spain and Colombia. Analyzing the political environments of the nations suggests that the renegotiation process is a product of the confluence of interests between the participating nations beginning at the domestic level. The nature of these interests likely shapes the outcome of the process. As such, the study helps illustrate the significant link connecting domestic politics and international relations.

26. Cater, Tatianna

HIV/AIDS Outreach and Prevention Techniques in Chicago Area Centers and Organizations

Undergraduate – Psychology

Human Immunodeficiency Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS) are growing to be something very common in the United States, yet people still do not view the diseases as something important. HIV/AIDS are still being viewed as something that is common either in Africa or the gay community and because people are not aware that HIV/AIDS is right here in the US they are not getting tested. Outreach and prevention techniques are very important in the process of helping people to be aware of HIV/AIDS testing. There are many ways to do outreach and prevention. My goal is to ultimately see what these many organizations or centers, whether on a college campus, or in a Chicago area center, do for their outreach and prevention specifically for HIV/AIDS testing and if the techniques that they are using working. Because I conduct outreach for the Gender and Sexuality Center (GSC) at the University of Illinois at Chicago I am very interested in how other places conduct their outreach. The way that I conduct my outreach for the GSC may not be the same as the way another organization conducts their outreach. Because of this, the main topic that I am planning to examine is the way that other organizations and Chicago area colleges/universities conduct their outreach procedures. I am doing this to improve the outreach for HIV/AIDS testing for the GSC and to hopefully increase the number of people that get tested monthly. I will begin this by examining the ways that HIV/AIDS affects young adults on college campuses and how that can then extend to what is being done at off campus facilities. The only people that I will be interviewing are the people working within the organization that have most of the insight on their organizations HIV/AIDS outreach techniques.

27. Chaudhry, Haroon; Grzelka, Jeff; Cain, Julie; Rosenblatt, Noah and Grabiner, Mark D.

Muscle Activation During Large Postural Disturbances Provides Direction Toward Maximizing the Effects of Practice on Reducing Fall Risk

Undergraduate – Biological Sciences

We have designed and tested a training protocol that effectively reduces trip-related falls. The mechanism(s) by which the protocol achieves its effectiveness is not known. Characterizing the underlying mechanism(s) could contribute to further refinement of the protocol. The leg used to perform a compensatory stepping

response following a trip is situation specific. Consequently, it is reasonable to design a training protocol that emphasizes stepping with both limbs. The purposes of this study were to determine if, during a series of repeated exposure to large postural disturbances, young subjects would demonstrate a preferential stepping limb and, if so, there would be differences in muscle activation indicative of anticipatory, i.e., planned use of the preferential stepping limb. Motion capture and electromyographic technology were used to collect kinematic and muscle activation data (bilateral gastrocnemii) on six healthy young adults during a series of 20 large (52 cm at 160 cm/s) forward-directed postural disturbances. Muscle activation was quantified during the period between the onset of the postural disturbance and the instant at which the recovery step foot left the platform. Four subjects used the same limb to perform the compensatory stepping response for all 20 trials. Two subjects used the same limb for 16 and 18 of the trials. Statistical analysis revealed that the differences between the initial activation of the stepping limb and non-stepping limb gastrocnemii were significant ($p \leq 0.001$) and favored the stepping limb side. Notably, for the stepping and non-stepping limb gastrocnemii, this pattern was conserved for the two subjects during the trials in which the stepping limb was not the preferred limb. The results indicate that a preferred limb is evident not only from stepping patterns but also from the associated initial muscle activation patterns. These results may be useful in the continued evolution of training protocols.

28. Cheung, Irene; Rankin, Kristin M.; Norr, Kathleen F. and White-Traut, Rosemary C.

Factors Related to Levels of Social Support Among Low Income Mothers of Premature Infants

Undergraduate –Department of Women, Children and Family Health Science

Mothers of hospitalized premature infants with low social support (SS) often have increased anxiety, postpartum depression, and less positive mother-infant interactions. The purpose of this analysis is to describe impacts of demographic and mental health factors on SS for mothers of premature infants. Factors associated with levels of SS were identified based on a literature review. Subjects were 146 mothers of hospitalized otherwise healthy premature infants (29-34 weeks gestational age at birth) from two Level II hospitals. We examined baseline maternal data from an ongoing randomized clinical trial of a mother-infant intervention. We first examined bivariate relationships between SS (PRQ-2000, low SS = lowest quartile) and demographic factors, state anxiety (STAI), and postpartum depression (PDSS). then used logistic regression to identify the strongest predictors of low SS. Latina mothers preferring Spanish interviews were more likely ($p < 0.05$) to report low SS (40.8%, $n = 49$) than Latinas interviewed in English ($n = 28$, 14.3%) and Blacks ($n = 69$, 17.4%). Mothers with high anxiety were more likely to report low SS than those with low/medium anxiety (43.8% vs. 19.3%, $p = 0.005$). Mothers with major and significant symptoms of postpartum depression were more likely to have low SS than those with normal adjustment (50.0% and 33.3% vs. 15.6%, $p = 0.003$). Clinicians should recognize that mothers preferring to talk in Spanish, as well as adolescents and those with postpartum depression symptoms, may need additional support to handle the stresses of having a premature infant.

Acknowledgment: 1 R01 HD050738-01A2 and the Harris Foundation.

29. Choi, Lindsey

Regulation of CYP2D6 Expression During Pregnancy

Undergraduate – Biopharmaceutical Sciences

Many women of child-bearing age require prescription medications for their own well-being. Once these women become pregnant, the physiological changes caused by the pregnancy affect how the medications are processed within the body. The exact processes for how pregnancy affects drug metabolism are still unknown. Consequently, a general drug dosage and regimen have been difficult to establish for many of the medications that these women rely on. Better understanding of the pregnancy-induced changes in drug metabolism would help clinicians determine optimal drug regimen in pregnant women.

Cytochrome P450 2D6 (CYP2D6) is an important drug-metabolizing enzyme, metabolizing approximately 25% of marketed drugs, including many medications prescribed to pregnant women. It has been shown that in pregnant women, drugs metabolized by the CYP2D6 are eliminated faster. However, the underlying mechanisms remain unknown.

Previously, using transgenic mice, we have shown that pregnancy induces transcriptional activity of CYP2D6. Based on these result, we propose to identify the specific gene regulatory sequences responsible for inducing human CYP2D6 expression, in the 2.5-kb upstream regulatory region of CYP2D6. This will be accomplished by using in vitro luciferase assay in HepG2 (hepatic) cells. Polymerase chain reaction will be used to amplify and clone the upstream regulatory region of the human CYP2D6 gene into a protomerless luciferase vector (i.e., pGL3), resulting in plasmid pGL3-CYP2D6. This plasmid will be transfected into HepG2 cells, which will be treated with plasma from pregnant women (1st, 2nd, or 3rd trimester) or postpartum women. After incubation of the HepG2 cells in the plasma, luciferase activity will be measured. High luciferase activity will indicate higher transcription of the CYP2D6 gene. We expect that pregnant women's plasma will increase the luciferase activity as compared to postpartum women's plasma. The results obtained from this study will likely provide novel insight into regulatory mechanisms for CYP2D6 expression during pregnancy.

30. Chotiyanota, Jill and Patil, Crystal L.

Unpacking the Meaning of Psychosocial Stress in the Treatment of Sickle Cell Disease

Undergraduate – Anthropology

Sickle cell disease (SCD), a hemoglobin disorder, affects the shape of red blood cells and has numerous effects on health. Pain episodes are common. Studies also suggest fairly high rates of common mental disorders occur among people with chronic diseases. In general, less is known about the interactions of mental well-being, stress, and pain management for those with SCD. For this presentation, we build on previous research and add to it clinicians' perspectives. We attended the SCD journal club, staff meetings and support groups and conducted in-depth interviews with seven clinicians (3 doctors, 3 nurses, and 1 social worker) from University of Illinois Medical Center. Interviews were transcribed verbatim and analyzed for themes. We compare the themes that arose from provider interviews to themes that arose in interviews with people living with SCD.

Our results indicate that clinicians often describe SCD patients as experiencing psychosocial stress. In part it is attributed to the uncertainty and unpredictability of SCD. Results from our interviews indicate that there are patient-clinician conflicts along several domains: discrimination, power and control, trust and displaced frustrations. We observed that clinicians often discussed "problem patients" and described them as frustrating. Clinicians felt a need to explain non-compliant behaviors. They often linked non-compliance to mental well-being and hypothesized about the role of subclinical strokes (approximately 11% of SCD patients have a documented stroke by the age of 20). We conclude with a discussion about the meaning of mental well-being and the multiple frustrations of living with and treating SCD. We raise questions about the origins of psychosocial stress and argue that it is important to understand if treatment protocols and patient-provider interactions can exacerbate or even trigger more pain for individuals seeking relief. Clearly, more research is needed to better understand the relationships among pain, stress, strokes and SCD.

31. Conklin, Elyse

Power and Law: Understanding the Source of Supreme Court Authority

Undergraduate – Political Science

Whether we realize it or not, the Supreme Court justices and their interpretation of the Constitution fundamentally impact the lives of each American citizen. Court decisions determine the direction of policy through judicial review, however as an entity, the Supreme Court inherently appears contradictory to the democratic ideals Americans collectively subscribe to. The Supreme Court simultaneously claims to uphold the Constitution and American liberal values as a fundamental check towards the executive and legislative branches, yet Justices are nominated by the President, approved by the Senate, and confirmed for life —with no consultation of the ”People.” Historically, the Supreme Court has been presented as the ‘least dangerous branch’ because it fundamentally lacks an enforcement mechanism while the Executive maintains police presence and other agencies and Congress codifies legislation. Rhetoric represents the only means by which the Court can enforce its rulings—the opinion published by the Court must compel obedience from the other branches and the population[1].
The purpose of this paper is to explore the relationship between the Supreme Court and authority, with a focus on the language that creates and imposes the power of the Court. The word “authority” functions on multiple levels throughout this work; I will first explore the origin of Court authority, with a focus on Marbury v. Madison. Following the starting point of judicial review, I will evaluate the expansion of the Court’s authority over life through an in-depth analysis of landmark cases. Finally, through an application of Michel Foucault’s theory of biopolitics and truth regimes, I advocate for a reconstitution of power between the population and imperfect mechanisms of power. The Supreme Court fundamentally shapes the political reality of every American citizen, yet claims to be shielded from politics itself—why do we (American citizens) collectively submit to the (often flawed) decisions of the Court?

32. Cynova, Christa

Investment Portfolio Analysis Risk/Return Performance

Undergraduate – Finance

When it comes to choosing the correct portfolio of investments to meet one's financial goals, there are many characteristics and performance measures that need to be taken into account. Many theories and models have been established with regards to choosing a suitable portfolio but how does the performance of a portfolio reflect an individual's risk and return trade-off? By evaluating the efficiency of the portfolio theory and determining the ideal asset allocation per client, one can meet their financial goals by investing in a given opportunity set. Using data collected over a given period of time, conservative, moderate, and aggressive portfolios perform differently. By analyzing the risk return trade-off for each ideal portfolio, given a client's level of risk, an analyst can accurately build an allocation based on a client's needs. Within these portfolios, using historical data, an analyst will know how much of an asset class should be allocated to a portfolio and the reasoning behind. Researching these elements also will help a portfolio manager understand why one portfolio works for a client while a different client prefers another. The differences from portfolio to portfolio are what makes one more or less appealing than the other. By observing market volatility and using historical data, an analyst can effectively choose allocations which will meet or exceed the client's prospect.

This data gathered reflects the concept as to why certain asset classes within a portfolio are ideal to invest in and how they accurately reflect the investor's risk return expectations

33. Daneshjou, Nazila; Komarova, Yulia A. and Malik, Asrar B.

Role of Rac1 on Regulating Integrity of Endothelial Adherent Junctions

Graduate – Pharmacology

The monomeric RhoGTPases Rac1, Cdc42, and RhoA are critical regulators of cell function. In endothelial cells, they are believed to act locally to regulate barrier function of the endothelial monolayer that lines all blood vessels. However, all previous assessments of their signaling function in regulating the endothelial barrier (comprised of adherens junctions (AJs)) have been at the whole cell level with little attention given to their actions spatially at AJs. The purpose of this study was to determine effects of activation of Rac1 (Rac1-GTP bound state) at the level of AJs in regulating the integrity of AJ barrier. We transduced the expression of the photo-activatable Rac1 in human lung microvessel endothelial cells (ECs) to activate Rac1 at the AJs. We demonstrated that spatial activation of Rac1 at AJs induced accumulation and clustering of VE-cadherin at nascent adhesion sites to promote the formation of AJs. Deficiency in IQGAP1, an AJ-localized scaffold protein that sequesters Rac1, blocked this effect, suggesting that IQGAP1-Rac1 interaction may be important in targeting Rac1 to the AJs. Thus, while Rac1 is important for formation of the VE-cadherin adhesive complex at AJs, the spatial function of Rac1 appears to be regulated by IQGAP1.

34. Darji, Monika

Investigation of the Safety and the Effects of Cotreatment of Tamoxifen and Red Clover Products

Undergraduate – Medicinal Chemistry and Pharmacognosy

Tamoxifen is a selective estrogen receptor modulator which acts as an antagonist and prevents the binding of estrogen to estrogen receptors in breast tissue. Therefore, tamoxifen is effective in treating and preventing breast cancer. However, since tamoxifen antagonizes estrogen, it leads to estrogen deprivation and this results in early menopause or an increase in the intensity of menopausal symptoms like hot flashes. Botanical dietary supplements like red clover products are commonly used to alleviate menopausal symptoms. Cancer protective as well as estrogenic activities have been described for red clover. These activities might potentially modulate tamoxifen's efficacy on breast tissue. Therefore, it was investigated whether red clover extract and its isolated constituents enhance or reduce the antiestrogenic and antiproliferative effects of tamoxifen on breast tissue. First, the influence of varying concentration of red clover and its constituents on the proliferation in the MCF-7 Bus breast cancer cell line with and without tamoxifen was analyzed using the SRB assay. It was found that cotreatment of tamoxifen with low concentrations of red clover like 300 ng/ml and 1 µg/ml slightly enhances the antiproliferative activity of tamoxifen while cotreatment with higher concentrations of red clover like 3 µg/ml and 10 µg/ml slightly reduces the antiproliferative activity of tamoxifen. Next, the activity of estrogen receptors in the MCF-7 Bus and T47D breast cancer cell lines was analyzed when treated with tamoxifen and red clover using the ERE-luciferase assay. The results demonstrated that low concentrations of red clover like 1 µg/ml cotreated with tamoxifen and estrogen enhances the antiestrogenic activity of tamoxifen. Future research is needed to study the interactions between tamoxifen and red clover extract.

35. Dave, Reetu; Bottoms, Bette; Harrington, Evan; Reynolds, Carrie; Salerno, Jessica; Najdowski, Cynthia and Kemner, Gretchen

The Relation of Political Orientation to Jurors' Perceptions of a Homicide Case Involving a "Gay Panic" Defense

Undergraduate – Psychology

When a "gay panic" defense is used in a murder case, the defense claims that the perpetrator is less responsible because the victim made a homosexual advance toward the defendant, which caused the defendant to act in an uncontrolled "heat of passion." In a mock-trial study, we examined peoples' perceptions of defendants who murdered a victim who either did or did not make a homosexual advance toward the defendant. We predicted that political conservatives would be less punitive toward a defendant in the homosexual advance condition (i.e., the gay panic condition) than in the no-advance control condition, because conservatives are less accepting of homosexuality (Skitka & Tetlock, 1993). We expected liberals to be equally punitive in both cases. Seventy-two community members read a vignette describing a homicide with or without a homosexual advance and answered questions regarding how confident they were in a verdict of either murder or the lesser charge of manslaughter, and their political orientation. As hypothesized, a marginal main effect of case type revealed that jurors tended toward more punitiveness in the control condition ($M = 10.56$) than in the gay panic condition ($M = 8.60$, $F(1,48) = 3.20$, $p = .08$). Analyses also revealed a main effect of political orientation such that conservatives were more punitive than liberals, $F(1,48) = 5.54$, $p < .05$. A significant interaction followed by simple effects analyses revealed that liberals were equally punitive in the gay panic condition ($M = 8.57$) as in the no-advance condition ($M = 7.32$), as expected. Conservatives, however, were far less punitive in the gay panic condition ($M = 8.64$) than in the no-advance condition ($M = 18.25$). Our findings suggest that conservatives' acceptance of the gay panic defense tempered their natural reaction of more extreme punishment than liberals typically favor for crimes.

36. Davis, Terri

Postcards from Bornzeville, 1935-1944: Visual Interpretations of African American Citizenship Through Farm Security Administration Photographs

Undergraduate – History

The research question presented by this study attempts to explore the treatment of African American citizenship through interpretation of Farm Security Administration Photographs. This study used multiple design elements including visual and explanatory data. The data collection procedures used were literary analysis juxtaposed to Farm Security Administration photographs during the same era. The primary findings of the study showed that African Americans were pictured as un-American and without access to resources full citizens had such as social rights and social capital. We can use these findings to address the current disparities in African American communities and create programs to alleviate such disparities.

Keywords: Bronzeville, African American Citizenship, Chicago Farm Security Administration Photographs

37. Deblina, Deb; Baek, Jinsun and Park, Thomas J

Naked Mole Rats Not Sour on Low pH

Undergraduate – Biological Sciences

Mammals have many detectors for low pH (acidosis). These include pain receptors in the skin, receptors in the brain stem for control of breathing, receptors in the brain for fear and receptors in the mouth for tasting sour. The present study is focused on the taste of sour. Sour is the least understood among the five known tastes. The subjects of our experiments were African Naked Mole Rats and Mice as a comparison. Mole Rats are interesting because they are known to be completely insensitive to low pH in the skin, yet they retain sensitivity in the brain stem respiratory area. The goal of the current project was to determine their level of sensitivity to low pH in their taste buds. Sensitivity would suggest pH processing for sour is similar to pH processing for respiration. On the other hand, insensitivity would suggest a similarity to pH processing for pain. We measured the preference for eating low pH gelatin versus plain gelatin. We found that Naked Mole Rats are insensitive to sour; they ate as much of the sour gelatin as the plain gelatin. In contrast, the Mice preferred the plain. In additional tests, we found that Naked Mole Rats prefer sweet gelatin over plain and plain over bitter. Our results suggest similarities between pH processing for sour and pain. Future experiments will use this information to identify common molecular processes in pH sensitivity.

38. Dehlin, Jessica; Bjorkquist, Olivia and Engel, Kathryn

Assessment of Medical and Emotional Progress throughout Methadone Maintenance Treatment

Undergraduate – Psychology

There are many methods of treatment for opiate dependency, Methadone Maintenance Treatment being one of them. Methadone Maintenance Treatment is a form of recovery that is a part of a harm-reduction technique to lessen the severity of withdrawal symptoms from those who are addicted and who are going through detox from heroin. Using surveys, this study looks at the difference between acute intoxication/ withdrawal symptoms, emotional/behavioral conditions, and the recovery environment from the baseline time of intake and the current standing of the participants. By looking at this relationship, it is possible that the hypothesis of Methadone treatment positively influencing one's addiction to opiates can be resolved and supported, given this population.

39. Dishkin-Paset, Justin; Salata, Michael; Manno, Katie; Gross, Christopher; Shewman, Elizabeth; Wang, Vincent; Bush-Joseph Charles and Nho, Shane

A Biomechanical Comparison of Repair Techniques for Complete Gluteus Medius Tears

Graduate – Bioengineering

A tear in the gluteus medius tendon has been determined to be a significant source of hip pain in the clinical setting. Although surgical intervention is performed, there exist few biomechanical data supporting the repair models. Sixteen fresh-frozen human cadaveric hemi-pelves were randomly divided into 3 groups: Double Row (DR), Suture Bridge (SB) and Intact. For the DR and SB groups, complete tears of the gluteus medius were created at the insertion and repaired. Using a materials testing system, the muscle was placed in

a custom cryogenic grip and the femur placed in a custom positioning jig. Intact specimens were loaded to failure in order to establish the cyclic loading protocol for repaired specimens (10N preload for 2 minutes, 150 cycles from 10 to 125N at 90N/s, and load to failure at 1mm/sec). Video-based tracking of markers on the muscle and tendon-repair unit was performed. Two-tailed, paired t-test ($p<0.05$) was used in comparing repair types. Maximum load was strongly correlated with BMD for the SB. SB showed significantly higher normalized yield load and normalized work to yield than the DR. At yield, optically-measured marker segment length was significantly greater for the SB. Mechanical properties of GM repair constructs were inferior to those of the intact, while the maximum load of SB and DR repairs were ~35% of the intact. The SB exhibited its first signs of yield closer to the point of complete failure by anchor pullout (70.9%), while the DR showed initial failure earlier (48.2%) by suture rupture. However, the SB repair-tissue construct may deform more due to its lower stiffness. For patients with average to high BMD, the SB would appear to be preferable due to strong fixation, technical ease, and decreased surgical time. The current study is among the first biomechanical investigations of the GM muscle-tendon-bone construct.

40. Dizdarevic, Arijana

What's in a Word? The Case for Same-Sex Marriage

Undergraduate – Political Science

Proposition 8, a California law banning same-sex marriage, was passed in November of 2008. Gay rights activists challenged Proposition 8 in the case of *Strauss v. Horton* (2009) on the grounds that the law was unconstitutional. To the dismay of thousands of same-sex couples and gay rights activists, the court upheld Proposition 8. The decision in *Strauss* seemed like the end-all, be-all for same-sex marriage in California—that is, until *Perry v. Schwarzenegger. Perry v. Schwarzenegger* is a court case in which the constitutionality of Proposition 8 is, yet again, being challenged. In August of 2010, Judge Vaughn Walker declared Proposition 8 unconstitutional. The case was immediately appealed to the 9th Circuit Court of Appeals, where the case is still pending. In the event that Proposition 8 is struck down, same-sex marriage will be legalized in California and many other states would probably follow suit in legalizing same-sex marriage. This, of course, would lead to the ultimate challenge to the Defense of Marriage Act (DOMA), which defines marriage as a legal union between one man and one woman for purposes of all federal laws, and provides that states need not recognize a marriage from another state if it is between persons of the same sex. Even President Obama instructed the Department of Justice to no longer defend DOMA in court because he thinks it is unconstitutional! It appears that litigation has been the driving force behind the fight to legalize same-sex marriage. Although scholar Gerald Rosenberg argues that courts cannot bring about significant social reform, the same-sex marriage movement is proving him wrong. It is showing that the legal strategy is working, especially judging by the fact that the public is now much more accepting of same-sex marriage.

41. Doroudian, Golnar; Gang, Anjulie; Curtis, Matthew W. and Russell, Brenda Russell

Cyclic Strain and Microtopography Affect Morphology and Gene Expression of Human Mesenchymal Stem Cells

Graduate – Physiology and Biophysics

Human bone-marrow-derived mesenchymal stem cells (hMSCs) are an attractive cell source for regeneration of damaged tissue. The objective is to understand how mechanical cues affect the proliferation and differentiation of hMSCs into heart, muscle, bone or nerve cell lineages. The approach used is to deliver known mechanical inputs to hMSCs grown in culture on flat two-dimensional surfaces, or on substrata with

microposts measuring 15μm high and spaced 75μm apart. These were mounted in a BioFlex device to provide cyclic straining (10%) at 1Hz frequency for 48 h (n=5). The effects of cyclic strain and microtopography on hMSC behavior were compared by shape and size of nuclei and cells, cytoskeletal organization with actin staining, and microarray analysis. When the combination of stimuli was provided, cells were elongated and spanned from micropost to micropost; whereas with only microtopography, the cells were more rounded and clustered near the microposts. The length/width ratio of the nuclei was highest with both strain and microtopography, and the nuclear surface area was greater on flat surface with or without straining. Microarray analysis showed approximately 6000 genes were significantly affected by cyclic strain with or without microtopography. Pathways of actin cytoskeletal organization, bone development and cell growth were altered with cyclic strain alone. However, the addition of microtopography had no effect on genes for migration, hypoxia, skeletal system and heart development. Interestingly, combined cues of strain and topography were most notable in cell proliferation. The protein/RNA/DNA ratio was the same in all conditions suggesting that cells change in number but not in size or protein mass. Altogether, the results show that physical stimuli of cyclic strain and microtopography differentially affect the biological processes of hMSCs. Therefore, attention to mechanical stimuli in the creation an artificial stem cell niches is essential for advanced applications for regenerative medicine. (Funded by NIH HL0905230).

42. Drozda, Natalie

Immigrant Adolescent Adaptation to School: The Newcomer Center

Undergraduate – Psychology

Refugee and immigrant families settle in various places in the United States, but many have landed in and around Chicago. Adapting to a new country is a huge adjustment for any person to make— and it can be frightening especially for children who do not know English. Many children have had their education interrupted due to spending time in refugee camps, while others may not have had much formal education at all. These adolescents may need special attention since they might not be at the same level as others their age who have had more years of schooling. This reality underlines the importance to make accommodations for these newly arrived adolescents and examine the classroom atmosphere to determine the most suitable ways to help them. The purpose of this study is to observe the behaviors and activities in an ESL classroom (at high school level) containing immigrants and refugees. The aims of this observational study are to understand the challenges immigrant students face as well as the issues faced by those who teach them. Such information will hopefully help to enhance future newcomer center programs. A comprehensive coding system was developed to help categorize and make sense of what was observed in the classroom. The general categories of behavioral incidents and engagement/disengagement with learning were used. Common sub-categories of classroom activity that were frequently seen were lateness and relationship building. In addition, a well researched measure of classroom climate will be used to help organize the data. It is projected that approximately 25 classes will be observed by the end of the study. Hopefully such observational information can help shed light on what would be helpful to these children during transitioning into their new lives and roles as students.

43. Duca, Jacqueline

The Effect of Family Dinners on Young Adult's Nutritional Habits

Undergraduate – Applied Health Sciences

Nutrition is important in all stages of life. However, some individuals are placed in an unfair disadvantage due to their upbringing. Studies have shown, how the foods that a child is exposed to during their development will effect their nutritional habits as a young adult, to some extent. By focusing on family dinners, we are able to see the impact this traditional practice has on the nutritional tendencies of young adults. Through paper based research for this project, it became apparent that people who have had regular family dinners at home were more exposed to nutrient dense foods as opposed to those who did not have family dinners on a regular bases. This increased the child's likelihood to choose a healthier diet when they left home. In addition, the research showed that families who regularly incorporate fast food dinners into their family meals had children who were at greater risk of becoming obese or developing other weight related complications. Therefore it is paramount to educate the public and bring awareness of the importance of family dinners for the future health of their children.

44. Elayan, Ahmad and Ozevin, Didem

Stress State Identification of Bridge Components Using Nonlinear Acoustics

Undergraduate – Civil and Materials Engineering

Bridges in service are permanently under imposed loads (dead and live) which forces their members to be continuously exposed to stresses at all times. Being able to identify the current stress state of a bridge member is very crucial in order to not only detect damage, but also predict when and where it is going to happen which will prevent catastrophic failures and provide enough time for maintenance. While live load stresses can be readily measured using strain gages, there is still no current nondestructive testing technique to measure stresses due to dead load. The purpose of this research is to use the acoustoelasticity theory to utilize the nonlinear behavior of materials in order to establish a relationship between ultrasonic velocity and stress condition in steel. The main goal is to construct a correlation between ultrasonic behavior with dead load stress to form a baseline data that is to be compared with field measurements. The research will introduce a new rapid bridge inspection method to obtain quantitative data about the remaining lifetime and overstressed conditions of bridge components. Initial testing was conducted on a solid steel rod (2.54 cm diameter) in order to show the feasibility of the proposed approach on a small scale test bed and the initial results were really promising. The test structure was loaded incrementally, and small perturbation was introduced at each load increment. The sensitivities of various wave modes to the stress on a steel rod under tension and compression were compared, and a finite element model of the test geometry was formulated. Also, a truss steel bridge model was tested to verify the effects of structural boundary, and sudden increase in the stress state due to the failure of a neighboring element.

45. Elfeki, Maryam

Exploring the Potential of Marine Actinomycetes to Inhibit the Growth of Pseudomonas aeruginosa

Undergraduate – Medicinal Chemistry and Pharmacognosy

Gram-negative pathogenic bacteria are an imminent threat of infection among humans. Their deadly persistence has highlighted the need for structurally and mechanistically new antibiotics on the market. Actinomycete bacteria have been an enduring source of antibiotics since the discovery of actinomycin in 1940. Since then, terrestrial actinomycetes have supplied greater than half of the antibiotics in clinical use. However, novel antibiotic discovery is currently stalled by the continuous re-isolation of known antibacterial agents. To address the problem of Gram-negative infections, we are exploring the potential of marine actinomycete secondary metabolites to inhibit the growth of the pathogen Pseudomonas aeruginosa. We

paired each actinomycete from our strain library with P. aeruginosa in agar competition assays. Upon observation of a distinct zone of inhibition between the two microorganisms, we selected the actinomycete for large-scale liquid culture studies. Using standard chromatographic and spectroscopic techniques we are extracting, isolating, and identifying the antibacterial metabolites that were responsible for the observed bioactivity. Using nuclear magnetic resonance spectroscopy (NMR) and mass spectrometry (MS), we are elucidating the structure(s) of antibacterial metabolites and further exploring their potential as drug leads to treat Gram-negative bacterial infections.

46. Kassaundra, Everette and De Groote, Sandra L.

Impact of Online Journals & Databases on Cross Disciplinary Journal Use

Undergraduate – Library

Purpose: The purpose of this study is to determine if the availability of online journals and cross disciplinary databases (PubMed, Web of Science) impacts researchers use of journals not directly in their discipline. *Methods*: To examine the impact of online journals and databases on health sciences researchers in dentistry and nursing, a retrospective, longitudinal study examining the citation patterns of researchers was conducted. Separate searches by author affiliation were performed in the Web of Science to find articles authored by nursing and dental faculty at two universities with large health sciences campuses. Searches were conducted for years: 1993/94, 1997/98, 2001/02, 2005/06, and 2009/10. Years 1993/94 and 1997/98 will establish a pattern of journal citing prior to the introduction of online journals and widespread remote database use. Years 2001/02, 2005/06 and 2009/10 will determine if changes in citing patterns occurred after the introduction of online journals and databases. Articles co-authored by researchers outside of the identified disciplines were not included in the analysis. The number of times a journal was cited was entered into a separate spreadsheet for each health sciences colleges at each of the academic institutions studied. Cited journals were coded by discipline using Ulrichs Serials Directory subject classification. *Results*: Preliminary results indicate that for both dentistry and nursing, there was an increase in the citations of articles from within the corresponding discipline; nursing researchers cited more nursing journals and dentistry researchers cited more dentistry journals. Generally, there was also an increase in articles cited from "medicine" but a decrease in journals cited from journals outside of the discipline "medicine." *Conclusions*: Although researchers are now more likely to be involved in cross-disciplinary research (anecdotally observed), when researchers co-author articles with other researchers from their discipline, they appear to rely on journals from within their discipline.

47. Fahey, Stephen; Bommena, Ramana; Kodama, Richard; Sporken, Robert and Sivananthan, S.

Selective Area Epitaxy of Cdte On Cdte/Znte/Si(211), Through a Nanopatterned Silicon Nitride Mask

Graduate – Physics

Single-crystalline CdTe/Si has proven useful as an alternative substrate to bulk CdZnTe for HgCdTe infrared detectors, however, such detectors are hampered by lattice and thermal mismatch. In particular, long-wavelength infrared (LWIR) HgCdTe/Si detectors have an operability that is likely thwarted by high threading dislocation density (TDD).

Here we investigate a nanopatterned CdTe/Si interface to reduce the TDD in CdTe/Si. Our motivation comes in part from the theoretical prediction that select CdTe seeding areas can be merged into a single coalesced film of potentially lower TDD. Molstad et. al. have shown that low TDD can be obtained on the top surfaces of 20μm–wide CdTe regions grown by Molecular Beam Epitaxy (MBE) on patterned Si(211). Their

coalesced film showed, however, a significant surface corrugation due to the island spacing, and high TDD in areas of merged islands. We address these problems by using smaller and closer seeds, observing the coalescence process, and confirming fully selective growth; with a goal of improving selective area epitaxy (SAE) and coalescence of CdTe/Si by MBE.

We performed SAE by MBE on pairs of patterned and unpatterned CdTe/ZnTe/Si(211) epilayers. One of each pair was coated with silicon-nitride, and patterned by ultraviolet interferometric lithography, yielding an array of 250nm–wide CdTe seeding regions at the base of silicon-nitride holes. The seeding areas were etched clean with bromine and chlorine solutions prior to SAE. The epilayers' surface morphology, crystallinity, and chemical composition were characterized by Scanning Electron Microscopy, X-Ray Diffraction, and X-Ray Photoelectron Spectroscopy before and after exposure to CdTe flux by MBE.

We find agreement with known growth conditions for SAE of CdTe; we find new SAE conditions for CdTe against silicon-nitride; we observe lower surface corrugation; and we point to future improvements.

48. Fink, Anne Marie; Gonzalez, Rose; Lisowski, Tadeusz; Pini, Maria; Fantuzzi, Giamila; Levy, Wayne C. and Piano, Mariann R.

Fatigue, Inflammation, and Projected Mortality in Heart Failure

Graduate – Biobehavioral Health Sciences

Introduction: Approximately 5.7 million people in the U.S. have heart failure (HF). Despite therapeutic advances, the 5-year mortality rate for HF is 50%. Fatigue is common with HF and independently predicts mortality. The physiological mechanisms underlying fatigue, however, have not been elucidated, and there are no effective therapies. *Purpose*: Inflammatory molecules, such as tumor necrosis factor-α (TNFα), interlukin-6 (IL-6), and C-reactive protein (CRP) have been implicated in the pathogenesis of HF. In this prospective investigation we determined whether inflammation was correlated with fatigue and projected mortality in HF. *Methods*: Patients with HF ($N = 59$) and healthy control subjects ($N = 25$ [age, gender, and race-matched]) completed the Fatigue Symptom Inventory, provided a venous blood sample and underwent an exercise test (6-minute walk). We calculated individualized mortality (Seattle Heart Failure Model) scores for each patient. *Results*: Patients with HF had significantly greater fatigue, poorer exercise capacity, and greater plasma levels of pro-inflammatory molecules (TNFα, IL-6, and CRP) compared to controls. The anti-inflammatory cytokine IL-10 was significantly greater in controls compared to HF patients. In HF patients, fatigue was correlated with elevated CRP values ($r = .42$, $\rho = .01$), reduced exercise capacity ($r = -.37$, $\rho = .01$), and higher projected mortality ($r = .39$, $\rho = .01$). Patients in the highest mortality risk category had greater IL-6 levels than those with lower risk ($F = 6.5$, $\rho = .01$). *Discussion*: Our findings underscore the clinical significance of inflammation in HF, particularly with regard to CRP and IL-6. The pro-inflammatory cytokine IL-6 is secreted by immune cells and triggers the release of CRP from the liver, which activates inflammation and tissue injury. We found greater CRP and IL-6 levels with higher fatigue and greater projected mortality, respectively. Research about these molecules is critical for understanding the pathophysiology of fatigue and for developing therapies.

49. Foti, Lisa; Dakshinamoorthy, Gajalakshmi and Ramaswamy, Kalyanasundaram

Molecular Identification of DEC Drug Target Proteins as Vaccine Candidates Against Lymphatic Filariasis

Graduate – Biomedical Sciences, Rockford

Lymphatic filariasis is one of the most prevalent tropical diseases. Diethylcarbamazine (DEC), also known as hetrazan, is the only drug of choice for this infection but because of its bitter taste, there is significant patient non-compliance leading to persistent infections in endemic regions. The World Health Organization (WHO) has mandated research in this field due to a fear of DEC-resistance in nematodes and need for vaccines. Brugia malayi is one of the parasitic filarial infections targeted for elimination by the year 2020 by the WHO, which has spurred vaccine and drug development, as well as new methods of vector control. In order to design a new drug or to modify the active compound, the mechanism of action of DEC on the larval stages of the parasite (microfilariae and larvae) must be studied. This was accomplished through screening a phage display cDNA expression library of the B.malayi to identify the drug target proteins of DEC and use of the identified drug target proteins as vaccine candidates against the lymphatic filariasis. The sequence analysis by BLAST identified BmMAK-16 and BmSPARC as DEC binding proteins and this was further confirmed by Westernblot. Analysis of isotype specific antibodies against BmMAK-16 and BmSPARC + BmMAK showed an elevated IgG1 and IgG2 response. Results of the ADCC assay and in situ micropore chamber showed that both the proteins can kill infective larvae of B. malayi in presence of competent cells. BmMAK-16 had a greater cytotoxicity (55%) as compared to Bm SPARC + MAK-16 immunized mice (~38%). In vivo micropore chamber results also showed greater protection of ~68% for BmMAK-16 immunized mice than ~40% protection for Bm SPARC + MAK-16. The results show that rBmSPARC and rBmMAK-16 are potent vaccine candidates.

50. Franklin, Nina; Ali, Mohammed; Goslawski Melissa and Phillips, Shane A.

Reduced Brachial Artery Smooth Muscle Function After Exhaustive Resistance Exercise in Obesity

Graduate – Physical Therapy

Obesity is a leading cause of preventable death worldwide and an independent risk factor for coronary artery disease. Low-grade inflammation associated with obesity promotes vascular reactive oxygen species (ROS) production and contributes to impaired endothelium-dependent, nitric oxide-mediated vasodilation which is a key event in the development of atherosclerosis. Impaired endothelium-independent, smooth muscle function is also linked to the development of atherosclerosis but most research suggests that it is preserved in obesity. Previous studies have shown that increased ROS production after acute exhaustive resistance exercise (ERE) impairs endothelium-dependent vasodilation (EDV) but not endothelium-independent vasodilation (EIV) in sedentary lean adults; however, these effects have not been demonstrated in obesity. The purpose of this study was to examine whether acute ERE would impair EDV and EIV in sedentary but otherwise healthy obese adults. Participants consisted of 8 obese (OB) (BMI 34.2±3.4) and 8 lean (LN) (BMI 21.5±1.5) young women. All subjects underwent a single bout of ERE using a progressive leg-press protocol with blood pressure measurements. Brachial artery flow-mediated dilation (FMD) (an index of EDV) was determined using ultrasonography before and after ERE. Sublingual nitroglycerin (NTG) (0.4 mg) was used to determine EIV after ERE. Subjects were normotensive with similar blood pressure responses during ERE. At baseline FMD tended to be lower in OB subjects (5.0±4.2%) compared to LN subjects (8.5±3.7%, $p<0.1$). After ERE, FMD was reduced in all subjects (OB: 3.4±2.9% and LN: 6.4±4.5%, $p<0.05$), but the absolute difference between pre- and post-ERE FMD was not significantly different among OB (-1.6%±3.9%) and LN subjects (-2.1%±4.0%, p=NS). EID in response to NTG (post-ERE) was lower in OB (19.0±9.0%) compared to NW subjects (27.6±6.0%, $p<0.05$). These data suggest that smooth muscle function is reduced in obese adults after acute exercise. This finding may be important in understanding the link between obesity and vascular dysfunction.

51. Funk, Meghan; Bottoms, Bette; Najdowski, Cynthia and Salerno, Jessica

The Influence of One's Political Views on One's Opinion of Juvenile Sex Offender Registry Laws

Undergraduate – Psychology

The purpose of this study was to investigate the link between a person's political views and a person's views of juvenile sex offender registry laws. The data were taken from two prior studies (Salerno, et al. 2010; Salerno, et. al, 2008). In the current study, responses to questions about political views, such as "When it comes to politics, how liberal or conservative are you?" were correlated with responses to questions about the degree to which one supports public sex offender registry laws for juveniles, such as "In your opinion, what is generally the most appropriate outcome for adjudicated/convicted juvenile sex offenders?". Survey respondents included 258 undergraduate college students, 94 attorneys, and 224 community members. Preliminary results indicate a statistically significant relationship between political views and support for juvenile sex offender registry laws for males, but not females. For males, there was a positive correlation between degree of political conservatism and support for juvenile sex offender registry laws. Additional analyses will be discussed. The results of this study have important implications for the development of fair sentencing guidelines. For example, if political views influence sex offender registry laws, this suggests the consequence of a juvenile sex offender's actions may be determined by the political orientation of those in charge of making laws as well as by judges and jurors who act on those laws.

52. Furlow, Benjamin

A Brand in Crisis: Tracing the Trajectory of "Made in Italy" from Proto-Industrialization to a Precarious Future, a Cassina Case Study

Undergraduate – Art History

The Italian luxury sector has been systematically outsourcing manufacturing jobs to low-wage countries in Asia and Africa over the last two decades. While continuing to charge their clientele upwards of $700 dollars for a pair of shoes and $3000 dollars for a man's suite, "Made in Italy" companies such as Prada and Gucci have maximized profits by moving manufacturing outside of the Italian peninsula. Ironically, two of the main reasons luxury companies have been able to justify their outrageously expensive prices is that their products were both designed and made in Italy. The unique Italian design process holds the dialogue between designer, craftsman, and manager as integral to the success of the product. Over the last half-century this process has cohered into a brand or seal-of-excellence know as "Made in Italy" and has been a marketing device ever since. The relatively recent trend of outsourcing manufacturing threatens to offset the dynamic Italian design process that enabled Italy to become a world leader in luxury goods. Through a case study on the Cassina furniture company of Meda, Italy, this paper traces and analyzes the history of "Made in Italy" from its roots in the proto-industrialization period in the Brianza region to its current precarious state of being. Using primary and secondary sources from the disciplines of Design, Social, and Economic History, the investigation labors to determine the validity of arguments, which are found in current discourse, that assert Italian design and the "Made in Italy" brand are in crisis. The paper concludes that while Italian design may continue to be noteworthy form many generations to come, the "Made in Italy" brand has reached a tipping point where it could easily descend into obscurity or continue to be an envied mark of distinction.

53. Galea, Jessica

Broken Backs of Amarna Workers: Spinal Pathology in 18th Dynasty Egypt

Undergraduate – Anthropology

Amarna, Egypt, was inhabited for a mere 17 years at most during the 18th dynasty. The pharaoh Akhenaten moved the Egyptian capital from Thebes to Amarna in 1345 BCE to establish new ground for his monotheistic religion. His workers, however, are responsible for the grand and lasting architecture of the site. Evidence of intense labor manifests itself through extensive trauma of the spine, such as arthritis, compression fractures, spondololysis, and Schmorl's nodes. Studying a combination of architecture and pathology can yield clues about the type of manual labor performed and its affect upon individuals.

54. Gampa, Anuhya; Larson, John and Park, Thomas

Calpain Activity in the Brains of Mice and Naked Mole-Rats: A Comparative Analysis

Undergraduate – Psychiatry

Naked mole-rats live up to ten times longer than other rodents of comparable body size. Numerous causes for variations in longevity have been suggested, ranging from reversible oxidative damage to endogenous telomerase activity. However, the mechanism responsible for the unusual maximum lifespan of naked mole-rats is uncertain. It has been noted that the activity of brain calpain, a calcium-dependent proteolytic enzyme, is negatively correlated with lifespan across diverse mammals; however calpain activity has not yet been measured in the naked mole-rat brain. Thus, this study aimed at comparing the levels of activity of m-calpain (which is activated with millimolar concentrations of calcium in the cell) in the mouse and mole-rat brain. The hypothesis was that because mole-rats tend to live longer, calpain activity would be lower in the mole-rats than in the mice. Various areas of brain tissue were extracted and homogenized from the subjects. After this, the protein concentrations of the samples were standardized and to measure total activity, a synthetic substrate was added which fluoresced upon cleavage by calpain. Calcium was added to activate the enzyme, and thus, activity levels were determined based on relative fluorescence from the substrate cleavage. Statistical analysis showed that across all samples, the mole-rat brain had significantly lower levels of calpain activity than the mouse brain, as expected from the relation between lifespan and calpain in other mammals. Why brain calpain activity is correlated with maximum lifespan across mammal species is unknown. The present results strengthen this relationship by showing that a rodent with an unusually long lifespan has unusually low levels of brain calpain activity. Future studies should examine the participation of this proteolytic activity in neurodegenerative processes that contribute to brain aging, and possibly contribute to longevity.

55. Garcia, Blake

A Study on Policy Methods to Better Prepare Latino Youth in Their Education

Undergraduate – Institute for Policy and Civic Engagement

In 2010, the Illinois State Board of Education reported that one in every five elementary students is of Latino descent. In addition, recent scholarship has shown great concern to the widening educational gap between Latino and White children. Due to the lack of academic preparation, accessibility to early childhood education, and parental mentorship, this study seeks to propose policies that would better serve the Latino

youth population in their academic progress. Because academic achievement is not, to a large extent, based on solely on socio-economic factors, the purpose of this research is to observe how parental involvement and culture within the household affects the academic development of the children. Various studies have been consulted in regards to childhood activities within and outside the household by observing their family structure, size, and routines. The results show that one of the most effective methods that produce higher academic results involves direct family engagement and as such, reform and creation of school policies in early childhood education programs should be sensitive to this evidence, in order to exercise parental involvement in the academic setting of Latino youth.

56. Garcia, Elizabeth

Behaviors of At-Risk Youth as Predictors of Detention Recidivism

Undergraduate – Psychology

Adolescence is a period in which youth experiment with many things as a way of trying to find their identity and a place in society. They are easily influenced by their peers and those around them and that can sometimes get them into trouble. It is also a time when, for some, they enter into delinquency. It is crucial for alternative residential programs like the Manuel Saura Center to try to identify the types of behaviors that indicate or are predictors of recidivism, admittance into a detention facility, in order to better tailor their programs to fit the needs of these vulnerable youth and prevent them from living a life of crime. Identification of key behaviors that predict recidivism are essential for just that. The participants in this study include male and female residents of Saura Center between the ages of 10-17 years with an average age of 15.6 who were referred to the center by the Cook County Juvenile Probation Department. A thorough analysis of the archival records of the participants was conducted including their daily score sheets, incident reports, and the staff record communications. A logistical regression of potential key indicators to recidivism will determine which behaviors more accurately predict recidivism. The behaviors to be looked at are refusal to follow directions or participate in group, verbal abuse or threats against staff, and noncompliance with physical escort, and contraband. So far in the data analysis, the behavior to most closely predict recidivism into the facility is verbal abuse or threats against staff. An early conclusion could suggest that emotional intelligence sessions be integrated into their curriculum.

57. Gardiye Punchihewa, Kasun; An, Se Yong and Metlushko, Vitali

Nano-Fabricated Extracellular Matrix (ECM) Topography Could Alter the Cancer Cell Behavior

Graduate – Electrical and Computer Engineering

Current therapeutic approaches for cancer, such as chemotherapy are highly invasive and have undesirable side effects. Even the surgeries cannot guarantee a complete recovery. Therefore advanced and effective alternate approach for cancer treatment is a timely requirement. It has been shown that the extracellular matrix (ECM) surrounding the cells could be used to manipulate the cell behavior. We exploited this technique, and trying manipulated the ECM to control the cancer cell growth. Our study mainly focuses on colon cancer treatment. Epidemiological data indicates that the colon cancer is one of the main causes in cancer deaths in USA. Topographical information of the human colon epithelial tissues was obtained using scanning electron microscope (SEM). Depending on the stage of the cancer, differentiation of the cells can be changed. We imaged the ECMs of normal, well differentiated, moderately differentiated and poorly differentiated colonic cancer cells. Our aim was to find out the dose matrix which is required to reconstruct the individual topographies using electron beam lithography (EBL), based on these images. Number of

experiments had been performed to find out an accurate relationship between the depth of the poly methyl methacrylate (PMMA) layer and the dose of the electron beam. In order to do that, pyramidal structures were fabricated with the smallest unit size ranging from 1μm to 5μm. Height of the individual structures was obtained using Atomic Force Microscopy (AFM) and SEM. Based on the information appropriate dose matrix was created to reconstruct the topography corresponds to different colon tissue samples.

58. Gatchalian, Jae; Prodoehl, Janey; Planetta, Peggy; Little, Deborah; Corcos, Daniel; Zhou, X. Joe; Comella, Cynthia; Shannon, Kathleen; Goetz, Chris and Vaillancourt, David

Diffusion Tensor Imaging of the Basal Ganglia in Parkinson's Disease and Atypical Parkinsonism

Undergraduate – Kinesiology and Nutrition

Distinguishing Parkinson's disease (PD) from other diseases that mimic its symptoms is critical for therapeutic management. This study aims to determine whether fractional anisotropy (FA) extracted from high-resolution diffusion tensor imaging (DTI) in the caudate, putamen, and globus pallidus can discriminate between PD, multiple system atrophy (MSA), progressive supranuclear palsy (PSP), essential tremor (ET), and healthy individuals. 59 subjects (8 PD, 14 MSA, 9 PSP, 14 ET, and 14 controls) were studied with a high resolution DTI protocol at 3 Tesla using an eight-channel. Regions of interest were drawn bilaterally in anterior, middle, and posterior portions of each structure by a blinded rater. The analysis used in the project was a group (5 groups: PD, MSA, PSP, ET, control) by side (2: left, right) by region of interest (3: anterior, middle, posterior) mixed model analysis of variance (ANOVA) with separate ANOVAs for each region. For caudate, patients with PSP had higher FA values than the other groups. For putamen, we did not observe a significant effect for group and the group by side and group by region interactions did not approach significance. For globus pallidus, while the group effect was not significant, we did find a significant group by region interaction ($p < .02$). A one-way ANOVA with group as the factor for each region indicated that patients with PSP had higher FA values for the anterior region ($p < .05$), but the other regions did not approach significance. In summary, patients with PSP had higher FA values in caudate and anterior globus pallidus. These structures are involved in regulating cognitive functions and eye movements. Since these deficits are a hallmark for the diagnosis of PSP, the current findings suggest that DTI in caudate and globus pallidus may reveal disease specific structural changes that may ultimately prove important for a differential diagnosis in the future.

59. Ghai, Aashima; Jawaid, Ali; Krooswky, Joel and Snee, Preston

A Ratiometric pH Sensor Using Magnetic Nanoparticle Conjugates

Graduate – Microbiology and Immunology

Nanotechnology has advanced significantly in applications to sensing biological systems in recent years. These applications include sensing of analytes such as proteins, DNA, and ions present in complex biological environments. Nanoparticles are exceptionally potent sensors due to their size dependent optical properties. Traditionally, dyes are used to measure pH of biological environments; however, the use of a single reporter dye does not allow for the quantitative measure pH levels. This leads to ambiguity of the exact pH of the environment. One way to circumvent this issue is to tether several fluorescent dyes onto emissive nanoparticles such that the nanoparticle's emission and the dye's absorption spectra overlap. This spectral overlap facilitates Forster Resonant Energy Transfer (FRET) between the nanoparticle and the dye. The nanoparticle's optical properties are essentially invariant to the local environment whereas the fluorescent dye is sensitive to changes in pH which leads to a ratiometric response between dye and

nanoparticle fluorescence. Unfortunately, this method requires high quality water solubilized nanoparticles usually synthesized with toxic heavy metals like cadmium or mercury. This can be potentially avoided by attaching two fluorescent dyes onto the surface of magnetic-oxide nanoparticle and observing FRET between the dye pair where one species has pH dependent optical properties and the other is inert. Because of FRET transfer, an isosbestic point will be present and the dyes can be calibrated to the pH of a solution. In our approach, MnO2, Fe2O3, CrO2, and CuO nanoparticles were synthesized. Two differently functionalized dyes were then chemically conjugated to the surfaces of the nanoparticles and the unconjugated dyes were removed from the system. A pH sensitive FRET interaction was observed between the dyes attached to the nanoparticle's surface.

60. Goes, John

Sums of Four Integer Squares Over Quadratic Number Fields

Undergraduate – Mathematics

A classical result of Lagrange (1770) states that every positive integer can be expressed as the sum of four integer squares. For example 10=2^2+2^2+1^2+1^2. These representations are not unique, since for example we also have 10=3^2+1^2+0^0+0^2. Jacobi exhibited an explicit function yielding the number of such representations for a given integer, including those obtained by reordering terms and permuting sign. In previous decades attempts have been made to generalize these results to other number fields, with limited success. Results have been limited to exactly three quadratic fields. Fulfilling ambitions inspired by computational data presented last year, we exhibit a closed Jacobi-formula for all class-1 quadratic number fields (conjecturally there are infinitely many such fields), essentially generalizing Jacobi's result to the quadratic integer case.

61. Gold, Leah

The Role of Cross Modal Transfer in Comprehension

Undergraduate – Psychology

Teachers often expect information presented during lectures (verbal material) to be integrated with material presented in a textbook (written material). We were interested in whether listening or reading leads to better initial learning, and how well information learned in one modality transfers to the other modality. Research shows that comprehension is best when listening to a passage versus reading a passage for less-skilled readers (e.g., elementary school students) whereas very good readers (e.g., college students) show no difference in comprehension for listening versus reading a passage (Hausfeld, 1981; Swalm, 2001). We expand on this research to explore whether presentation modality influences transfer, defined as how information learned in one modality transfers to the other modality.

Participants will be presented with 8 passages twice and will either listen to the passages or read the passages during the first and second presentations. This creates four conditions: listening during the first and second presentations (LL), reading during both presentations (RR), listening then reading (LR), or reading then listening (RL). Participants will answer questions after each presentation. Results will be evaluated as a function of vocabulary (better readers have larger vocabularies). We predict that, following the first presentation, low vocabulary participants will show higher comprehension when listening to a text than when reading the text whereas higher vocabulary participants will show no difference in comprehension across modality. We are specifically interested in comprehension following the second reading when

modality switches between presentations (LR and RL) versus no change in modality (LL and RR). We predict better comprehension in the no-change conditions than the change conditions for low vocabulary participants and no difference between change and no-change conditions for high vocabulary participants. The results will help us better understand differences in learning styles.

62. Gollogly, Lila and Hecht, Gail

Enteropathogenic *E. coli* Effectors EspG1/G2 Disrupt Microtubule Networks and Prevent Restoration of the Intestinal Epithelial Barrier

Graduate – Microbiology and Immunology

Enteropathogenic *E. coli* (EPEC) infection is a leading cause of diarrheal mortality in infants. EPEC pathogenesis includes disruption of intestinal epithelial tight junctions (TJs). TJs are dynamic structures with proteins constantly recycling between the plasma membrane and cytoplasm. The aim of this study was to investigate the role of EPEC-induced microtubule (MT) disruption by the effector proteins EspG1/G2 on TJ restoration. To assess TJ function, transepithelial resistance (TER) was measured to determine barrier function in intestinal epithelial cells (Caco-2 or T84). MTs were disrupted by incubating cells at 4ºC followed by nocodazole to prevent recovery at 37°C. To investigate TJ recovery, calcium chelation and restoration was used. During TJ recovery post-chelation, the absence of MTs decreased TER by 22.6% compared to controls ($n = 8$, $p < 0.01$). This suggests MTs play an important role in TJ restoration. To determine the impact of EPEC-induced MT disruption on TJ recovery, monolayers were infected with WT EPEC or an EspG1/2 mutant until TER decreased by ≈40%. Bacteria were killed with gentamicin. Recovery of TER was increased by 29.0% in *deltaespG1/2* compared to WT ($n = 6$, $p < 0.001$). To address the role of MT motors in TJ restoration, cells were treated with an inhibitor of the minus-end MT motor dynein, erythro-9-(2-hydroxy-3-nonyl)adenine (EHNA). EHNA delayed recovery of TER by 29.6% ($n = 9$, $p < 0.001$). Adenylyl-imidodiphosphate (AMP-PNP), a kinesin inhibitor, had no effect on TJ recovery. These data strongly support a role for MTs in TJ restoration. These data strongly support a role for MTs in TJ restoration. Our data suggest that EPEC EspG1/2 prevents TJ recovery after EPEC infection, leading to perpetuation of intestinal barrier loss and severe clinical consequences.

63. Goslawski, Melissa; Bian, Jing-Tan; Szczurek, Mary; Piano, Mariann R. and Phillips, Shane A.

The Effects of Frequent, Episodic Alcohol Consumption on Altered Macro-and Micro-Vascular Reactivity in Young Adults

Graduate – Physical Therapy

Previous studies have shown that individuals who engage in binge drinking (≥5 alcohol drinks/ 2 hours: men; ≥4 alcohol drinks/2 hours: women) at least once every two weeks have similar negative cardiovascular risk profiles as chronic drinkers. The negative effects of alcohol consumption on the cardiovascular system may be mediated by changes in vascular reactivity and vascular derived substances such as endothelin-1 (ET-1). We hypothesized that individuals who binge drink will: (1) exhibit impaired vasodilator reactivity of the brachial artery and resistance arteries (RA) and (2) demonstrate increased constrictor responses to ET-1 in RA compared to abstainers. Men and women (mean age=23) who reported binge drinking (BD) (n=11) and abstainers (A) (no alcohol consumption reported for ≥1 year; n=13). In BD subjects measurements were made prior to a BD episode (pre-BD, > 96 hours since most recent BD episode), and post BD (within 24-48 hours). Brachial artery function was tested using flow mediated (FMD) and nitroglycerin dilation (NTG; 0.4 mg) using ultrasonography. Gluteal fat biopsies were obtained and RA were isolated for vascular reactivity

measurements to acetylcholine (Ach) (10^{-9} to 10^{-4} M) in the presence and absence of the nitric oxide synthase inhibitor L-NAME (10^{-4}M), and to exogenous ET-1 (10^{-12} to 10^{-7} M). Brachial FMD was similar among groups. However, NTG- induced dilations were reduced post BD (pre binge: 18.6±2.9%, post: 10.4±5.2%, p=.01). Constrictions to ET-1 were similar among both BD groups and A, and in both BD groups before and after binge. Dilations to Ach tended to be reduced in both BD groups (p=0.058) compared to A, and reductions in the post- BD group were greater than those in the pre- BD group (p=0.115). L-NAME had similar effects across groups. These results indicated that exposure to BD reduces Ach and NTG –mediated dilations in resistance and conduit arteries, respectively.

64. Greco, Sarah and Vincent, Catherine

Disability and Aging: An Evolutionary Concept Analysis

Graduate – Women, Children, and Family Health Sciences

The idealized image of successful aging as living independently and autonomously does not convey the reality for many adults in the United States and globally who are living with a disability. There have been inconsistencies throughout the literature in defining disability and aging. A concept analysis using Rodger's method was undertaken to identify the attributes, antecedents, and consequences of disability and aging; define the concept; and determine implications for nursing practice and research. An extensive search from multiple databases was conducted; 30 sources were used in the analysis. Four attributes were defined: limitation in physical, sensory, and/or mental function; universal human experience; difficulties in activities of daily living (ADLs)/instrumental activities of daily living (IADLs); and social construction. Exemplars were identified to provide a representation of the attributes in context and a model of disability and aging was created. The attributes, antecedents, and consequences provide important implications for practice. Through an understanding of the attributes of disability and aging, nurses and other healthcare providers will be better informed about how to incorporate the multiple factors contributing to disability into comprehensive care. The provider can use the antecedents of disability and aging to identify specific factors that could lead to disability and educate older adults and their families about interventions that can be used to modify these factors. The identification of both positive and negative consequences of disability and aging can be used to anticipate potential future decline and provide valuable information about available resources. Overall, this concept analysis provides a better understanding of disability and aging, which can improve care for the older adult.

65. Grzelka, Jeff; Chaudhry, Haroon; Cain, Julie; Rosenblatt, Noah and Grabiner, Mark D.

Changes in Muscle Activation Coordination Patterns Following Repeated Exposure to Large Postural Disturbances Requiring Stepping Responses May Decrease Fall Risk

Undergraduate – Kinesiology and Nutrition

We have demonstrated that a brief training protocol consisting of responding to postural disturbances that require stepping responses to avoid falling significantly decreased trip-related falls both in the laboratory and in the community. However, the mechanism(s) underlying the protocol effectiveness is not known. Success or failure of a trip-related recovery effort depends on the ability to arrest/reverse trunk flexion motion. Thus, we expected that activation patterns of muscles that could contribute in this way would demonstrate strong associations with the change in trunk velocity during the recovery step following large postural disturbances. The purpose of this study was to determine if repeated exposure to large postural disturbances would cause meaningful changes in activation coordination. Motion capture and electromyographic technology were

used to collect kinematic and muscle activation data on six healthy young adults during a series of 20 large (52 cm at 160 cm/s) forward-directed postural disturbances. The activation of the first 10 trials was compared to that of the second ten trials using multiple linear regressions. The changes in trunk velocity during the recovery step and muscle activation during the recovery step were the dependent and independent variables, respectively. The first 10 trials included activation of muscles that, by virtue of positively signed b-coefficients, appeared to significantly (all $p \leq 0.05$) impair the ability to arrest/reverse trunk flexion velocity during the recovery step. However, the apparent negative functional contribution of these muscles was absent during the second 10 trials. It was of interest to note that during both the first and second sets of ten trials that the total percentage of the shared variance accounted for by the regression, albeit significant (all $p<0.001$) was only 25 percent. The results provide initial evidence that the effectiveness of the protocol may be attributed to changes in neuromuscular coordination.

66. Gudiyella, Soumya and Brezinsky, K.

Oxidation of Aromatic Surrogate Fuel Components of Jet Fuels

Graduate – Chemical Engineering

Jet fuels are used to power both civilian and military air crafts. Investigation of the combustion behavior of jet fuels aids in the design of combustors with greater efficiency and lower pollutant emissions. The multi-component nature of these fuels limits our experimental capabilities on individual components of jet fuels. A useful approach to this problem is to study surrogate fuel components and surrogate fuel component mixtures of jet fuels. These surrogate fuel components replicate the parent fuel in both physical characteristics (such as density and boiling point) and chemical characteristics (such as H/C ratio and cetane number).

High pressure oxidation experiments were performed on two chosen aromatic surrogate fuel components, m-xylene and n-propylbenzene in the High Pressure Single Pulse Shock Tube (HPST) at University of Illinois at Chicago. These experiments were performed at temperatures and pressures relevant to combustion environments. Experiments on m-xylene oxidation were performed at nominal high pressures of 25 and 50 atm and for a temperature range of 1050-1700 K, at fuel lean, stoichiometric and fuel rich conditions (Φ = 0.53, 1, 2.35). Experiments of n-propylbenzene oxidation were performed at nominal pressures of 25 and 50 atm, with the temperatures ranging from 902 to 1680 K and for an equivalence ratio of 0.5-2.0. A variety of stable species ranging from small hydrocarbons, to single ring and polycyclic aromatic hydrocarbons were sampled from the shock tube and analyzed using standard gas chromatographic techniques. Detailed chemical kinetic models were developed to simulate the stable species profiles as obtained from the high pressure oxidation experiments of m-xylene and n-propylbenzene. Both the models provide a good fit for the consumption of the fuel, oxygen and the formation of the major aliphatic and single ring aromatic intermediates.

Financial support for this project is provided by the Air Force Office of Scientific Research under grant number FA9550-07-1-0515.

67. Guo, Wenji; Schlict, Michael Schlicht; Kucynda, Teresa; Kajdacsy-Balla, André

Co-treatment of Ferric Ammonium Citrate (FAC) With Ebselen Decreased FAC Induced PC-3 Cell Invasion

Undergraduate – Pathology

Prostate cancer progression, invasion, and metastasis are complex processes involving the interplay between cancer cells and microenvironment with tight regulations to ensure the growth and survival of cancer cells. The studied hypothesis is that environmental iron exposure may trigger already established cancer cells to increase their invasive and metastatic behavior through a non-genotoxic mechanism. PC-3 prostate cancer cell invasion with iron was investigated using Neuroprobe filter membrane transmigration assays. PC-3 cells were pre-incubated with 100 μM ferric ammonium citrate (FAC) for 6 hours. Excess iron was removed before the assay. The PC-3 cells were placed on an extracellular membrane preparation (Matrigel ®) in the upper wells of the chamber and allowed to migrate onto the underside of a porous membrane that allowed cell transmigration. The number of cells migrating to the underside of the membrane is a direct measure of cell invasion. Pre-treatment with 100 μM FAC caused a 4-fold increase in PC-3 cell invasion through the Neuroprobe porous membrane above control when measured at 24 hours ($P < 0.05$). The FAC concentrations that induced PC-3 invasion were significantly below that which interfered with cell viability or proliferation rate within the assay period of time. Furthermore, we discovered that co-treatment of FAC with antioxidant ebselen, a hydrogen peroxide inhibitor, decreased FAC-induced PC-3 cell invasion. We also examined the mRNA expression of invasion related genes using a cDNA array and found a positive correlation between the exposures to FAC and the invasion phenotype of prostate cancer cells. The data demonstrated the upregulation of genes, such as fractalkine and plasminogen after PC-3 cells were treated with FAC, which may be associated with iron-induced invasion of prostate cancer. Our data suggest iron overload may be detrimental to patients with prostate cancer and that the effect of iron on invasion may be inhibited by ebselen.

68. Hanif, Sarah; Rizvi, Ayesha and Zdunek, Alan

Electric Field Enhanced Water Desalination

Undergraduate – Chemical Engineering

One basic substance essential for the survival of all organisms is water. Water is easily accessible in developed countries; however, in third world countries, drinking water is treated like gold. In Ghana, pure water is priced at $3 per cubic meter while Colombia's price is a whopping $5; compared to only $0.50 in New York [1]. High costs of water are due to high equipment and installation costs of water purification systems which can be approximately $8 million per system [2]. These high costs drive those who cannot afford drinkable water to drink impure water causing probable illnesses such as agitated skin, repeated urinary tract infections, and many others [3]. Due to a lack of doctors to assist patients with these illnesses, affordable pure water is a must in third world countries.

Seawater is abundant on Earth and commercial desalination technologies, such as reverse osmosis (RO), have been developed to alleviate the pure water shortage problem. However, RO requires high pressures which, in turn, require large amounts of energy and high costs of operation. Recently, it has been shown that applying an electric-field to electrolytes speeds up the diffusion rates of the salt ions [4]. This phenomenon can potentially be exploited to develop a new technology that will create a faster, more efficient way to purify water. The process implements laws of electrochemistry, using an electric field applied around the unit which forces the salt to split into ions and be attracted to their respective electrode. Then the ions are then absorbed by ion-exchange resins, leaving the water pure of any present salt. When fully developed, this unit can be placed within a water purification plant and make water more accessible and affordable for these deprived nations.

This poster presents an initial investigation into the proof-of-concept and development of the electric-field enhanced desalination process. Experiments have been performed testing the effects of applied voltage on the rate of desalination of water. Results presented show that an applied electric field increases the rate of salt removal by enhancing the transport of ions to the resin, and also distinctly changing the ion-water to water-water structure.

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69. Hao, Jianjun; Nedvetsky, Yana; Galang, Maria; Handelman, Chester; Viana, Grace; BeGole, Ellen and Evans, Carla

Orthodontic Tooth Movement With Flapless Corticotomy: a Pilot Study in Beagle Dogs

Graduate – Orthodontics

Objectives: To determine differences in amount and type of tooth movement between flap and flapless corticotomy groups after 8 weeks of orthodontic force application. Setting and Sample Population – Five beagle dogs, aged 15 months, were used in this study. The experiments were completed in the Biological Research Laboratory, and all analyses were conducted in the Department of Orthodontics, University of Illinois at Chicago. *Materials and Methods*: All mandibular third premolars were extracted in five dogs; fourth premolars and temporary anchorage devices were used as anchors and second premolars were moved distally towards the extracted third premolar positions utilizing a novel orthodontic appliance. Orthodontic force of 1.5 N was generated with Ni-Ti closed coil spring in every appliance. Apical and coronal measurements of tooth movement were recorded in week 0 and week 8 by measuring the distance between 2 separate permanent indentations on the canine and second premolars with a digital caliper. Data analysis was performed by Wilcoxon signed-rank test. *Results*: Bodily movement of 0.18-1.77 mm in 8 weeks was achieved. No gross tipping or rotation was observed. No statistically significant difference in amount or type of tooth movement was found between flap and flapless groups at 8 weeks. All appliances remained intact until the end of the study. *Conclusions*: The flapless corticotomy procedure is feasible in beagle dogs. The newly designed orthodontic appliance achieved bodily movement in beagle dogs. We were unable to show a difference in the amount or types of tooth movement between the flapless and flap groups at 8 weeks possibly based on Wilcoxon signed-rank test. This study lacked a control group without surgical procedure.

70. Harding, James; Tsang, Waltz and Ozevin, Didem

Preventing Imminent Failures of Pipeline Networks via Novel Real Time Leak Location Approach

Undergraduate – Civil and Materials Engineering

The buried and on-ground pipelines develop damage due to temporal variables such as corrosion and creep or instantaneous threats such as impact. 70.33% of pipeline failures in the last ten years are gas distribution pipelines which causes environmental pollution (e.g. water contamination leading to 1.3 million fish killed), damage (e.g. destruction of homes and roads) and fatalities. 19.12% of the failures are due to internal damages, such as fatigue and internal corrosion (8.82%) along with excessive pressure (10.29%). 80.88% of the failures are due to external causes such as external corrosion (17.65%) as well as impact from a third party (63.24%) that lead to the deterioration of the pipelines. A damage detection and location approach in the pressurized pipelines before reaching structural instability is needed to prevent any catastrophic failure and, consequently, detrimental environmental impact. Acoustic emissions are propagating elastic waves due

to the formation of damage or structural changes (e.g. leak), which cause sudden stress-strain change in a material. In this study, a new leak localization approach is developed in order to locate leakage in a multi-dimensional space. The approach is to determine arrival time differences using cross correlation function, and introduce the geometric connectivity in order to identify the path that the leak waves should propagate to reach the AE sensors. The geometric connectivity combines the geometric boundaries of the structure to define the shortest wave paths from the leak sources to the AE sensors using the local coordinate system. The approach is successfully demonstrated on laboratory scale polypropylene pipeline networks. With the developed novel location approach, the leak location in multi-dimensional space can be identified in an effective way using an array of sensors spread on the pipeline network.

71. Herron, Amanda; Raney, Gary and Engel, Kathryn

Evaluation of a Behavior Modification Program for Children

Undergraduate – Psychology

The present study was designed to evaluate how effective a current behavior modification program for children is in increasing positive behavior while simultaneously decreasing inappropriate behavior. The behavior modification program is offered by a nonprofit organization in the Chicagoland area that assists families that are experiencing difficulties with rearing children between the ages of 18 months and 6 years old. These issues may include non-compliance, bedtime or mealtime issues, and socialization problems. The organization combines parent training and a child classroom setting in the program to modify behavior. Parents learn how to use positive behavioral techniques, such as, praise, verbal following, and differential attention, to modify the child's behavior.

The aforementioned organization tracks each child's behavioral progression during the program through the use of an evaluation form parents are asked to complete at the beginning of the program, during the program, and at the completion of the program to track the child's behavior changes. This evaluation form is used to assess the child's behavior in several areas of his or her life and the frequency of problematic behaviors (e.g., problems with getting ready in the morning, issues at mealtimes, and inappropriate public behavior).

The efficacy of the program will be evaluated based on the behavioral changes reported in the behavior progression evaluations of children who participated in the program in either 2000 or in 2009. Prelimary evaluation indicates significant reduction in problematic behaviors in mealtime and leisure time. Further analyses will be performed to assess changes in appropriated behavior associated with mealtime, leisure time, and public settings. This is the first evaluation of this program, and its correpsonding methods, in this manner. The results can be used to help the organization analyze which aspects of their program are most and least effective, thus enabling them to streamline and improve their program to maximize benefits for the families they serve.

72. Ho, Tsui-Ting; Arslan, Ahmet D.; He, Xiaolong and Beck, William T.

Short-term Exposure of Leukemia Cells to Chemotherapeutic Agents is Associated With Changes in MicroRNA Expression

Graduate – Biopharmaceutical Sciences

The acquisition of resistance to anticancer drugs is a key obstacle to successful cancer therapy. An increasing number of studies have investigated the roles of microRNAs (miRs) in drug resistance. We reported that the upregulation of miR-135b/-196b correlated positively with acquired drug resistance as well as expression of

the ATP-binding cassette (ABC) transporter ABCB1 in the human T-cell leukemic CCRF-CEM cell line. We found similar increases in miR-135b/-196b in other cell lines derived from leukemias, but not from solid tumors, suggesting that induction of expression of these miRs may be histiotype-specific. miR-196b maps between the *HoxA9* and *HoxA10* genes. We observed upregulation of *HoxA9* mRNA in relation to short-term chemotherapeutic drug exposure in CCRF-CEM cells, indicating that the expression of miR-196b is linked to *HoxA* gene transcription. To investigate the kinetics of expression of miR-135b/-196b, ABCB1 and ABCC1, we challenged CCRF-CEM cells repeatedly with etoposide for 48 h with a 3-day drug-free incubation in between. We found that changes in miR-135b/-196b expression were paralleled by expression of the ABCB1 gene, but not the ABCC1 gene. These results suggest that miR-135b and -196b are involved not only in the initial response of cancer cells to chemotherapeutic challenge, but also in the development of chemoresistance. We subsequently measured expressions of miR-135b/-196b, ABCB1 and ABCC1 in CCRF-CEM cells exposed to repeated drug challenge after either 15 or 20 passages in drug-free medium. Treatment of these previously-exposed cells again with etoposide resulted in unexpected attenuation of miR-135b/-196b and ABCB1 expression. We further determined that the etoposide IC50 in these cells had increased from 300 nM to 1 □M. Our results suggest that induction of miR-135b/-196b after drug exposure is transient and offer insights into the establishment of the drug-resistant phenotype which seems to re-set the IC50 to higher levels.

73. Hong, Jaeyoung; Mehta, Supriya D. and Bailey, Robert C.

The Effect of Age and Circumcision Endorsement on Sexual Behavioral Risks: Results From a RCT of Male Circumcision for HIV Prevention in Kisumu, Kenya

Graduate – Epidemiology

Background: Three randomized trails[1] in sub-Saharan Africa demonstrated male circumcision reduces HIV acquisition by ~60%. There has been concern that promoting male circumcision may lead to greater risk behaviors, in response to feeling more "protected" against disease. There was no evidence of risk compensation in our trial in Kisumu, Kenya[2]. Sexual behaviors - sex without condoms, multiple sex partners, and exchanging sex for gift or money - decreased at the same rate over time in both circumcised and uncircumcised groups. We examined whether the decline rate of these 3 behaviors differed by age and men's endorsement circumcision's benefits. *Methods*: Subjects were enrolled 2002-2005, randomized 1:1 to intervention or control, and followed for 24 months. 2,781 men aged 18-24 were interviewed and medically examined every 6 months. Circumcision endorsement was assessed using 5 questions (summed score 0-5), with higher score indicating greater endorsement. Baseline age was dichotomized at the median (18-20 vs. 21-24). We used generalized estimating equations analysis to estimate the odds of each binary risk over time, to account for the within-subject correlation. *Results*: The decline rate of not using a condom among the younger group was higher than the older group over time (time by age: .083 +/- .051, p=.002), but the rate of decline in having multiple sex partners or engaging in exchange sex did not differ by age group. We found no association between the rate of decline of sexual risk behaviors and the endorsement score over time in both circumcised and uncircumcised group. *Conclusions*: These data indicate younger and older may respond differently to sexual behavioral risk reduction messages. Additional analysis should examine behavioral risk over time by how long participants have been sexually active. The lack of association between behavioral risk over time and circumcision endorsement provides additional support for lack of risk compensation.

1. Bailey RC, et al. Lancet 2007;369:643-56 at Kisumu, Kenya, Gray RH, et al. Lancet 2007;369:657-66 at Rakai, Uganda, and Auvert B, et al. PLoS Med 2005;2:e298 at Orange Farm, South Africa
2. Bailey RC, et al. Lancet 2007;369:643-56 at Kisumu, Kenya

74. Hwang, Helen

Mechanism of TNF-α-Induced Endothelial Barrier Dysfunction

Undergraduate – Pharmacology

Endothelial cells line the blood vessels forming a barrier between blood and underlying tissue. The integrity of the endothelial cells lining the blood vessels of vital organs like lung, heart, brain and kidney is key to prevent inflammation. Inflammatory mediators like Thrombin, TNF-α, Interleukin-1 and histamine cause leakiness of the endothelial barrier. This results in transmigration of inflammatory cells through the endothelium resulting in inflammation and edema of underlying tissue. The mechanism of action of these inflammatory mediators has been extensively studied. The small GTPases Rho and Rac regulate endothelial barrier function. Rho is known to cause barrier dysfunction by increasing the stress fibers whereas Rac is known to strengthen the barrier. But, the mode of regulation of TNF-α-induced endothelial barrier dysfunction is not completely understood. The purpose of our study was to identify the mechanism of TNF-α-induced endothelial barrier dysfunction. More specifically, we studied the effects of Rho and Rac on the endothelial barrier in Human Umbilical Vein Endothelial Cells (HUVEC). We used ECIS (Electric Cell-substrate Impedance Sensing) technique to assess the barrier properties. The intactness of the barrier was measured by recording the resistances of the endothelial monolayer. Our results show that Rac inhibitor (NSC23766) significantly reduced TNF-α-induced endothelial barrier dysfunction in contrast to the normal function of Rac. More interestingly, Rho inhibitor (Y27632) also partially decreased endothelial barrier dysfunction upon stimulation with TNF-α. Our results suggest a dual regulation of TNF-α induced endothelial barrier dysfunction by both Rac and Rho. In conclusion, selective inhibition of Rho and Rac can help prevent deleterious effects of TNF-α on the endothelium.

75. Isel, Sarah

An Assessment of the Social and Legal Welfare of Iraqi Refugees in Chicago

Undergraduate – Political Science

The purpose of this study was to delineate the daily social and legal frustrations of Iraqi refugees in Chicago. Since the beginning of the 2003 US-led invasion of Iraq, approximately 2 million Iraqis have been internally displaced within Iraq, and another 2.8 million Iraqis have been displaced elsewhere. From 2006-2009, 2,223 of those externally displaced Iraqi refugees embarked on their new life in Chicago. This study begins with an overview of the conditions surrounding internally and externally displaced Iraqis in countries other than the US, since the majority of Iraqi refugees only came to Chicago after having been resettled previously in Iraq, Syria, or Jordan. Newspaper articles, academic journals, and on-the-ground reports from humanitarian organizations provided data for this part of the research. In order to gain first-hand accounts of the refugees in Chicago, I conducted in-depth interviews with five Iraqi refugees about their experiences since emigration, with specific focus on their experiences since arriving in Chicago. I also interviewed an attorney who works in US immigration and asylum law, in order to get a better understanding of how the Iraqi refugees' legal position may compare to other refugee groups. Newspaper articles and reports from Chicago's leading Iraqi refugee aid organizations provided a context to better understand the individual experiences of my interview subjects. Overall, I found that the principle problem facing Chicago's Iraqi refugees is unemployment. They often face difficulties obtaining jobs in the US due to language barriers and a lack of transportation to English classes and licensing agencies. Further hindering their integration here is their experiences with corrupt governments and violence in the past, leaving them with a strong sense of suspicion of others which severely cripples their ability to form relationships and establish a sense of community in Chicago.

76. Ivanova, Sylvia; Onul, Abdullah; Elseth, Kim M.; Vesper, Benjamin and Radosevich, James A.

Are High Nitric Oxide Producing Tumor Cells More Resistant to pH Change Than Low Producing Tumor Cells?

Undergraduate – Biological Sciences

Objectives: Patients with solid tumors that have a necrotic center portend a poor outcome. At the cellular level, the tumor cells are exposed to a harsh, low pH, microenvironment in and around, the necrotic center. Cells that survive in a broader pH are anticipated to have a more aggressive phenotype. Our laboratory has developed a model system based on the clinical finding that tumors that over-express Nitric Oxide (NO) are much more aggressive than those that produce low amounts. This model system involved adapting tumor cells to survive in high NO (HNO) concentrations. We hypothesized that a greater resistance to pH variation by the HNO cell lines would provide further evidence that these cells have a more aggressive phenotype than their un-adapted "Parent" cells, and that may reflect what is seen clinically. *Methods*: Parent and HNO cells of an adenocarcinoma cell line (A549) and a squamous carcinoma cell line (SCC116) were exposed to varying pH levels (pH 3-12) for 48 hours. Cell viability was measured using the MTT assay. *Results*: The A549-HNO and SCC116-HNO cells have a significantly broader range of tolerance to changes in pH than their corresponding parent cell lines. The A549 cell line had a greater overall tolerance to changes in pH than the SCC116 cell line. *Conclusion*: The adaptation of tumor cells to grow in a HNO microenvironment also results in their ability to grow in a broader range of pH conditions. This finding may explain why, patients that present or progress to having tumors with necrotic masses have a poor outcome – their tumors are more adapted to grow in various microenvironments. This study represents the first step in a series of studies directed at defining how pH, which alters intracellular Calcium levels and thereby gene expression, may be altered in tumors with HNO expression.

77. Javaid, Maria and Zefran, Milos

Interpreting Communication Through Physical Interaction During Hand-Over Task

Graduate – Electrical and Computer Engineering

This poster describes the work done to study physical interaction - a bidirectional exchange of forces during direct or indirect contact -as one of the modalities of interpersonal communication. The work is part of a broader research agenda that aims to develop a multimodal communication interface for robotic assistants for the elderly. Experiments are conducted at a fully functional studio apartment with elderly subjects to observe the role of different communication modalities when an elderly is communicating with a care-giver during activities of daily life besides collecting data. To collect physical interaction data a low-cost data glove is developed by the authors. The user study helped to identify the tasks during which physical interaction plays an important role. One of such tasks "hand-over" task is studied through experiments in the Computer Vision and Robotics Laboratory, UIC and physical interaction data is obtained through the data glove. It is shown through the results that the handover task requires communication through physical interaction and different stages of handover task can be recognized from the physical interaction data. And humans' indirect physical interaction carries some signature which should be explored to identify different kinds of physical interaction.

78. Jiang, Ruixuan; Majmudar, Neena; Lu, Meiling and Beck, William

Exploring the Functional Relationship Between Notch and ABCC1

Undergraduate – Biological Sciences

Cancer remains a top cause of death in the developed world, partly due to the development of multidrug resistance (MDR). Overexpression of the ATP binding cassette (ABC) transporters, which efflux anticancer drugs, is a phenotype of MDR cancer cells. We have previously demonstrated a positive correlation of expression of intracellular Notch1 (N^{IC}) and ABCC1 transporter. We found that N^{IC} contributes to MDR by upregulation of ABCC1. In order to show the functional relationship between the two proteins, we performed drug efflux experiments. We treated MCF-7 and MCF-7/VP breast tumor cells with the anti-cancer drug doxorubicin and measured the amount of drug efflux over time using flow cytometry. The MDR MCF-7/VP cells, which overexpress ABCC1, exhibited increased doxorubicin efflux as compared to the drug-sensitive MCF-7 cells. To better establish the connections between Notch, ABCC1, and drug efflux, we compared drug efflux in MCF-7 cells stably overexpressing N^{IC} (NICD4), and "empty vector" control MCF-7 cells (pCDNA3). As expected, we saw increased drug efflux in NICD4 cells compared to MCF7/pCDNA3 cells. To establish whether the observed drug efflux is ABCC1 specific, we treated both NICD4 and PCDNA3 cells with probenecid, an inhibitor of ABCC1 pump activity. Indeed, the probenecid inhibited doxorubicin efflux, and we found the efflux from NICD4 and PCDNA3 to be similar. Finally, γ-secretase is required for the processing of Notch into its active form, N^{IC}. We blocked γ-secretase activity in the MCF-7 and MCF-7/VP cells using DAPT and assayed the drug efflux. Drug efflux of the two cell lines was similar, as expected. If our disruption of the Notch pathway shows that N^{IC} is indeed a mediator of ABCC1 expression and thus a contributor to MDR, treatment of cancers known to be resistant might include γ-secretase inhibitors such as DAPT as a supplement to other medications.

79. Jimenez Morales, David; Linag, Jie and Eisenberg, Bob

Active Sites of Enzymes are Crowded With Charge

The chemistry of enzymes occurs at active sites that concentrate biological function into functional pockets. Functional pockets mix catalytic amino acids and substrate in tiny volumes. Here, we look for biological properties of that small space. We imagine that electric charge plays important roles, because even one charge in a small space produces large electric fields. To estimate densities of fixed charge, we measure the volume of functional pockets and count 'charged residues' in it. We collect locations of functional pockets from enzymes of known structure that catalyze the main six enzymatic reactions. Functional amino acids are identified by their participation in catalysis. We measure the volume of pockets using both solvent-accessible and molecular- surface models. 'Charged residues' are R, K and H (positive); E and D (negative). Charge density is extraordinarily large (~20 Molar on average, often larger). Mobile counterions for the fixed charge are presumably nearby in high density. Active sites do not resemble the infinitely dilute ideal solutions of classical enzyme kinetics. Their enormous charge density is comparable to the charge density of solid NaCl. Different types of enzymes have different charge densities. Hydrolases show the largest values of charge density. Some enzymes have extraordinarily large charge density -phosphoglycerate mutase (PDB = 1o98, density of charge 103 Molar, Molecular Surface), or RNA Triphosphatase (PDB = 1d8h, 70 Molar, Molecular Surface). Crowding of charged side-chains and ions produces enormous steric and electrostatic forces in these tiny active sites. The balance of these forces seems likely to be of great importance to enzyme function. Many charged pockets are also found away from active sites. Charged pockets are likely to be involved in many surface interactions. They may be reservoirs of electromechanical energy that can drive conformational changes.

80. Jones, Aunica; Wolf, Nina and Fung, L.M.

Site-Directed Mutagenesis of R41E PurE for Drug Discovery Studies

Undergraduate – Chemistry

PurE is an essential enzyme from the Bacillus anthracis microorganism involved in the biosynthesis of purines. This project involves an introduction of a mutation at residue 41 in PurE, from arginine to glutamic acid (R41E). The site-directed mutagenesis method replaces a nucleotide in the DNA molecule of PurE such that the new codon translates to glutamic acid, and it requires the synthesis of a DNA primer containing the desired nucleotide base change. A step-by-step procedure was used to design and obtain a pair of primers for site-directed mutagenesis. The immediate goal of this project was to conduct a DNA extraction to isolate the parent PurE DNA plasmid from a cell culture containing the plasmid. This plasmid is used as the DNA template, together with the newly obtained primers, in polymerase chain reactions (PCR) to introduce the mutation. Agarose gel electrophoresis method will be used to separate DNA fragments after PCR for sequence analysis. Once the mutated plasmid is obtained, it will be transformed into E. coli cells for protein expression. The enzymatic activity of this mutant will be compared with the parent enzyme. It will be used, together with the parent enzyme, to screen for small molecule binding. Small molecules that bind may become drug candidates for the treatment of anthrax infection.

81. Jones, Tristesse; Sojarto, DD and Farnsworth, Norman

Authentication of Asclepias Tuberosa Commercial Samples for the Use of Research in the Botanical Center's Dietary Supplements for Women's Health

Graduate – Medicinal Chemistry and Pharmacognosy

Introduction: Women consume commercial preparations of Butterfly Weed (*Asclepias tuberosa* L., Asclepiadaceae) root to ease undesirable symptoms of menopause. Since there is minimal scientific research on this dietary supplement, there is a need to authenticate the identity of commercial samples, when chemical, biological and clinical studies of commercial samples are to be undertaken. The purpose of this study was to ascertain that commercial samples of Butterfly Weed are indeed derived from *Asclepias tuberosa* L (*A.tuberosa). Hypothesis*: Commercial samples labeled as the root of Butterfly Weed are indeed the root of *A. tuberosa*. *Experimental procedures*: Commercial samples were purchased and powdered. An extensive literature review was performed. Reference materials (actual roots) were acquired from various sources, including living plants and herbarium specimens, and were powdered. Organoleptic evaluation, light microscopic (LM) and scanning electron microscopic (SEM) examinations, as well as thin-layer chromatography (TLC) were performed on both the reference and the commercial samples. *Results*: Data from organoleptic evaluation, LM , SEM, and TLC, as a result of the examination of the commercial samples show significant similarities with those from the reference samples, in terms of cell and tissue morphology, crystal structures, and as well as chemical profile. These data are also in good conformity with data in the published literature. *Conclusions*: Data from the present study established that commercial samples labeled as Butterfly Weed are indeed samples of the root of *A.tuberosa*. Hence, the hypothesis is proven.

Acknowledgements: Dr. Soejarto and Norman Farnsworth for advising, Field Museum for permission to use herbarium specimen, Michael Totura, Farm Specialist, for procuring living plant tissue from Field station, Kristina Jarosius, SEM Specialist, for SEM training.

82. Kaewken, Utumporn; Ngyen, Vu; Hsu, Ying; Hettiarachchi, Madhawa and Linninger, Andreas

Anatomical Fine Structures inside the Spinal Canal Drastically Enhance Micromixing in Intrathecal Drug Delivery

Undergraduate – Bioengineering

Intrathecal drug delivery is an efficient way of administering drugs into the central nervous system, bypassing the blood brain barrier. The cerebrospinal fluid pulsates in the spinal canal at the frequency of the heart beat due to periodic expansions of the cerebrovasculature. Compared with pure diffusion in stagnant fluid, pulsatile flow enhances species transport three to five fold. Inside the spinal canal, drug transport is mainly due to this convective pulsatile flow of cerebrospinal fluid. Flow and drug mixing are further influenced by the anatomical complexity of the subarachnoid space which is populated with nerve bundles and microscopic trabeculae.

In this study, we aim to quantify the effect of anatomical fine structures on enhanced micromixing inside the spinal canal. Computational models of the human spinal canal that incorporate protruding nerve bundles and arachnoid trabeculae were constructed. Control models without these structures were built for comparison. The dimensions of the nerve roots, trabeculae and parameters of intrathecal infusion match published clinical values. To study the effect of these obstacles on pulsatile fluid flow and drug transport, the Navier Stokes and Species Transport equations were solved with direct numerical simulations. Results showed that the presence of nerves and trabeculae in the subarachnoid space increases resistance in cerebrospinal fluid flow as well as drug mixing.

Nerves and micro-scale trabeculae are significant for accurate quantification of intrathecal drug distribution inside the spinal canal.

A future goal is to construct a computational model of human central nervous system which features anatomical accuracy and reproduces cerebrospinal fluid flow dynamics validated with CINE MRI flow measurements. The final stage is to build a computer model for prediction of drug dispersion in a patient's central nervous system. This computer model will enable anesthesiologists to optimize infusion parameters for assessing toxicity threshold and evaluating infusion outcomes a priori.

83. Kalliappan, Rajah and Rockne, K.J.

Biological Gas Production in Sediments Pollutes the Water Column in the West Branch of the Grand Calumet River, Indiana

Graduate – Civil and Materials Engineering

Sediment capping is a relatively new technology for treatment of contaminated sediments. Ideally, a cap would result in stopping the release of contaminants to aquatic biota, reducing the ecological and human health risk posed by contaminated sediments. A major challenge in capping is methane, nitrogen, and carbon dioxide gas bubbles rising out of the sediments from the biodegradation of organic matter, a process called gas ebullition. Ebullition results in increased flux of buried contaminants to the water column and subsequent exposure to aquatic organisms. This study aims at understanding ebullition-mediated contaminant transport in sediments of the Grand Calumet River, Indiana to assist the design and monitoring efforts for dredging and capping of the site carried out by the USEPA. The river sediments are highly polluted with total heavy metals between 2200-17000 mg/kg and total polycyclic aromatic hydrocarbons (PAHs) between 22-300 mg/kg, respectively. Gas/contaminant collection traps were installed at 13 sites along the river to measure the gas production and ebullition-facilitated contaminant flux from the sediments. Large volumes of gases were released from the sediments (0.3 – 2 L/m2/d) because of the high levels of organic matter in the sediments (5-25%). A wastewater treatment plant (WWTP) outfall located in the study site greatly

influenced the water quality and gas production. The water quality upstream of the plant was characterized by high turbidly and ammonia levels, whereas downstream the water was less turbid with low ammonia levels and much higher temperatures due to the release of warm treated wastewater to the river. Higher gas production and methane levels were observed upstream of the treatment plant outfall. Gas ebullition resulted in very large inputs of heavy metals and PAHs to the water column; 30 and 1 mg/m2/d, respectively. This represents an ongoing source of pollution to the Grand Calumet River that must be controlled for effective remediation. The WWTP greatly improves the water quality and capping is expected to decrease the ebullition facilitated fluxes. However, the potential for increased biogas production due to increased temperatures from the wastewater effluent (and thus greater contaminant flux to the water column) are not known.

84. Kang, Hahk-Soo; Krunic, Aleksej; Chai, Hee-byung; Kinghorn, Douglas A and Orjala, Jimmy

Antiproliferative Cyclophanes From the Cultured Freshwater Cyanobacterium Nostoc Sp.

Graduate – Medicinal Chemistry and Pharmacognosy

Cyanobacteria are known to be a prolific source of bioactive molecules. In our screening, the crude extract of a cultured *Nostoc sp.*, obtained from Grand Mere state park in Michigan, showed strong antiproliferative activity against the HT-29 human colon cancer cell line. The crude extract was fractionated using Diaion HP-20 resin to afford 8 fractions and the active fractions were subjected to LC-MS dereplication. Subsequent analysis indicated the presence of potentially novel compounds. HPLC purification of the active fractions using reversed phase C_8 column lead to the isolation of two new cyclophanes as well as four previously described indolocarbazole alkaloids. The structure determination of the new compounds was carried out by a combination of spectroscopic techniques including HRESIMS, and 1D and 2D NMR experiments. Two new cyclophanes showed antiproliferative activity against HT-29 with an IC_{50} of 3.3 and 1.7 μM, respectively. The structure determination and biological activities of the compounds will be presented.

This research was supported by P01 CA125066 from NCI/NIH.

85. Kapica, Shauna; Giesting, Paul and Guggenheim, Stephen

The Effect of Salinity on Methane Hydrate Intercalates in Montmorillonite

Undergraduate – Earth and Environmental Sciences

Montmorillonite [Sample SWy-2, $\sim M^{+}_{0.70}(Al_{2.99}Mg_{0.52}Fe^{3+}_{0.43})(Si_{7.97}Al_{.03})O_{20}(OH)_4$, where M^+ = exchangeable cation], a common deep-sea sediment, is a clay mineral capable of adsorbing organic and polar molecules between the silicate (2:1) layers. SWy-2 can adsorb methane hydrate complexes ($CH_4 + H_2O$) as a montmorillonite-methane hydrate (MMH) intercalate at CH_4 and H_2O saturated conditions at appropriate conditions of temperature (T) and pressure (P). This X-ray diffraction (XRD) study investigates the effect of salinity on the stability of the MMH as a function of the activity of H_2O and CH_4. This study is of interest because methane is a greenhouse gas, methane is common in sediments on the continental margins, and ocean temperatures are expected to rise in the future, which may destablize methane-bearing sediments.

The layer-to-layer distances [d(001) values] of SWy-2 were observed by XRD in a high-pressure environmental chamber containing SWy-2, brines, and methane gas at high pressures and low temperatures. At $P_{(CH4)}$ = 41 bars and 0.5 M NaCl solution (= seawater salinity), the d(001) of SWy-2 varied by < 1 Å over a temperature range from 5.5 ^{o}C to -1.5 ^{o}C. These experiments seem to indicate that changes in d(001)

values were not significantly different over the temperatures studied. In contrast, for SWy-2 at $P_{(CH4)}$ = 41 bars and 0.25 *M* NaCl solutions (= brackish water), the *d*(001) decreased from starting values of 23.2 Å at 5.5 °C to 20.7 Å at -0.5 °C, and this is a significant change in *d*(001) values. The known upper limit for MMH at *P* = 41 bars is 4 °C (salt-free water), therefore these data may suggest that a different $CH_4 + H_2O$ complex has formed. This conclusion requires confirmation.

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86. Karimi, Mohammad Ali and Dombard, Andrew

Understanding the Thermal Evolution of Mars Using Impact Craters

Graduate – Earth and Environmental Sciences

Understanding the characteristics of the planet Mars can assist us in improving our knowledge about planet formation and the evolution of the solar system. Geologic activity is driven by internal heat, so tracing a planet's thermal history is critical to this endeavor. Unfortunately, there are no direct measurement of the heat flow coming out of Mars at present or in its past, so the thermal history of the Red Planet must be inferred by modeling features seen on the surface and gravitationally sensed within its interior. Past studies have only examined prominent features on Mars, such as its handful of massive volcanoes, which provides a biased view of the thermal history, because such features are few, tend to be clustered together, and formed over a relatively short period of time. In contrast, impact craters are much more evenly distributed across the surface of Mars, both spatially and in time, so they provide a more ubiquitous probe on thermal history. In this study, we use the finite-element method to simulate the evolution of impact-crater topography on the surface of Mars and on the crust-mantle boundary. Our candidate craters have diameters of 200-700 km, small enough to be sufficiently numerous yet large enough to have a detectable gravitational signal that can be used to determine topography on the crust-mantle boundary. Sufficiently high temperatures in the deep crust can make the lower crust flow, consequently changing the topography on the crust-mantle boundary and surface. Thus, the process of lower crustal flow is a function of heat flow; higher heat flow causes more evolution. Consequently, simulating the evolution of the topography of large craters gives a fresh outlook on the global thermal evolution of Mars.

87. Karpouzian, Tatiana; Morgan-Short, Kara; Faretta-Stutenberg, Mandy; Brill, Kate; Wong, Francis and Wong Patrick

The Role of Working Memory in Second Language Development

Undergraduate – Psychology

Learning a second language (L2) is typically a difficult task, especially during adulthood. However, some learners are able to acquire a language with more ease than others. Investigating individual differences in various cognitive skills may provide insight into why this disparity exists among learners. One aspect of cognition that has been found to be relevant to successful L2 learning is working memory (e.g., Mackey et al., 2003), but researchers have yet to look at individual differences in L2 development over time. The present study aims examine the role of working memory at low and high proficiency levels. Participants in the study completed a listening span task to assess working memory, and were then trained and tested on an artificial language. Language training consisted of four sessions, which included implicit learning conditions. After the first and final training sessions, which represent low and high proficiency levels, L2 development was assessed.

Participants were asked to judge the acceptability of correct and incorrect sentences in the artificial language. Analyses were performed on L2 development over individual performance on the working memory assessment to determine whether working memory was a significant predictor of learning success at low and high proficiency. Results indicated that working memory was a significant predictor of L2 learning at high proficiency, but not at low proficiency. Interestingly at high proficiency, the results indicated that individuals with a higher working memory capacity were less successful on the L2 task than those with a lower working memory capacity. These results are consistent with previous findings that "less is more" for some aspects of language acquisition (e.g., Conway et al., 2003). Future investigations should expand on this finding by examining the role of working memory capacity in learning under both implicit and explicit learning conditions.

88. Karras, Maria and Kolokythas, Antonia

Using Molecular Markers in Cystic Aspirate to Differentiate Between Keratocystic Odontogenic Tumors, Ameloblastomas & Dentigerous Cysts

Undergraduate – Oral and Maxillofacial Surgery

Purpose: Three of the most common cystic lesions encountered in the maxillomandibular region are keratocystic odontogenic tumors (KCOTs), ameloblastomas and dentigerous cysts. To make a diagnosis, tissue samples are typically obtained from the lesions. Oftentimes, however, it is difficult to differentiate between a KCOT and ameloblastoma at the histological level [4]. Once a diagnosis has been reached, a treatment plan is formulated. The treatment for KCOTs and ameloblastomas tends to be extremely invasive, often resulting in facial deformities for the patient due to the aggressive nature of the lesions [9]. In this study, the aspirate from the lesions will be utilized to identify the presence of specific molecular markers and any differences in their levels of expression. This information will be used to create a cytokine profile for each of the three lesions. *Methods*: Twelve patients at the UIC College of Dentistry's Department of Oral and Maxillofacial Surgery that were receiving treatment for a radiolucent lesion that had been diagnosed as a KCOT, ameloblastoma or dentigerous cyst in the maxillomandibular region were eligible for participation. In order to test for the presence of the sixteen specific molecular markers chosen, an enzyme-linked immunosorbent assay (ELISA) was used. Bio-Rad XRS and ChemiDoc XRS software were employed to visualize the results. *Results*: Fifteen pairs of cytokines showed statistically significant ratios of expression, with each of the three lesion types showing varying levels of expression. A cytokine profile for three lesions was successfully created. *Conclusion*: Though this pilots study shows promising results, this information will be used and compared with results obtained from a larger pool of samples to determine whether or not there is a difference between KCOTs, ameloblastomas and dentigerous cysts at the molecular level. This will allow for a more accurate diagnosis as well as a less invasive diagnostic method.

89. Kataria, Kumud

Vulnerabilities to Depression

Undergraduate – Psychology

Depression is defined as a mental illness that involves the body, mood, and thoughts. It is characterized by lack of activity and self-worth, along with feelings of sadness, gloom and inadequacy. Individuals experiencing depression face hopelessness, passivity, indecisiveness, suicidal intentions, loss of appetite, weight loss, and sleeping disorders. Approximately 13 million to 14 million people experience a depressive disorder every year; and only 20 percent obtain satisfactory treatment. Ninety-seven percent of those experiencing depression report that their work, home life, and relationships have suffered as a result of it.

With depression affecting many individuals and various aspects of life, it is crucial to investigate the causes for it. "What are the etiologies of depression?," one may ask. Vulnerabilities to depression can be divided into several categories, four of which include personality predictors, relationship dysfunction, cognitive vulnerabilities, and biological vulnerabilities. Sociotropic or dependent individuals experience anaclitic depression as a result of their personality characteristics, whereas autonomous or self-critical persons experience introjective depression. Dependent and self-critical individuals also experience relationship dysfunction as a result of their personality characteristics, thus increasing their vulnerability to experience depressive symptoms. Additionally, several cognitive vulnerabilities also play a key role in invoking depressive symptoms, which may lead to depression. These include dysfunctional attitudes, negative cognitive style, ruminative response, cognitive distortions, construct availability, along with associative memory and mood congruity. Beck's theory of the cognitive triad and the learned helplessness model further help explain such negative cognitive styles. Research on abnormalities in the way certain parts of the brain function among depressed patients has contributed to understanding how brain physiology may have a crucial part in predicting depression. Furthermore, these four vulnerability factors, namely personality predictors, relationship dysfunction, cognitive vulnerabilities, and biological vulnerabilities work together in an integrated manner in increasing the likelihood of an individual experiencing depression.

90. Kemner, Gretchen; Bottoms, Bette L.; Harrington, Evan; Reynolds, Carrie; Salerno, Jess; Najdowski, Cindy and Dave, Reetu

The Effect of Jurors' Religiosity in Their Perception of a Homicide Case Involving "Gay Panic" Defense

Undergraduate – Psychology

The "gay panic" defense is a form of provocation defense in which the defense attorney in a murder trial argues that a victim's homosexual advance caused the defendant to lose control. Jurors are instructed to choose a sentence of lesser severity if they believe that the provocation presented was enough to result in an ordinary person losing control of his or her actions. Little empirical research has assessed the effects of juror individual differences on perceptions of defendants who use the gay panic defense. I predicted that religion could influence punitiveness in these cases. Specifically, compared to jurors who are less religious, mock jurors who are the more religious would be more likely to accept the gay panic defense and will be less punitive. In a control condition in which there is no homosexual advance or gay panic defense, however, mock jurors would be equally punitive. Seventy two community members (19 to 67 years) participated in this study. They were asked to act as a juror and read a written scenario summarizing a murder case. Jurors read one of two versions: In the gay panic condition, the victim made a homosexual advance toward the defendant, and in the control condition he did not. Participants rated their religiosity on a 1 (Not at all religious) to 5 (Extremely religious) scale. Contrary to our hypotheses, no interaction between religiosity and condition B=.1.47, ns. Thus, this study found that a juror's religiosity did not have an effect on how punitive mock jurors were in a case in which the gay panic defense is used.

91. Khalid, Syed

In Vivo Evidence for the GTPase Facilitated Mechanical Role of Dynamin in Vesicle Fission

Undergraduate – Biological Sciences

Exocytosis of synaptic vesicles is rapidly followed by compensatory plasma membrane endocytosis. The efficiency of endocytosis has been shown to vary with experimental conditions, but the molecular basis for

its control remains poorly understood. The function of GTPase dynamin has been implicated in vesicle fission by means of electron microscopy, in vitro lipid tube imaging, FM dye, and postsynaptic electrophysiological experiments. Though these experiments provide an appreciation for dynamin's endocytic role, they do not implicate specific knowledge of dynamin's dynamic function in endocytosis. Here, by means of cell-attached capacitance electrophysiology, real-time illustrations of membranous area dynamics were utilized to functionally discern the role of dynamin in endocytosis. Dynasore, a well-known membrane permeable dynamin GTPase inhibitor, was used to disrupt dynamin GTPase activity. Thusly, a 73% increase in endocytic duration induced by dynasore treatment was observed of the already retarded number of endocytic events recorded—a near three-fold decrease. A 95% increase in the fission-pore conductance, which is determined by the fission-pore geometry, is observed in cells treated with dynasore. Our data provides the first piece of in vivo evidence for the mechanical role of dynamin in vesicle fission.

92. Khan, Roshina

Jane Addams's Hull House Provides a Model for Improvement of Economically Disadvantaged, yet Culturally Rich Populations

Undergraduate – Neuroscience, English

In 1930, Chicago became the city with the third largest population of Jews in the world. The Jewish immigrants moved into the poorest parts of the city, including an area just south of present day UIC. By the time Jane Addams's Hull House opened its doors in 1889 on South Halsted Street, Jewish Americans had significant involvement in that area of Chicago.

The Hull House was the best known settlement house where people serving the poor in urban areas would live among the poor and serve them directly. This approach was progressive and brought social reform to underprivileged populations in a more effective, long-lasting form. The Hull House served as a community center where people of various ethnicities could mingle and connect to one another at the various lectures, clubs, activities, and classes. Jane Addams worked with poor children who attended the Hull House to nurture their growth and supported community leaders in their efforts to help others.

The Hull House serves as a model for modern day projects to inspire leadership in others through commitment to public service. Studying how the Hull House interacted with a specific culture, in this case focusing on people of Jewish descent, provides examples that should be replicated or improved upon when attempting to bring social reform to an underprivileged area where a certain culture predominates. Observations from this project were used to better understand personal experiences of bringing aid to an indigenous village in Costa Rica, providing tutoring to underprivileged children in Pilsen, and volunteering at a non-profit clinic that caters to certain ethnicities. By observing the influence of Jane Addams and the Hull House, and through further understanding via personal experiences, one can learn how to improve projects that bring social reform to areas inhabited by close-knit communities.

93. Khandaker, Farihah

The Effects of Economic and Political Institutions on Bangladeshi Children and Non-Profit Organizations

Undergraduate – Economics

The goal is to understand the political and economic factors that have brought forth a non-profit organization for children in Bangladesh. Distressed Children International (DCI) is a non-profit charitable organization in Bangladesh that helps children stay in school by providing monthly stipends to families. DCI provides data

to understand the economic and political ramifications of operating in Bangladesh, and the economic successes and failures of a charitable organization. Additionally, the exogenous factors in Bangladesh that have brought forth the necessitation of a non-profit organization in the first place are studied. In terms of methodology, any information collected for research is from books, websites, journal articles, or logistical data from DCI. Given that I have studied two disciplines at the University of Illinois at Chicago, I thought it would be more beneficial for me to attempt to perform this analysis from those academic perspectives, the political science lens and the economics lens. I believe these two areas of study compliment each other to a sufficient degree, so that the ultimate culminating research will be comprehensive. The results indicate that the corruption within Bangladesh's political institutions has inhibited many children from receiving an education and has slowed down economic initiatives in certain respects. Furthermore, the legislation in place has not created the necessary overhaul in order to keep children out of the labor force. DCI is performing an important service to Bangladesh, however, there needs to be a sustainable and long term plan in order to overhaul the existing education system and create a higher standard of living for Bangladeshi children.

94. Kim, Candice; Vidovich, Mladen

Medicolegal Characteristics of Cardiac Catheterization Litigation

Graduate – Cardiology

Background and Aims: Cardiac catheterizations have become an integral part of medical care; however, there have been few assessments of the pattern of medicolegal cases that involve cardiac catheterizations. This study reviews the patterns of liability and medical outcomes in cases involving cardiac catheterization litigation. *Methods*: Legal case opinions were obtained from LexisNexis Academic; case characteristics, litigation outcomes, and medical outcomes were identified. Additionally, data was collected from the Physician Insurers Association of America (PIAA), which is an Association that maintains a data registry of medical professional liability claims. *Results*: Between 1985 and 2009, the PIAA registry documented 1361 closed coronary angiography claims. The medical specialty of Cardiovascular Disease was involved in 699 of these cases with other specialties such as internal medicine, CT surgery, general surgery being involved in the remaining cases. Of these claims, 36% (492 of 1361) were voluntarily dismissed, 25% (337 of 1361) were settled before litigation, 16% (215 of 1361) were not prosecuted, and 11% (154 of 1361) were involuntarily dismissed. The most common alleged error was for improper performance (482 of 1361) followed by no medical misadventure (316 of 1361). Of the 116 cases reviewed through LexisNexis, only 30% (35 of 116) were judged in the patients' favor. Litigation against physicians occured in 90.5% (105 of 116) of cases with judgments in favor of the patients in 29.5% (31 of 105) of cases. Death as outcome was present in 42 cases. In these claims, the physicians were more likely to be sued (95%--40 of 42) and the judgment was more likely to be in the patients' favor (40.5%--17 of 42). *Conclusion*: In litigation related to cardiac catheterizations, the majority of cases are due to medical malpractice and physicians are sued in a high percentage of those cases. It is important that cardiologists recognize these patterns of litigation as this may impact and improve the processes of care. However, physicians in other fields should be aware of these findings as specialties outside of cardiology were involved in almost half of all litigation cases.

95. Kim, Hyun Jung; Krunic, Aleksej; Lantvit, Daniel; Swanson, Steven and Orjala, Jimmy

Novel Nitrile-Containing Fischerindoles From the Cultured Cyanobacterium Fischerella sp.

Graduate – Pharmacy

Cyanobacteria are known to produce biologically active and structurally diverse metabolites. More than 70 indole alkaloids from cyanobacteria have been isolated and showed a variety of biological activities. The majority of these alkaloids contain an isonitrile or isothiocyanate moiety. Of the more than 70 indole alkaloids described to date, only five have been classified as fischerindoles, while only two of these alkaloids have been reported as nitrile substituents.

Fischerella sp. was acquired from the culture collection and cultured in the laboratory. The freeze-dried biomass was extracted with CH2Cl2/MeOH (1:1). In our target-based screenings, the crude extract showed significant inhibition of 20S proteasome. Eight fractions were obtained via our standard protocol, and evaluated. Fraction 5 displayed 20S proteasome inhibition and further fractionation led to isolation of a known compound, hapalosin. A large scale culture of this strain however, resulted in an extract with a substantially different chemical profile and HPLC-ESI-MS analysis indicated the presence of potentially new indole alkaloids. Further purification led to isolation of four novel nitrile-containing fischerindole-type alkaloids: namely, 12-epi-fischerindole I nitrile, (1) deschloro 12-epi-fischerindole I nitrile (2), 12-epi-fischerindole W nitrile (3), and deschloro 12-epi-fischerindole W nitrile (4).

The isolates were evaluated in the 20S proteasome assay at 50 μM, and only hapalosin showed inhibition with IC50 of 12 μM. All isolates were also evaluated toward a set of human cancer cells for their cytotoxicity. 2 and hapalosin were found to be cytotoxic in HT-29 colon, MCF-7 breast, H460 lung, and SF268 glioblastoma cancer cell cells with ED50 of 23, 84, 76, >40 μM for 2, and ED50 of 22, >40, 27, >40 μM for hapalosin, respectively.

3 and 4 possess a new carbon skeleton for hapalindole-type alkaloids, where the five-membered ring of the fischerindole skeleton has been expanded to a six-membered ring. Almost all hapalindole-type alkaloids reported to date contain either isonitrile or isothiocyanate substituents. The only report of a nitrile moiety is in ambiguine G and Q nitriles. Therefore, all four here reported are unusual fischerindole-type indole alkaloids in that they each contain a nitrile moiety.

96. Kloppmann, Hannah; Delavari, Nina; Kaponda, Chrissie P.N.; Mbeba, Mary M.; Chimango, Jane; Jere, Diana L.; Norr, James L. and Norr, Kathleen

Factors Predicting Condom Use Among Urban Health Workers in Malawi

Undergraduate – Nursing

Purpose: Personal behaviors put health care workers in southern Africa at risk for HIV infection, but little research focuses on their personal risk. The purpose of this secondary analysis is to examine predictors of condom use among sexually active urban health workers in Malawi. *Conceptual Framework*: We used social-cognitive learning theory to identify intermediate factors predicted to affect condom use: condom attitudes, self-efficacy for safer sex and partner communication. *Subjects*: The sample of 255 sexually active health workers in a referral hospital of central Malawi comes from the baseline data of a larger intervention study. *Method*: We examined correlations between condom use and demographic factors [if married, education, religion, gender, job type (clinical/clinical support/non-clinical), age, food security] and intermediate factors [general HIV knowledge (6 items, % correct), ABC prevention strategies (# mentioned, abstain, faithful, condoms, range 0-3), condom attitudes (10 items, scored % favorable, $\alpha = 0.77$), self-efficacy for safer sex (mean of six items $\alpha = .80$); talking to partner (if discussed condoms, safer sex, range 0-2). A logistic regression was then conducted using the significant factors. *Results*: 22% of the sample used condoms sometimes or always in the last two months. Only five factors significantly correlated ($p<.05$) with condom use: if married (negative), Catholic, condom attitudes, talking to partner, and condom self-efficacy (all positive). In logistic regression these factors explained 39% of the variation in condom use. Significant factors in the regression were: Catholic (OR=3.9), self-efficacy for safer sex (OR=5.1), talking to partner (OR=5.3). *Conclusion*: Sexually active health workers have low condom use rates and need interventions to encourage safer sex. These findings support social-cognitive learning theory in that condom attitudes, self-

efficacy, and talking to partner are all related to condom use. Interventions for health workers should build positive attitudes, and skills for safer sex and partner communication.

Key Words: HIV prevention, health workers, condom use

97. Knowlton, Christopher; Hanson, George; Orozco, Diego and Wimmer, Marcus

Autonomous Reconstruction of TKR Tibial Inserts to Measure Wear

Graduate – Bioengineering

Total knee replacement (TKR) is an increasingly common orthopedic surgery to reduce pain and restore mobility to a gradually younger and more active patient population. However, wear of the polyethylene tibial component resulting in periprosthetic osteolysis remains a primary cause of device failure. Measurement of wear in surgically retrieved components is challenging because the original surface is not available. The purpose of this study was to develop and validate a method of calculating the volume loss on the articulating surface of a cruciate ligament retaining tibial insert. It was hypothesized that the developed method would be less accurate than estimation either by computer-aided design (CAD) model or by size-matched unused inserts but would correlate strongly to gravimetric measurements. Three unworn inserts were digitized, and points were removed to simulate worn regions. An autonomous reconstruction method, in which design-congruent curves were least-squares fit to the unworn regions, allowed for the interpolation of the original surfaces in worn regions. Seven inserts worn in knee simulator testing were also digitized. Volume loss was calculated using autonomous reconstruction and compared to measured mass loss. For a 707 mm^2 simulated worn area on unworn inserts, the volume difference for autonomous reconstruction (9.85±6.78 mm^3) was significantly less than that for CAD estimation (28.89±8.27 mm^3, p=0.001) and not significantly different than that for size-matched unused insert estimation (8.89±7.69 mm^3, p=0.82). Geometric volume loss on the simulator inserts correlated linearly to gravimetric wear (R^2=0.94) with a regression slope near unity (m=1.38±0.15, p=0.06.) The results of this study indicate that autonomous reconstruction can be used to accurately measure wear when the original surface of an insert is not available, as with *ex vivo* implants. Geometric measurement can analyze the spatial distribution of wear, which provides insight and new metrics to the *in vivo* wear process of TKRs.

98. Kociolek, Anton

Donde Este mi Congo Laré: The Central African Legacy in Puerto Rico

Undergraduate – Anthropology

The African heritage of Puerto Rico has been, to date, poorly studied. Although a handful of scholars have explored aspects of the legacy of African peoples in Puerto Rico, the subject has remained something of a lacunae in the larger body of African Diasporic studies. No systematic study of the contribution of African cultures to the emergence and development of Puerto Rican creole culture has been undertaken, in contrast to the rich body of work that has been devoted to similar themes in other Caribbean societies such as Cuba, Haiti, or Jamaica. Africans and creoles of African descent arrived in Puerto Rico over the course of centuries, through the Atlantic slave trade and through intra-Caribbean migration. An important element within the African based population in Puerto Rico were various Bantu speaking peoples from West Central Africa – an area stretching from present day Gabon on the north, to the northern part of Angola on the south. An examination of historical documents and the study of African derived elements within Puerto Rican popular culture underscores the apparently important place that Central Africans had within the larger matrix

of Puerto Rican society. Bomba – a neo-African musical complex encompassing traditional Afro-Puerto Rican drumming, song forms, and dance styles – can be examined as an important legacy of Central African Bantu groups in Puerto Rico. An examination of the instrumentation, song lyrics, dance choreographies, postural aesthetics, and associated terminology suggests that much of bomba dance and music ultimately derives from Central African forms. Puerto Rican bomba is also historically linked to dynamics of migration from other regions of the Caribbean, and bears marked similarities to neo-African styles elsewhere in the Caribbean, many of which have also been associated with populations of Central African descent. This paper draws on secondary sources ,including written documents and multimedia recordings, as well as the author's own research and personal conversations with musicians, dancers, and others to explore the structural and ideational legacy of Central Africans in Puerto Rican music, dance, and popular religion.

99. Kowalski, Anna

Identity Formation in Transracially Adopted Korean Americans

Undergraduate – Communication

Transracial adoption in the United States is a misunderstood institution. Negative media coverage and portrayal of adoptees has resulted in multiple studies focusing on potential harm to society and family bonds rather than the challenges faced by the adoptees themselves. This study provides a comprehensive look at the identity formation process undertaken by transracially adopted Koreans raised in the United States. In addition to a summary of sociological and communication studies concerning identity in general, this paper offers a historical perspective to the adoptee experience through consideration of the evolution of U.S. immigration policy and media representation. Research was conducted through textual analysis of secondary works as well as several Korean adoptees' autobiographies, which were used to provide a more personal perspective to the topic. It was discovered that the presence of dual identities in transracial adoptees results in a heightened awareness of societal scrutiny, and this causes the process to appear strikingly similar to the biological children of recent immigrants. However, it was concluded that the existence of unanswerable questions is the unique factor in adoptee identity formation, and how these questions are approached and addressed by the adoptive parents ultimately defines the child's full perception of self.

100. Kucharczyk, Maja; Dombard, Andrew and Meyer-Dombard, D'Arcy

Rapid Mapping of Geothermal Features in Yellowstone National Park

Undergraduate – Earth and Environmental Sciences

Yellowstone National Park contains at least 10,000 geothermal features; nowhere else in the world is an area so dense in these features. Study of the ecology of microbial life that lives in these springs, and its interdependence on the geochemical environment in which the microbes are found, is hampered by the fact these geothermal features are very dynamic. In order to understand the context in which geochemical and microbial samples are taken, detailed maps of the features and their outflow channels are required. Mapping using traditional surveying techniques has proven to be so time consuming, however, that there may exist only a single map per feature that possesses the fidelity required for the geobiological sampling. This is unfortunate because the springs and the outflow channels in particular can change appreciably from year to year. Furthermore, many features, particularly sites of recent interest, are currently unmapped. Clearly, a new map is desired for each feature studied during a field season, in order to place collected samples in their proper geospatial context and to track the changes to the geothermal features. We have been developing a rapid mapping protocol to achieve this goal. The procedure involves taking a series of nadir-pointing images,

and stitching them together using commercially available photo-mosaicing software. The time to survey a geothermal feature is reduced from days to hours, and the post-processing time is similarly reduced, especially if the mosaicing steps are automated. The prototype maps appear to have the necessary fidelity for the geobiological sampling. Future refinements to the protocol should improve efficiency, thus providing scientists a powerful new tool to understand the microbial ecology of geothermal features in Yellowstone.

101. Kuhn, Angela

An Empowered Workforce Through Corporate Sustainability

Undergraduate – Business Administration

Sustainable efforts are becoming incorporated into corporations quickly as the trend increases in society and the government creates regulations forcing companies to become more efficient in building their triple bottom line. Government legislation, consumer demand, employee interest, and the reduced costs of efficiency are leading companies to create a greater consciousness of the environment, people, and the economy. Increasing sustainability efforts, corporations can create a competitive advantage in their industry—through profits, meeting demands, and producing new, innovative products to meet standards. To successfully achieve a competitive advantage, sustainability must be integrated into the corporation's culture. Empowering employees is the only way a company can achieve a complete cultural transformation.

How can businesses operate in a sustainable way and get their people to go along to give the company a competitive advantage? For employees to be fully adapted to the corporations improved culture they must rethink every aspect of their job and workplace in sustainable terms. Although a majority welcome sustainable efforts into their company, employees must be motivated by management to enthusiastically grasp this change—they need to be given a reason for change.

Through my research I considered the best ways to change corporate culture. I organized a successful process that can be used to alter the company's and employees' operations and all around attitudes to be sustainable. I have researched many of the top sustainable companies and the most profitable companies to find out what strategies are success in transforming an organization toward sustainability.

Through the course of my research I have investigated these topics, proving they are the track to getting employees empowered to adapt sustainability. A corporation cannot be sustainable without full support and enthusiasm of its employees. So my main goal of this capstone is to fully understand how to get them there.

102. Kulkarni, Hanumanth and Reddy, Krishna

Effects of Unsaturated Hydraulic Properties of MSW on Moisture Distribution in Bioreactor Landfills

Graduate – Civil and Materials Engineering

Moisture distribution in a bioreactor landfill depends on various parameters such as the leachate recirculation system and its geometric configuration, hydraulic properties of municipal solid waste (MSW), and others. Hydraulic properties of MSW are the most important parameters that govern leachate distribution. Studies on the effect of saturated hydraulic properties of MSW on moisture distribution are documented in literature; however, studies on the effect of unsaturated hydraulic properties are scarce. The main objective of this paper is to model the effect of unsaturated hydraulic properties of MSW on leachate distribution. Since MSW is unsaturated, flow of two immiscible fluids (leachate and landfill gas) is expected; therefore, a mathematical model that accounts for a two-phase system is implemented which considers leachate as wetting fluid and landfill gas as non-wetting fluid. This model is validated based on reported laboratory test

results and mathematical modeling studies. The effect of unsaturated hydraulic properties of MSW indicates significant variations in leachate distribution under steady state and gravity drainage conditions, which shows that its consideration is essential in the design of leachate recirculation systems in bioreactor landfills.

103. Kunamalla, Aaron; Garg, Daman and Jeffery, Constance

Purification of Mexd, A Multidrug Resistant Transmembrane Protein

Undergraduate – Biological Sciences

Transmembrane proteins play vital roles in cell-cell communications, ion transport and maintenance of cell structure and are the targets for the majority of pharmaceuticals in use today. Multidrug resistance (MDR), caused by the actions of transmembrane efflux pumps, has become an increasingly common medical problem. The MDR pumps jettison drugs or antibiotics into the external medium, which lowers intracellular concentration below a toxic threshold, and thereby preventing the drugs or antibiotics from reaching their targets within the cell. The physical structures of MDR proteins are necessary in order to elucidate their mode of operation and develop possible countermeasures to the efflux pumps. The purpose of this project is to purify and crystallize the MDR transmembrane protein MexD from Pseudomonas aeruginosa for biochemical and biophysical analysis. P. aeruginosa is an opportunistic bacterial pathogen that is a major contributor to the reduced life expectancy observed in individuals with cystic fibrosis. Furthermore, P. aeruginosa causes opportunistic infections in immunocompromised burn and cancer patients. Currently, efforts to successfully purify MexD are underway. Once purification of MexD is achieved, it can be crystallized and studied via X-ray crystallography. The structure and function of the MexD protein can then be used to design innovative drugs or antibiotics that can effectively remain in the target cell or create pharmaceuticals that can shutdown the MDR pumps. MDR efflux pump inhibitors would enable the intracellular accumulation of drugs and antibiotics, thereby increasing the effectiveness of anti-cancer drugs and antibiotics in treating multidrug resistant cancers and opportunistic infections.

104. Kuo, Phillip

Pharmacogenomics

Undergraduate – Liberal Arts and Sciences

Advances in pharmacogenetics and pharmacogenomics have the potential of revolutionizing health care with personalized medicine. Originally focusing on single nucleotide polymorphisms (SNPs) in monogenic traits, the field has developed to involve the proteins affecting drug metabolism “pathways” as well as drug targets. The emphasis on pharmacokinetics and pharmacodynamics mirrors the transition towards genome-wide approaches that include regulatory SNP and structural RNA SNP biomarkers in addition to those that alter the amino acid sequence of encoded proteins. Pharmacogenetic strategies offer significant insight on improving drug therapies for cancer, psychiatric disorders, and addictive disorders, especially for drugs with narrow therapeutic indexes, too . As pharmacogenomics transitions to the clinic, the implementation of electronic medical records will be critical for successful treatment.

105. Larson, Carol

Why Can't We All Agree? A Cognitive Prototype Model of Moral Disagreement

Graduate – Educational Psychology

How does moral disagreement become manifest? According to the cognitive prototype model of moral disagreement, people focus on social context, intention, consent, and outcomes properties when making moral judgments. Situations with no property conflicts are prototypes. Situations that deviate from the prototype are nonprototypes. This framework predicts that prototypes will result in a high level of agreement while nonprototypes will be more prone to moral disagreement. It also predicts that prototypes will be judged differently than most nonprototypes. In an Internet study, 481 adults (range = 18 - 80) responded to a questionnaire. The results were analyzed using 4 separate one-way MANOVAs, each comparing 5 conditions (i.e., 1 prototype and 4 nonprototype conditions) in a given scenario set. Judgments about prototypes and nonprototypes were compared on three dependent variables: right/wrong, praise/blame, and level of difficulty. Additionally, frequency and percentages of "right" vs. "wrong" responses were tabulated to identify which conditions resulted in aggregate agreement or disagreement. The findings were that the prototypes significantly differed from all or several of the nonprototypes on judgments of right/wrong and blame/praise ($p \leq .01$) in a given set. In 3 out of 4 scenarios, the prototypes were significantly easier to judge than some or all of the nonprototype conditions ($p \leq .01$). Although a few nonprototypes acted similarly to the prototypes, none received higher ratings of praise/blame or rightness/wrongness in their respective immoral or promoral scenario sets and none of the nonprototypes were easier to judge. Additionally, prototypes received the highest levels of agreement (≥ 99 percent). The findings support the model's claim that most nonprototypes will be judged differently than prototypes and are a source of moral disagreement.

106. Latka, Regina

Carboline Formation from Transition Metal-Catalyzed C-H Bond Amination

Undergraduate – Chemistry

In the field of pharmaceutical research, organic chemistry plays a key role in discovering better ways of manufacturing important drugs. As an undergraduate researcher in the Driver research group, I have been making Beta-Carbolines and Carbazoles as part of a bigger project involved in the synthesis of Dimebolin. Dimebolin is a drug used to delay the progression of Alzheimer's disease. However, the mechanism of dimebolin remains uncertain and there is some evidence that it affects mitochondria. The goal of the project is to find a more efficient route in the production of Dimebolin, yielding a low amount of by-products and minimizing the steps of production.

The first step in forming the beta-Carbolines and Carbazoles is a Suzuki cross-coupling reaction. Substrates have been made using a variety of substituent groups including –Me, -F, -MeO, -CF3, and –Cl. Following the Suzuki cross-coupling reaction, an azidation reaction transforms the amine into an azide. Following the azidation, a methylation reaction protects the nitrogen in the catalyst reaction. The substrates created have been screened with the following catalysts: RuCl3 x H2O, Pd(PPh3)4, Ir(COD)OMe, and Ir(COD)Cl. The Carbazole compound has been made using methods previously discovered by the Driver researcher group.

Most of the research has been done this past year. The substrates formed from the Suzuki cross-coupling reactions and azidation reactions have been made and screened with catalysts. The final months were spent optimizing the Beta-Carboline and Carbazole compounds. We have found that ruthenium III chloride hydrate catalyzes the stereo-selective formation of beta-carbolines from aryl azides.

107. Launiere, Cari; Czaplewski, Gregory; Myung, Ja Hye; Hong, Seungpyo and Eddington, David

Biomimetic System for Circulating Tumor Cell Isolation

Graduate – Bioengineering

Microfluidic CTC isolation devices are used to remove cancer cells from patient blood samples for the purposes of cell enumeration and molecular characterization. The information collected can be used for the monitoring of disease progression or for basic research. Some early systems are already being tested in clinical settings. However, there is still much room for improvement in terms of cost, efficiency and ease of use. We have developed a system that combines biomimetic protein combinations, hydrophoretic cell focusing, and microscope interface features within one inexpensive and easily fabricated device. Improvements to the validation procedure, such as the use of rheologically biomimetic test solutions and automation of the enumeration procedure, allow for rapid benchmarking of new device designs.

108. Lederer, Adam; Dombard, and Patterson

Investigation of Conomara Chaos, Europa: Characterizing spatial behavior of a non-terrestrial ice morphology

Graduate – Earth and Environmental Sciences

Europa is the third largest satellite of Jupiter. It is a rocky world roughly Moon-sized and capped with a global ice and water shell that is 100 km thick. At nearly 800 million kilometers from the Sun, its average surface temperature is cold, 90-130 K. Surprisingly, images from NASA missions show the surface modified by processes that may involve liquid water. Thermal energy from tidal forces from Jupiter may be enough to internally heat Europa and allow a subsurface liquid water ocean beneath a 20-km thick water-ice shell. Europa has a vast and unique spectrum of surface morphologies. A class of features called chaotic terrain includes circular features juxtaposed with a grainy matrix. Conomara Chaos is a surface feature that resembles a conglomeration of terrestrial sea icebergs locked in a slushy sea. However, the actual scale and non-terrestrial nature of Conomara indicate a distinctly Europan process. Several models have been proposed to explain the formation of chaos on Europa. Surface morphology determined by subsurface mechanisms is a common to all the models, but each of these models has a unique control on the surface conditions at the time of formation. A previous study indicated that the majority of the berg-like objects have been translated counterclockwise from their initial locations. This reconstruction is equivocal, however, because measurement errors were not considered. Thus, we will re-perform this reconstruction. A kinematic computer model will then test whether random impulses to bergs can result in net translation, or whether directed flow is required. The results of the study may further resolve the puzzle of chaos formation and rule out some models. Better data and imaging from a future mission to Europa will be needed to resolve ultimately the intricacies of chaos.

109. Lee, Allison

The Marriage of Odysseus and Penelope

Undergraduate – Classical Studies

In this paper, I will investigate the topic of good marriage and address the question of how the marriage of Penelope and Odysseus conform to the current psychological analyses to what constitutes a good marriage.

Exposure to the entertainment media has caused our generation to have a misleading idea of marriage. When our expectations of everlasting love and happiness are not fulfilled, the marriage instantly falls apart. We realize too late that the happy endings are actually the beginning and marriage life is not so simple.

Homer's Odyssey is one of the invaluable written archives that our ancestors left behind to provide guidance for future generations. Odyssey is more than what it seems as the poet's real intention goes beyond mere story telling. Odyssey, at its core, is more like a moral guidebook. Upon deep analyses of the complex narrative, moral ideals of the ancient times are unveiled.

Through such analysis, I will illustrate the psychological character of Penelope as she deals with social pressures while holding onto hope of Odysseus' return. I will also look into why Odysseus had a profound relationship with Penelope despite his affairs with other women. Lastly, I will endeavor to show how an understanding of a good marriage by following the relationship of Penelope and Odysseus.

Current psychological studies show that the modern concept of a good marriage has not changed so much from the time of Odyssey. Our ancestors too experienced the marital problems that are not much different from ours today. Odyssey teaches us that marriage can exist in many forms and what really matters in order to have a good marriage is how we overcome the problems together as a couple. Having a better understanding of what a good marriage is may improve our chances of having a good marriage ourselves.

110. Lee, Chia-Kuei; Wang, Shan-Tair; Choi, Heeseung and Corte, Colleen

Behavioral Problems Among School-Aged Children Born to Adolescent Mothers and Adult Mothers in Taiwan

Graduate – Health Systems Science

Background: The majorities of studies have been conducted in the west and shown that children born to adolescent mothers have more behavioral problems than children born to adult mothers, which may not generalize to Taiwan given the very different social and cultural system and norms. Purposes: Secondary data analysis of longitudinal dataset was conducted to explore children's behavior problems over time in children born to adolescent or adult mothers in Taiwan. Methods: A matched sample of 107 children born to adolescent mothers and 111 children born to adult mothers were recruited from 12 elementary schools in Taiwan. Child behavioral problems were assessed using the Chinese version of Conners Parental Rating Scale completed by 218 parents at Time 1 (Grade 1-2) and the Conners Teacher Rating Scale completed by 81 teachers at Time 1 and 102 teachers at Time 2 (Grade 5-6). Maternal age at child birth, child's sex, and other sociodemographic factors were also collected. Multivariate analysis of variance was used to analyze the data. Results: Children of adult mothers had higher anxiety compared to children of adolescent mothers according to parents' reported. Teachers reported that children of adolescent mothers had more behavior problems than those of adult mothers. Both parents and teachers reported that boys had more behavior problems than girls at Time 1. Moreover, according to teachers' reports, children of adolescent mothers and boys had more behavior problems and these differences persisted over time. Besides, those differences in behavior problems persisted even after controlling for other sociodemographic factors. Conclusions: Differences in child behavior problems in Taiwan are associated with maternal age at child birth and child's sex. Future studies are needed to explore the specific factors in order to develop the intervention program to improve these children's behavior problems in Taiwan.

111. Lee, Damien; Campbell, Stephen; Johnson, Bradford and Knoernschild, Kent

Comparison of Temporary, Permanent, and Modified Dental Cements on the Retention of Implant Restorations

Graduate – Restorative Dentistry

Aim: The purpose of this study was to examine the effect of different types of dental cements on the retention of cement-retained implant restoration, as the liquid-to-powder ratios are manipulated. *Materials and Method*: Ninety dental implant abutment replicas were embedded in standardized acrylic blocks. Ninety prefabricated burn-out copings were used to standardize the copings. Wax loops were added onto the coronal portion of the copings, invested in gypsum, burned out, and cast in noble Type III casting alloy according to manufacturer recommendations. The copings were divided into 3 categories of cements: manipulated, temporary, and permanent. In the manipulated cement category, glass ionomer (GI) (Ketac), GI cement mixed with 1.5 times more liquid, GI cement mixture with 2 times more liquid were used. In the temporary cement category, zinc oxide non-eugenol temporary cement (ZONE) and temporary implant cement (Improv) were used. In the permanent cement group, resin cement (Panavia), GI in syringe (Fuji Cem), carboxylate cement (Durelon), and zinc phosphate cement (Fleck's) were used. All groups had 10 specimens. A static load of 6.8 kg was placed during the setting of the cements. All specimens were placed on a universal testing machine and underwent tensile pull test. Peak load for all specimens were analyzed using one-way ANOVA and Tukey and Games-Howell post hoc tests ($\alpha < 0.05$). *Results*: A significant mean difference was found among the three groups of Ketac with three different concentrations for peak load ($p < 0.0001$). A significant mean difference was found for the peak load between the groups of permanent and temporary cements ($p < 0.05$). The manipulated cements were significantly higher in retention compared to temporary cements ($p<0.05$). *Conclusion*: By manipulating the concentration of the cement, one is able to achieve lower retentive values, hence increasing the possibility of retrieving the implant supported crown.

112. Lee, Lillian

Different Language Learning Experiences in the Acquisition of Subsequent Second Languages

Undergraduate – Psychology

A growing number of people learn more than one second language (L2). Different experiences with language learning may play a facilitative role in the acquisition of subsequent L2s, but it has not been examined how previous L2 knowledge and experience may affect subsequent language learning.

The current study focuses on how the language learning background of an individual is related to successful learning of an artificial language. Factors examined include, total number of non-native languages spoken, total number months spent living abroad, total years of instruction in an L2, and knowledge of Romance languages. Success in the artificial language is measured via performance on a grammaticality judgment task (GJT) that included three types of linguistic violations: phrase structure (word order), morphosyntactic gender agreement (between noun and adjective or determiner), and verb argument (where transitivity properties of the verb are violated). The target of instruction was the artificial language BROCANTO2 and the context of learning was a computer-based board game. Participants were 30 adult native speakers of English who had never been fluent in another language. Linguistic experiences were self-reported during a language background questionnaire that was administered at the beginning of the experiment and two GJTs were conducted: one at low proficiency and a second at the end of language learning and practice.

The results of a correlation analysis reveal a significant positive relationship between the number of the non-native languages spoken, total number months spent living abroad, and performance on the GJT at

low proficiency. A significant negative relationship was found between performance on the GJT at low proficiency, performance on the morphosyntatic gender agreement, and knowledge of Romance languages.

Based on these results, it appears that total number of the non-native languages spoken, total number of months spent living abroad, and knowledge of Romance languages play a substantial role in the acquisition of subsequent L2s.

113. Lee, Melody

A Framework for Public Health Ethics

Undergraduate – Biological Sciences

Public health has traditionally relied on biomedical ethics for approaching moral dilemmas. However, biomedical ethics, while sharing core values with public health, is not an appropriate fit for public health. Medical ethics has a focus on individual health whereas public health ethics is more concerned with the health of the population as a whole. The two fields are approaching the same issues in two different ways. Therefore, a framework specific to public health is needed. However, despite this need, few public health ethical frameworks have been proposed. This paper argues that the existing frameworks are insufficient for the needs of public health, based on the collaborative paper "Public Health Ethics: Mapping the Terrain" by the leaders in the field. This framework is unclear on many of its points, and is not formulated in an accessible way. A more specified framework is proposed as a more helpful guide to approaching moral problems in public health. In this framework, the guidelines of effectiveness, least infringement, and public justification should help the public health practitioner to better approach the ethical dilemmas that inevitably crop up in practice.

114. Leenheer, Elizabeth; Williams, Sloan and Batai, Ken

Mitochondrial Analysis of the Mijikenda

Undergraduate – Anthropology

The Mijikenda, a Bantu speaking ethnic group from southeastern Kenyan coast, consisting of nine tribes, collectively claim recent origin from Singwaya, an area around northeastern Kenya or Somalia. However, some believe that European colonial rule led the formally ethnically distinct Mijikenda tribes to unit and claim ancestral relationship under the Singwaya origin myth. This project examines the mitochondrial DNA (mtDNA) variation of the Mijikenda to evaluate the Singwaya myth.

In order to test the Singwaya origin myth, we analyzed mtDNA hypervariable region I (HVRI) sequence of 92 individuals from four of nine tribes (Jibana, Kambe, Kauma, and Ribe) and then we compared it to mtDNA variation of the other five Mijikenda tribes, Bantus and East African populations. Supporting the recent origin of the Mijikenda tribes in northeastern Kenya, two Mijikenda tribes were plotted closely with Afro-Asiatic populations from Ethiopia and Somalia. The genetic relationship of Mijikenda tribes to other Bantu and East African populations were examined with a multidimensional scaling (MDS) plot constructed using population pairwise genetic distance. The recent origin, however, suggests genetic homogeneity among the Mijikenda tribes, but Exact Test and AMOVA show that they are genetically differentiated from each other, and they are scattered widely on the MDS plot. The observed genetic differentiation could be explained by the ethnic distinction existed among the Mijikenda tribes or genetic drift due to small population size. In fact, the Mijikenda tribes were genetically not as diverse as many Bantu and non-Bantu East African populations.

Key Words: mtDNA, ethnicity and Kenya

115. Lei, Dawn

Web M.D.: The Changing Physician- Patient Relationship

Undergraduate – Biological Sciences

Over the past two decades, the United States has not only seen the development and popularization of the Internet, but has embraced and integrated it into everyday life. Indeed, the Internet has become so entrenched in today's world that little remains untouched by this unseen hand. Medicine is no exception. The ballooning consumerist culture that has overtaken and become the American way, when combined with this new modern marvel, has lead to the development of a new patient. A patient who is not content to play the traditionally filial role to the paternalistic physician. In this new age of digital mastery and ease of information, the new patient expects and demands more. Medicine has become a service, something reviewed on websites and quantified by surveys, and any breach of expectation now finds resolution in the rooms of a court. As the patients have changed, so too have the physicians. A new view of medicine, termed defensive medicine, is on the rise and it too has changed the way the physician-patient relationship operates. The rapid growth of the Internet, spurred ever onward by the changing dynamics of the United States culture, has irrevocably altered the face of the medicine and the ties that bind physicians and patients together.

116. Lin, Annie; Marion, Andrea and Wang, Qun Tian

Analyzing Apoptosis Ratio of Wild Type and Mutant Embryos with *Additional sex combs-like 2* Gene to Determine the Reason Behind Enlarged Heart Ventricles

Undergraduate – Biological Sciences

The heart is the first organ to form in vertebrate animals. Many molecular pathways have been discovered that regulate heart development and function. A mutant mouse model for *Additional Sex Combs-like 2* dies shortly after birth with several heart abnormalities. The purpose of this project is to understand the function of the *Additional sex combs-like 2 (Asxl2)* gene in mammalian heart development. We noticed that *Asxl2* $^{-/-}$ embryos have larger ventricles than wild-type at embryonic day (E)18.5. Our first hypothesis for the observation of large heart in *Asxl2*$^{-/-}$ embryo is that cardiomyocytes in *Asxl2*$^{-/-}$ hearts may undergo apoptosis at a lower rate than in the wild-type heart. Our second hypothesis is that *Asxl2*$^{-/-}$ hearts had a greater rate of proliferation therefore, the heart is bigger than wild-type. To determine the apoptosis ratio in wild-type and the *Asxl2*$^{-/-}$ hearts at E12.5 and E15.5, we used cleaved-caspase 3 (CC3) as a marker of apoptosis. We stained heart sections for CC3 to determine if there was a significant difference of apoptosis in wild-type and mutant hearts. Our data show that the CC3-positive cells were mostly found around the vessels of the heart rather than in the ventricles. This suggests that the enlargement of the heart in the ventricles could not be due to a lower amount of apoptosis. To test our second hypothesis, we used bromo-deoxyuridine (BrdU) to label cells that are undergoing proliferation. The proliferation rate was examined in the hearts at E12.5 and E13.5, and we observed no difference in proliferation between wild-type and *Asxl2*$^{-/-}$ hearts. However, we cannot exclude the possibility that proliferation is higher at some stages which are not yet examined.

117. Litvinova, Katerina; Tomic, Goran and Jarrett, Jon

The Quest for a Unifying Theory behind Quantum Mechanics and Local Realism: Shortcomings of Imperative and Constraining Components

Undergraduate – Philosophy

The incompatibility of the numerical account of quantum and classical physics is a matter that has been firmly established with the use of modern day experiments and mathematical equations. This research dwells deeper into the world of quantum mechanics to reveal results that are incompatible with any current day theory about the workings of the quantum world. Using an experimental device known as a Mermin Contraption, its three completely separated components yield data from which incompleteness aspects of quantum theory arise. Using Bell-type inequalities to show that an incompatibility exists between quantum mechanics and the experimental findings from this contraption, a connectedness seems to present itself between two spatially distant events. However, it is currently impossible to combine the mechanisms of local realism and quantum mechanics to say how the two synchronize to result in the data found. The vital and deficient components of local realism and quantum mechanics are analyzed using findings brought to attention by Bell's Theorem to develop a new explanation for the mysteries at hand.

118. Love, Romeo and Patil, Crystal L.

Sickle Cell Pain Management: Patient Experience

Undergraduate – Anthropology

The Anthropology and Global Health Sickle Cell Disease Research Team has been collective conducting research on Sickle Cell Disease (SCD) since 2008. Given all of the support services and advancements in sickle cell disease (SCD) care and pain management, little research has been spent on understanding the experience from the sufferer's perspective. The purpose of this research is to capture individual experience about living with SCD and the uncertainty of chronic pain. Subjects were recruited and interviewed at the UIC Sickle Cell Disease Clinic and Acute Care Center. Over the course of 12 months, we developed and continuously revamped an interview guide aimed at capturing the pain experience. Interviews were transcribed verbatim and entered into a text analysis program in order to identify themes in participant responses to interview questions. Results from these semi-structured interviews provided us with a wealth of information about patients' experiences in living with and treating their SCD. Stereotyping of SCD patients because of their knowledge of the healthcare system and specific requests for medications while in the midst of great suffering affects treatment. Conclusions from this study show that many patients designate the emergency department (ED) as a last resort and prefer to suffer at home until the pain becomes completely intolerable. Often the pain needs of SCD patients go unfulfilled as previous experiences with pain therapies negatively affect decisions about when and where to access the healthcare system. It is our hope that these data can improve the total health and pain management therapies for those with SCD in order to make living with this devastating disease a little bit easier, particularly among those suffering from the uncertainly around their chronic pain.

119. Lymberopoulos, Georgia

The Effects of Phytomedicine on Plaque Acidogenicity

Undergraduate – Dentistry

The effects of phytomedicine on dental caries are discussed. Dental caries are caused by acidic metabolites produced by bacteria that normally inhabit the mouth, where they feed on carbohydrates. These bacteria exist in oral biofilms, or slime layers made of millions of bacterial cells, forming dental plaque. Unchecked,

this biofilm can reach a thickness of hundreds of cells on the surface of teeth and become mineralized, thus leading to calculus. When plaque builds up, the microorganisms in the area of the biofilm closest to the surface of the tooth begin to metabolize carbohydrates anaerobically, thus producing acidic bacterial waste products. Thick plaque build-up on tooth enamel hinders saliva from neutralizing the acid produced by the bacteria or remineralizing the damaged tooth surface, and tooth decay results. Phytomedicine, or the use of plants and isolated phytochemicals for prevention and treatment, has proven effective in controlling the proliferation of oral bacteria. The Plaque Glycolysis and Regrowth Method is utilized to study the effects of natural antimicrobial agents isolated from higher plant sources and examine the ways in which they affect oral pathogens and lead to dental plaque formation. Research is approached by both basic and clinical approaches. Overnight fasted dental plaque is collected from a non-treated quadrant of dentition for an accurate in vitro evaluation of plaque activity. Treated dental plaques are examined after extended periods of time to allow clearance and activation of antimicrobials within the oral cavity. Dental plaque samples collected are tested for metabolic and regrowth action in controlled conditions. Evidence in support of the reduction of plaque acidogenicity by phytomedicine is validated.

120. Madhi, Khalid

Dynamics of Control, Contestation and Solidarity in Marrakesh

Graduate – Political Science

My study explores how city promoters in Marrakesh, Morocco combine an amalgam of festivals, conventions, tourism and real estate to create a "place identity." In addition to the city as a structure, Marrakesh' boosters use signs in the form of powerful synecdoche to invoke greatness and attractiveness of the city and construct a "character of the place." The urban space in Marrakesh—unlike most U.S. cities—combines a model where well-defined perimeters separate "tourist space" from the rest of the city where poverty and urban decay is prevalent; but also carefully overlaps tourist space with the traditional old medina . For the Western tourist, the Medina "scene" is reminiscent of the European Medieval town; it is also an embodiment of the orientalists' archetype of the 'treacherous Kasbah'. Hence, the reproduction of such a scene promises a genuine and interactive experience; but is also staged and artificial. This reproduction therefore places the tourist (middle class and upper middle class Europeans) and the disenfranchised locals in a rather antagonistic relationship. The city therefore becomes a locus for control and contestation.

On a broader conceptual level, Marrakesh is case in which an alliance between public institutions and private interest perpetuate a structurally exploitative relationship between dominant and subordinate groups "where the grossly unequal distribution of resources, privileges, benefits, and costs present the dominant group with a problem of social control." On the other hand, the subordinate group is cornered in an endless cycle of dead-end jobs (the service industry) designed to cater to the demands of a global clientele.

121. Madugulu, Sasidhar

Design, Fabrication, and Characterization of Model Microfluidic Dispenser

Undergraduate – Mechanical Engineering

Retinal diseases such as Age-Related Macular Degeneration and retinitis pigmentosa significantly affect the lives of those afflicted. As part of the process of developing a novel micro/nanosystems-based technology for a biomimetic ocular implant that could potentially restore some of the lost functionality of the retina, a bench-top meso-scale thin-film piezoelectric diaphragm-driven microfluidic device that can reliably dispense nanoliters of liquids was developed and characterized. The significance of this work lies in the initial

investigation and measurement of specific operating principles and the identification of various challenges associated in developing such a device. Through an extensive iterative design and manufacturing process, the ability to create a device that delivers precise volumes without micro fabrication or micromachining processes was shown. The device, constructed from acrylic, occupies and area 20 mm x 20 mm and holds approximately 9.5 μL of fluid, which is controllably dispensed through a 150 μm inner-diameter silica capillary. The dispensed volume was measured using an optical microscope and image processing software over a range of command voltages, the maximum observed volume being 15 nL at 10 V and the minimum being .5 nL at 2 V. Additionally, the dynamic behavior of the output fluid was modeled using a hydraulic circuit analogy, which involved treating the system as an RC circuit with a non-linear capacitance. The motion of the meniscus was found to match the predictions of the circuit-model for command step functions and sinusoidal diaphragm inputs. To correlate voltage inputs with fluid volume outputs, the diaphragm displacement profile at various voltages was characterized using a micro-scanning vibrometer system and the volume was found by integration. The integrated volumes and output volumes were found to in agreement. This data will be used to design a more complex, multi-port dispensing system bench-top prototype.

122. Malone, Maire and Martin, Robert D.

Axial Rotation in the Primate Forelimb: A Study of the Distal Humerus and Proximal Radius

Undergraduate – Anthropology

This study is a broad-based exploration of the elbow joint across the order Primates. The goal was to identify features of the articular surfaces most closely associated with axial rotation of the forelimb. Specimens used were from the Mammalian Skeletal Collection housed at Chicago's Field Museum of Natural History. Various aspects of the humeroradial joint were examined qualitatively and quantitatively, with special attention paid to scaling relationships between metric features of skeletal morphology and body size. Digital slide calipers were used to take measurements of articular surfaces of the proximal radius and distal humerus of 24 species of mammals, including 16 primates and 8 other placental mammals and marsupials, in order to place the variation seen among primates within the larger context of variation among mammals generally. Previous studies have examined the elbow joint in similar ways, but to date, none has described the relationship between the degree of circularity of the radial head and body size. That omission has been corrected in this study. Seen in tandem with other features, the circularity of the radial head indicates the degree of axial rotation possible in the forelimb, which is linked to varying degrees of arboreality. Inclusion of this feature in future analyses, should yield a clearer picture of the trade-offs between morphology and body size.

123. Mansour, Olivia; Engel, Kathryn and Bjorkquist, Olivia

Depression and Anxiety in Teen Females and Males

Undergraduate – Psychology

Anecdotally, females are said to be more emotional than males, as well as worry and stress more over various everyday encounters. There are many explanations as to why males may be able to suppress certain feelings more than females and vice versa. Some researchers argue that due to biological predispositions, males and females differ in vulnerability and susceptibility to depressive or anxious feelings. It is essential to study depression and anxiety rates among males and females to contribute to future research and scientific understanding of the differences among males and females. The purpose of the study is to report mean scores of anxiety and depression among teen females and males to determine if females have higher rates of

depression and anxiety than males. The sample consisted of one hundred fifty-five (N=155) participants. Participants were in the age range of 13-15 years. Twenty-two female high school students and one hundred thirty-three male students completed a Beck's Anxiety Inventory and CES-D Depression Screening. When assessments were administered, females and males were separated from each other in different rooms. Assessments were scored and analyzed. The mean score for females on the CES-D Survey (M=16.76) compared to the males' mean score (M=11.88) permits failure to reject the hypothesis that females tend to have more depressive symptoms. The mean score for females on the Beck's Anxiety Survey (M=16.14) compares to the male's mean score (M=7.67) also allows failure to reject the hypothesis that females tend to be more anxious than males. Independent samples t-test values indicate that females had significantly higher levels of depression than males, $t(114)=2.04$, $p< .05$. Independent samples t-test values for anxiety also indicate that females in general had significantly higher levels of anxiety than males, $t(111)=3.61$, $p<.05$. A small, female sample size was a major limitation to this study.

124. Marginean, Alexandru

Olfactory Discrimination Learning and Learning Set Formation in Mice

Undergraduate – Biological Sciences

The study of human memory disorders hinges on a clear neurobiological understanding of human learning and memory formation. The study of cellular mechanisms for memory formation and learning in affected individuals is; however, extremely difficult and invasive. For this reason, mouse models have become extremely important. In order to utilize these models maximally, it is important to establish the cognitive capabilities and limitations of mice. The present study consisted of three experiments aimed at determining if a learning set (a type of higher order cognitive process) can be acquired by mice. The acquisition of a learning set results in improvement of learning rate across a series of analogous discrimination problems and the adoption of a "strategy", such as "win/stay, lose/shift" when confronted with a new problem. Mice were trained on multiple discrimination problems using olfactory cues. The first experiment measured error rates in a long series of reversal problems using a single pair of discriminative odors. The second experiment examined whether a learning strategy established during serial reversal trainings would transfer to the learning of a novel odor pair. Finally, the third experiment looked to demonstrate whether training on multiple novel odor pairs would be more effective than serial reversal learning in establishing a win/stay, lose/shift strategy. While perseverative errors declined precipitously during serial reversal learning, regressive errors remained substantial. Serial reversal learning experience had no beneficial impact on the learning of a new problem with different odor cues. Finally, mice that had learned a series of eight distinct discrimination problems learned a novel problem no faster than did mice that had simply been trained extensively on a single discrimination. While these results do not support the hypothesis that mice acquire olfactory learning sets, the experiments raise methodological issues that should be addressed in future studies of this problem.

125. Mariano, Bernard; Reynolds, Carrie and Bottoms, Bette

The Influence of Political Orientation on Perceptions of Homosexual and Heterosexual Domestic Violence

Undergraduate – Psychology

Domestic abuse is a serious problem facing American society today. It has been predominantly seen as a problem faced by women in heterosexual couples. Research suggests, however, that both men and

women in heterosexual and homosexual relationships experience abuse (Seelau, Seelau, & Poorman, 2003). In cases of domestic violence, people sometimes have a tendency to blame the victim for the incident. Past studies show that conservatives are sometimes more likely than liberals to blame the victim for abuse. We expected to replicate and extend that finding in our study of the effects of political orientation of participants and the gender of both the victim and the perpetrator on people's tendency to blame victims of domestic violence. We also expected to replicate and extend prior findings that male victims are thought to be more responsible in domestic abuse cases than female victims (Harris & Cook, 1994) by finding a similar pattern in homosexual relationships.

479 participants read brief vignettes describing domestic violence incidents. Victim and perpetrator gender were varied. Participants reported the level of blame they attributed to the victim. Analysis revealed no significant main effects of political orientation $F(3, 479) = 4.43$, $p = .36$ *n.s.*, victim gender $F(3, 479) = 2.14$, $p = .49$ *n.s.*, nor defendant gender $F(3, 479) = 5.43$, $p = .55$ *n.s.*

Analyses did reveal a significant three-way interaction. There was a significant interaction between gender of the victim and the perpetrator for liberals. Liberals blamed the perpetrator equally when the victim was a woman $F(1, 479) = 2.84$, $p = .84$ *n.s.* When the victim was a man, liberals blamed him more when he was in a homosexual rather than a heterosexual relationship $F(1, 479) = 3.97$, $p = .05$ suggesting that liberals blame a homosexual man for being abused in a relationship when compared to other couples.

126. Martin, Keith and Picco, Vittorino

An Automated Antenna Measurement System Utilizing Wi-Fi Hardware

Graduate – Electrical and Computer Engineering

Antenna pattern measurements are typically conducted using an anechoic chamber, a two-axis positioner, and a network analyzer. The large investment needed to build such a facility prevents educational groups from demonstrating antenna patterns. We propose an inexpensive, easy to construct system to measure the gain of an antenna operating at 2.4GHz. The system utilizes a Wi-Fi router to generate the RF signal used to excite the measurement antenna (MA). The antenna under test (AUT) receives this incident signal, and serves as the receiving antenna for an additional Wi-Fi router. When queried, the receiving router provides a Received Signal Strength Indicator (RSSI) value that is proportional to the incident power of the received signal. By rotating the AUT and measuring the RSSI in each position, the three-dimensional gain pattern of the AUT is determined. Because the RSSI is evaluated only for the specific Service Set Identifier (SSID) of the transmitter, incident fields from devices operating at the same frequency do not affect the result. This robustness to interference helps mitigate the effect of operating outside an anechoic environment. A directional MA also minimizes scattering from the environment. Time averaging of multiple measurements, calibration, and linearization ensure accuracy. A simple two-axis positioner is constructed using readily available components, including a commercially available stepper motor and controller kit. The stepper motors are controlled using a PC running LabVIEW software. A LabVIEW program is developed to control the motion of the AUT and query the receiver for RSSI measurements. This allows automated measurements of the entire three-dimensional gain pattern. The gain pattern can then be viewed in two- and three-dimensional plots. The total cost for this system will be under $1500, compared to several hundred thousand for a typical anechoic setup.

127. Mauleon, Gerardo; Fall, Christopher and Eddington, David

Spatio-Temporal Oxygen Control of a Brain Slice-- Stroke on a Chip

Graduate – Bioengineering

The hippocampal acute brain slice preparation is an excellent model for studying how neuronal tissue responds to a hypoxic insult; a fundamental question to stroke research.
In order to fully understand the relationship between oxygen and neuronal function, one should subject the tissue to an environment where the oxygen supply can be controlled both temporally and spatially without disturbing any other variables. To address this problem, we have developed a microfluidic add-on to a commercially available perfusion chamber that diffuses oxygen throughout a thin membrane and directly to the brain slice. A microchannel is responsible for the rapid and efficient oxygen delivery and can be modified to allow different regions of the slice to experience different oxygen stimuli. Using this novel device, we show that we can not only obtain a stable oxygen environment throughout the brain slice, but we also obtain better control over the hypoxic insult as demonstrated with the use of the calcium-indicator Fura-2. Finally, we show that we can independently oxygenate different regions of the hippocampus and measure two independent responses.

128. McGinty, Patrick; Goslawski, Melissa and Phillips, Shane A.

Aerobic Exercise Prevents Reduced Arterial Compliance After a Single Bout of Resistance Exercise

Graduate – Applied Health Sciences

Introduction: Reductions in arterial compliance after an acute bout of exercise can induce arterial dysfunction and threaten vascular endothelial health. Recent studies have shown that an acute bout of resistance training reduces compliance in arteries for up to sixty minutes. Hypothesis: We hypothesized that aerobically conditioned subjects would demonstrate less reduction in compliance after an acute bout of resistance training compared to subjects who participate in chronic resistance training. *Methods*: Healthy, lean sedentary (SED), resistance trained (RT; weightlifted > 3x/week), aerobic trained (AT; runners > 15 miles/week), and cross trained (WT; weight lifters and runner) individuals underwent a single progressive 15 minute leg press weightlifting session. Brachial artery flow-mediated dilation (FMD) was measured with ultrasound and blood pressure was measured with a standard blood pressure cuff before, during and after exercise. Compliance was calculated from these measurements with the formula: 2*(max diameter-min diameter)*min diameter + (max diameter - min diameter)^2/(pulse pressure*min diameter)^2. *Results*: All subjects were normotensive with similar blood pressure responses to exercise. All groups demonstrated similar arterial compliance pre-exercise. There was no difference in compliance after exercise in SED, RT, and CT groups. However, brachial artery compliance was increased after acute weight lifting (mean pre: .00160 vs. mean post: .00218) in AT individuals. *Conclusion*: These results indicate that aerobic exercise but not resistance exercise may be important in protecting against reduced arterial compliance induced by a single weight lifting session.

129. Mehta, Yasmin; Valika, Insiya Karim; Bartlett, Laura; Gonzalez, Kay and Morgan-Short, Kara

Adjective Agreement & Syntactic Position: An ERP Study of Adjectives in Mexican Spanish

Undergraduate – Spanish

Neurolinguistics is an exciting new field that can bridge the gap between theoretical linguistics and biological perspectives on language processing. Our pilot study looks at theories of adjective placement in Spanish using experimental techniques, specifically Event-Related Potentials (ERPs). The ERP technique utilizes EEGs time locked to a stimulus to show real- time cognitive processes. In Spanish, adjectives can appear before the noun (prenominal) or after the noun (postnominal), and they agree with their noun in

gender and number in both positions, but it is not known if these positions are processed differently. Studies on agreement with prenominal adjectives in German (Davidson & Indefrey, 2009) and in Dutch (Sabourin & Haverkort, 2003) found a P600 for non-agreeing adjective-noun word pairs embedded in sentences. However, Barber & Carreiras's (2005) ERP study on postnominal adjectives in Spanish found a LAN/P600 for adjective-noun word pairs in sentences. Thus, there appear to be differences in cognitive processing according to adjective position. This difference, however, has not been explored within a language that has both pre- and postnominal adjectives. Our pilot study fills this gap by investigating different types of adjectives in both pre- and post-nominal position types in Spanish. To this aim, we recorded ERPs from 12 native speakers of Mexican Spanish while they read sets of three words in Spanish with the order of either article-adjective-noun (prenominal; la simpática vaca 'the nice cow'), or article-noun-adjective (postnominal; la vaca simpática 'the cow nice'), which they judged as being "Good" or "Bad". The ERPs elicited to gender agreement violations on prenominal adjectives generally show sustained frontal negativities and posterior P600-like components. However, postnominal adjective agreement violations tend to elicit sustained frontal negativities without P600s. These pilot results indicate that agreement processing may be dependent upon the position of the agreeing element, regardless of word category.

130. Miller, Brian

HIV Testing in Hospital Emergency Departments

Undergraduate – Biological Sciences

Because many minorities living in underserved neighborhoods are uninsured, large numbers do not get access to regular HIV/AIDS screenings which has contributed to the failure in reducing the infection rates among some minority groups. While 15 – 20 percent of Emergency Department (ED) visitors use the ED for primary care, they do not get the potentially life-saving screenings that those who are insured or are wealthy have access to. Though there have been initiatives put in place by the Federal government and community organizations, in Chicago, the AIDS rate for Black Americans was more than twice the AIDS rate in White Americans in 2006. This study examines how offering rapid HIV tests in the Hospital ED as a means of educating and slowing down the spread of the virus in under privileged communities. Highlighted in this discussion are two vehicles that are crucial to the successful implementation of rapid HIV testing in the ED: reliability and sustainability. This research attempts to illuminate the reliability of the rapid HIV test results and the sustainability of screening programs implemented in the ED. Recommendations on how hospital policy should be altered to increase access and education are based on interviews and recent case studies. Making screenings available to those who otherwise would not have access to their personal health information will serve to decrease the health disparities in America and foster access to long term care and treatment of carriers of this chronic illness.

131. Min, Joy

Immigrant Obesity: Understanding Contributors to Obesity in Korean American Immigrants in Chicago

Undergraduate – Kinesiology and Nutrition

Obesity is epidemic in worldwide, and it is the major public health problem not only for native-born Americans but also the immigrants in the United States. Research has been shown that American obesity epidemic would be much more severe without the mass movement of immigration. It has been estimated that minority groups will make up more than 50% of overall US population by the 2040 (Pablo J, 2009). Even

though immigration is an important population dynamic in the United States, there are not enough data reflecting immigrant's impact on American obesity.

Obesity research targeting Asian Americans has been limited. One reason for the lack of research on obesity in Asian Americans is that Asian American have been shown to have a lower BMI on average compared to other ethnic groups. However, Asians may often metabolically obese but have a normal body weight. Since Asians have lower BMI but have higher level of adiposity, obesity is a major concern in this population because they develop diabetes in a shorter time, at younger ages, and a lower BMI. Moreover, immigrants face more barriers to quality health care, and are less likely to receive preventive health care than native born Americans.

Studies have shown that proportion of overweight and obese foreign born individuals increased with longer duration of residence in the United States. Dietary intake is one of the factor that may increase the risk for obesity among American immigrants. Therefore, undertanding factors that contributed to changes in immigrants' food preferences and behaviors is important step to prevent and manage immigrant obeisty.The purpose of this study is to understand relationships between acculturation and risk factors for obesity in multigeneration Korean American families by the photovoice process.

132. Mureli, Shwetha; Bare J Dan and Banach Kathrin

Effect of Mesenchymal Stem Cells on the Electrophysiological Properties of Cardiomyocytes

Graduate – Cardiology

Mesenchymal stem cells (MSCs) improve cell survival and alleviate cardiac arrhythmias when transplanted into cardiac tissue; however, little is known about the mechanism by which MSCs modify the electrophysiological properties of the cardiomyocytes to induce these changes. We used an *in vitro* model to test the hypothesis that paracrine factors secreted by MSCs change the electrophysiological properties and intercellular coupling of cardiomyocytes. HL-1 cells derived from mouse atria were plated on microelectrode arrays (MEAs) and once they reached confluency the conduction velocity (θ) and spontaneous activity was analyzed from field potential recordings. Conditioned tyrode (ConT) was generated by 15 h incubation with MSC. The time dependent change of frequency and θ was compared between Ctrl and ConT treated cells. All cultures showed spontaneous activity for the duration of the experiment (4h). For Ctrl the spontaneous activity (t_{0h}: 4.45±0.97Hz; t_{4h}: 4.41±1.08 Hz) and θ (t_{0h}: 0.025±0.002mm/ms; t_{4h}: 0.027 ±0.003 mm/ms) did not change significantly over 4h. In contrast, ConT treated cells showed an increase in θ (t_{0h},: 0.024±0.002 mm/ms; t_{4h}: 0.031 ±0.004 mm/ms) and beating frequency (t_{0h}: 4.40±0.08Hz; t_{4h}: 4.89±0.30Hz). A change in θ can be mediated by an increase in depolarizing current or decrease in the intercellular resistance through enhanced gap junction coupling (Cx43). We have previously demonstrated that ConT increases $I_{Ca,L}$ in ventricular myocytes through Akt mediated signaling. Future experiments will determine if increased $I_{Ca,L}$ enhances beating frequency and θ or if θ is changed through upregulation of Cx43. Overall the experiments demonstrate the feasibility of our in vitro model to determine the mechanism by which MSCs modulate cardiac electrophysiological properties and attenuate cardiac arrhythmia.

133. Musa, A.B.M. and Eriksson, Jakob

Travel Time Measurement Using Wi-Fi Monitors

Graduate – Computer Science

Real time traffic time prediction is an important service to the commuters for informative travel planning, congestion avoidance, and cost saving. However, the existing systems for travel time prediction are

either too costly or not very accurate because of naive algorithms used for sensor data processing. In this poster, we will describe a low cost travel time prediction system that uses inexpensive Wi-Fi monitors and advanced algorithms for data processing to predict the travel time accurately.

With the proliferation of smart phones, many vehicles are having smart phones, which send Wi-Fi packets periodically. We are capturing these packets using Wi-Fi monitors deployed along the road to measure vehicle speed hence the travel time for that road. In most trivial way, one can calculate the speed of a vehicle along the road from the time-gaps among successive observations. However, multiple real-world complexities arise for building an accurate system. First, multiple monitors can hear packets at the same time or with little time-gap because of long range of Wi-Fi and intermittent packet transmission. Second, Vehicles may not necessarily move along the road segment with the monitors deployed but in some adjacent roads. Third, Vehicles may be parked for some time between successive observations. Fourth, packets may be obtained from pedestrians, and bikers. All these complexities demand advanced processing of the raw data. To solve these problems, we are applying Viterbi algorithm to find most probable positions of the vehicles along the road. Then we are applying clustering algorithm to separate different classes of moving objects. Finally, we are calculating speed at multiple segments of the road to accurately predict the travel time.

During the presentation, we will describe the monitoring system and data processing algo- rithms. We will also show all the hardwares used.

134. Muzahim, Yasameen; Li, Lenong and Bouvier, Marlène

Insights into Molecular and Structural Aspects of the E3-19K/MHC class I Complex

Undergraduate – Microbiology and Immunology

MHC class I molecules bind peptides that are generated from the degradation of endogenous or virus specific proteins and present them on the cell surface for recognition by cytotoxic T-lymphocytes (CTLs). This cell-to-cell recognition process leads to the elimination of infected cells. In turn, viruses have developed strategies to affect negatively MHC class I antigen presentation and inhibit the recognition of virally-derived peptides by CTLs. The earliest study of viral evasion mechanism using Adenoviruses (Ads), that cause respiratory tract diseases, found that the Ad protein E3-19K retains MHC class I in the endoplasmic reticulum and prevents their expression on the surface of infected cells. There is evidence that E3-19K and MHC class I association is a pathogenic factor in acute and persistent Ad infection. Up to now, it is not fully characterized how E3-19K modulates host antiviral immune defenses. The goal of this project is to gain insights into molecular and structural aspects of the E3-19K/MHC class I complex.

Our hypothesis is that refolding of unglycosylated E3-19K, generated as inclusion bodies from *E.coli*, together with MHC class I is likely to result in a stable and homogeneous E3-19K/MHC I complex. Inclusion bodies of E3-19K were refolded in the presence of HLA-A_2 in an oxidative refolding buffer to generate the E3-19K/HLA-A_2 complex. After concentration, the refolding mixture was purified by gel filtration chromatography followed by analysis by SDS-PAGE and native gel electrophoresis. Overall, our results confirmed the critical role of HLA-A_2 in promoting the refolding of unglycosylated E3-19K. In conclusion, we showed that glycans on E3-19K play a key role in stabilizing the protein, and that unglycosylated E3-19K can be refolded only in the presence of MHC class I. The E3-19K/HLA-A_2 complex may be amenable to crystallization, which would be a significant step to advance our understanding of E3-19K function.

135. Myung, Ja Hye; Gajjar, Khyati A.; Jelena, Saric; Pearon, Ryan M.; Launiere, Cari A.; Eddington, David T. and Hong, Seungpyo

Direct Measurements on CD24-Mediated Rolling of Human Breast Cancer MCF-7 Cells on E-selectin

Graduate – Biopharmaceutical Sciences

Purpose: Tumor cell rolling on the endothelium plays a key role in the initial steps of cancer metastasis. Identification of the ligands that induce the rolling of cells is thus critical to understand how cancers metastasize. Here we report, for the first time to our knowledge, a set of quantitative and direct evidence demonstrating that CD24 expressed on MCF-7 cell membranes is responsible for rolling of the cells on E-selectin. *Experimental*: The binding kinetics of CD24 with E-selectin were measured directly and quantitatively using surface plasmon resonance (SPR) provided by BIAcore® technology. An E-selectin-immobilized glass slide, a gasket, and a rectangular parallel plate flow chamber were assembled in line under vacuum and MCF-7 cells or CD24-conjugated microspheres were injected into the flow chamber at 50 μL/min. How the cells or microspheres behave on E-selectin under flow was recorded by a microscope equipped with CCD camera. *Results*: The binding kinetics between CD24 and E-selectin was directly measured, which revealed that CD24 has a binding affinity against E-selectin (KD = 3.4 ± 0.7 nM). The involvement of CD24 in MCF-7 cell rolling was confirmed by the rolling behavior that was completely blocked when cells were treated with anti-CD24. A simulated study by flowing microspheres coated with CD24 onto E-selectin-immobilized surfaces further revealed that the binding is Ca2+ dependent. Additionally, we have found that actin filaments are involved in the CD24-mediated cell rolling, as observed by the decreased rolling velocities of the MCF-7 cells upon treatment with cytochalasin D (an inhibitor of actin-filament dynamics) and the stationary binding of CD24-coated microspheres (the lack of actins) on the E-selectin-immobilized slides. *Conclusions*: Given that CD24 is known to be directly related to enhanced invasiveness of cancer cells, our results imply that CD24-based cell rolling on E-selectin mediates, at least partially, cancer cell extravasation, resulting in metastasis.

136. Nangle, Ryan

"Making it Right" Campaign

Undergraduate – Communication

On April 20, 2010 the Deepwater Horizon, a deep sea drilling rig, exploded in the Gulf of Mexico and sank two days later, eventually causing the largest accidental marine oil spill the world has ever seen. The devastation brought on as a result was seen on millions of televisions across the country, creating a backlash against British Petroleum (BP), the company leasing the deep sea drilling rig. With trust in the company lost and integrity gone, BP chose to conduct a public relations campaign using the video-sharing site YouTube. The overall conceptual problem this research attempts to solve is to understand how BP attempts to restore its image by persuading the viewers of its YouTube videos to think a certain way about the company, in light of the oil spill in the Gulf of Mexico. More specifically, this research was an attempt to identify what messages BP sends through its YouTube videos and what image restoration techniques are used. Additionally, the Aristotelian appeals that are used to transit those messages are observed, i.e. pathos, ethos, or logos. As would be expected in these videos, BP relies on appeals to emotion, or pathos, and appeals to credibility, ethos, in its efforts to restore its image. In terms of image restoration strategies as discussed by Benoit (1997), BP relies exclusively on three broad categories in its YouTube channel videos: reducing offensiveness of event, corrective action, and mortification. This research falls in line with previous research done on company image restoration such as studies of Firestone (Blaney, Benoit, & Brazeal, 2002), USAir (Benoit & Czerwinski, 1997) and Exxon (Benoit, 1995). The research presented here is important because it gives insight into how YouTube can be used by businesses as a means to create an identity for itself in response to negative media attention.

137. Naveed, Hammad

Intertwined Coil inspired modeling of β-barrel membrane protein structures using predicted interstrand interaction constraints

Graduate – Bioengineering

Among the two classes of membrane proteins, beta-barrel membrane proteins are found in the outer membrane of Gram-negative bacteria, mitochondria, and chloroplasts. They carry out diverse biological functions, including pore formation, membrane anchoring, enzyme activity, and are often responsible for bacterial virulence. Although membrane proteins comprise approximately one third of all proteins encoded in a genome, they are sparsely represented in the protein structure databank, due to difficulties in experimental structural determination. We have developed a computational method to predict three dimensional structures of beta-barrel membrane proteins from transmembrane sequence segments. Our method takes advantage of an asymmetric potential function derived from detailed combinatorial analysis of known membrane protein structures. In addition, we have developed a model to account for interstrand loop entropy. In a set of 25 non-homologous proteins with known structures, we can successfully predict strand register at 73% accuracy. This is a significant improvement from previous results (44%) and from random chance (7%). Based on predicted strand registrations, we are now able to predict the three dimensional structure of the transmembrane region of beta-barrel membrane proteins from sequences alone. The average RMSD of transmembrane region between predicted and native beta-barrel membrane protein structure is less than $4A^{o}$ for Cα and main chain models and less than $6A^{o}$ for an all atom model for this set of 25 nonhomologous proteins in a blind test. Our method is general and can be applied to genome-wide structural prediction.

138. Ng, Louisa

An Economic and Market Analysis of the Pharmaceutical Industry in Sweden and Denmark – Implications for U.S. Health Care Reform

Undergraduate – Economics

The pharmaceutical industry remains one of the largest and most profitable markets that exist. Despite the international recession, the global pharmaceutical market is expected to grow 5 to 7 percent to a staggering value of $880 billion in sales for 2011 (IMS Health Forecasts, October 2010). When health care reform was being proposed in the U.S., some believed that the best way to rectify the disparity of the now 50 million uninsured and to slow the growing health expenditure was to reform the current structure into a more universal health care system for all. If one were to consider what the most extreme forms of this type of system that currently exists, one should look to the Scandinavian countries as a model. These countries have an advanced welfare state as well as government run health care systems. The two biggest pharmaceutical and biotech markets in the Scandinavian area are Sweden and Denmark who share similarities in their collaborative approach towards health and pharmaceutical care. An analysis of the market and economic conditions of the pharmaceutical industry and strict generic formularies in these two countries was performed from the relevant literature. This information provides insight into the short and long term results of the passed U.S. health care reform.

139. Nguyen, Mimi; Jarosz, Andrew and Wiley, Jennifer

Gender Differences in Performance on Working Memory Tasks

Undergraduate – Biological Sciences

Working memory capacity is an individual's ability to actively hold information while simultaneously processing other material. One of the most popular measures of working memory capacity is the Operation Span (OSpan), which is a complex span task that tests an individual's ability to hold a series of letters in memory while solving simple math operations. Performance on complex span tasks generally predict performance on other cognitive tasks, including those testing an individual's spatial ability, ability to switch between different tasks, and ability to avoid inhibition. Another task that is usually highly related to performance on complex span tasks is the Antisaccade, which tests the ability to avoid looking at the distracting stimulus that appears on the screen and instead look to the opposite side. Previous studies have demonstrated that multiple variables can affect performance on working memory tasks, including stressful conditions and spatial ability. It has also been suggested that male and female participants may actually use different strategies on such tasks. The goal of the current study is to further investigate whether participants of different genders might use different strategies by examining the relations of their OSpan scores to other cognitive measures, including the Antisaccade, and by coding the kinds of errors that participants make on working memory tasks. Analyses of the relation between OSpan and Antisaccade Task performance showed that only males showed the predicted relationship ($r(47) = .49$, $p < .01$), while females did not ($r(91) = .11$, $p > .05$). Differences in the way the two genders approached the working memory tasks, and the errors they make, will be discussed.

140. Noor, Erada; Klein, Laura; Fujinami, Y. and Nater, Urs Markus

A Review of the Effect of Stress, Caffiene and Cigarette Exposure on Salivary Proteins

Undergraduate – Biological Sciences

Changes in salivary alpha- amylase (sAA) along with other salivary proteins have been a prime indicator of psychological stress. Furthermore, caffeine and cigarette exposure may also display adverse changes in salivary proteins. It was hypothesized that there would be an increase in the production of salivary proteins as there is an increase in the exposure to stress, caffeine, and cigarette. In order to test the effect of stress, 30 participants underwent the Trier Social Stress Test (TSST), a test which uses mental arithmetic task and speech before an audience. Salivary proteins, such as salivary alpha-amylase and salivary cortisol, and cardiovascular activity were measured before and after undergoing the test. Effects of caffeine exposure were demonstrated on 45 participants, who were treated with 200 mg or 400 mg of caffeine or placebo for 20 minutes. Saliva samples, blood pressure, and heart rate were measured before and after treatment. Effects of cigarette smoke exposure were understood via treatment of rats. Rats were housed in an animal chamber and saliva was collected from the rats at day 0, day 15 and day 30. The results of the stress exposure display that there is a positive relationship between amylase and sympathetic activity. It was found that changes in the salivary alpha-amylase were determined by the amount of caffeine exposure; although the control group demonstrated the lowest sAA activity and the 400 mg caffeine exposure the highest sAA activity. Salivary flow rates did not differ in rats exposed to cigarette smoke but rather there was an increase in amylase and peroxidase activities and a decrease in total salivary protein content.

141. Novak, Ashley

Presence Detection of JWH Cannabinoids in Unknown Substances Through Forensic Analysis

Undergraduate – Biochemistry

JWH cannabinoids have become a recent creation in pharmaceutical and researching companies all over the world. Initially designed to study the structure and function of the endocannabinoid system of mammals, these designer drugs soon became available to the public on the internet and in stores all over the world. Commonly known as "Spice," the marketing for these cannabinoid substances misleadingly sold the products as "herbal smoking blends" for smoking and other forms of consuming. However, it was discovered that these herbal substances contained ingredients of cannabinoid ligands, compounds found in marijuana, or tetrahydrocannabinol (THC). Within the last few years, many of the JWH cannabinoid compounds have been declared illegal in many countries all over the world, including the United States, in which many are awaiting trial to be categorized as Schedule 1 drugs. One of the JWH cannabinoid drugs awaiting trial is known as JWH-250, or 1-pentyl-3-(2-methoxyphenylacetyl)indole. Due to a lack of scientific techniques to detect this drug in unknown substances, as well as simple detection methods for law enforcement officials on the scene, it was set out by our group of interns to create and test methods to these problems involving JWH-250. Experimental methods, such as mass selection (MS), gas chromatography (GC), thin-layer chromatography, high liquid pressure chromatography (HPLC), UV-vis testing, and infrared chromatography (IR), were all used to determine the structure, molecular weight, and absorbance values for JWH-250. Thin-layer chromatography and color tests were used specifically as simple visual tests for determining what solutions reacted with the powdery-white substance. Ehrlich's, Marquis, Mecke's, and Mandelin showed positive reactions with the color-changing test. At UV-vis peaks of 215 nm, 246 nm, 304 nm, 362 nm, and 485 nm, absorbances were recorded as 0.58764, 0.27165, 0.29464, 1.6366E-2, and 1.3632E-2, respectively. The molecular weight of the compound was calculated as 335.4 g/mol, and the structure of the cannabinoid was created using the results of the infrared (IR) spectra. Once a library had been established for the compound, the methods were continually repeated to test and verify that they were conclusive and could be used as intensive detection methods for not only forensic scientists, but also simple color-changing methods for law enforcement officers on scene.

142. Núñez, Lubia; Olivera, Jessica; Conley, Danielle and Yavorskiy, Denis

The Evolution of Pilsen: A Study on the Effects of Gentrification

Undergraduate – Sociology

Pilsen is a Chicago neighborhood that consists of mostly Mexican American and Mexican immigrant residents. Pilsen is also considered to be a port of entry for recent Mexican immigrants. Currently, the neighborhood is experiencing the process of gentrification, in which the neighborhood is undergoing vast changes commercially, demographically, socially, economically, and otherwise. In order to study gentrification in Pilsen, we conducted content analyses, observations, and interviews of residents and select business owners. Based on these methods, we found that gentrification is the leading cause of resident, business, and cultural displacement in Pilsen. But, the effects of and attitudes about gentrification are not all negative. Gentrification has also created positive change for the community, including much-needed improvements of roads and sanitations procedures, as well as decreased crime and increased diversity. We found that the force of gentrification is not happening as fast as people may think, but it is a very powerful and real force in the Pilsen community. Pilsen is a neighborhood with a rich history and the changes that are currently taking place in Pilsen have a real impact on the residents and to the future of the community.

143. Nunnelly, Danielle A.; Mezzich, R; Shiang-Lee, B; Jayathilaka, L; Kaufman, LS and Warpeha, KM

The Pirin1 Protein is a Unique Molecular Switch in Young Plants, Regulating Plant Responses to Environmental Cues

Graduate – Biological Sciences

The pirin protein (PRN) is a transcription co-factor and enzyme expressed in most prokaryotic and eukaryotic organisms that has rapidly become a focus of interest in cellular stress. Our laboratory has previously reported on PRN1 importance in seed germination, early development and transcription of light-regulated genes in Arabidopsis, a research model and plant organism (Lapik and Kaufman, 2003; Warpeha et al., 2007). Plants experience different programs of gene expression and activities during night compared to daytime and in times of stress compared to no stress. Abiotic (non-living) signals act as information to the plants transcriptional machinery. Herein, we demonstrate that the activities of PRN1 are different in complete darkness (night) compared to light (day) in the leaf cells of young plants, as mediated by the heterotrimeric G-protein pathway (putative G-protein-coupled receptor 1 [GCR1] and G-protein-alpha subunit 1 [GPA1]). In daytime, PRN1 acts as a transcriptional regulator and interacts with proteins of the NF-Y, which subsequently interact with light-regulated genes with a CCAAT-box binding motif. In the absence of light, PRN1 breaks down quercetin (a metabolite and antioxidant with critical functions in cellular defense systems) and interacts only with the off confirmation of the GPA1. The aerial portions of dark grown prn1 mutants, treated with a brief dose of UV-B, accumulate more than four times the amount of quercetin compared to wild type (wt) seedlings. Additionally, the metabolites produced by prn1 mutants are different compared to wt. PRN1, therefore, may act as an important switch to ultimately up- and down-regulate the cellular concentrations of UV-absorbing quercetin in the cells of young leaves. These findings will help provide a better understanding of how plants respond to environmental cues, which could yield great agricultural rewards, especially with regards to global climate changes affecting our environment and the current world hunger crisis.

144. Nwabuisi, Evelyn; LaDu, Mary Jo and Yu, Chunjiang

Apoe4 Delays Spine Formation and Accelerates Loss of Mature Spines, *in vitro*

Graduate – Anatomy and Cell Biology

Apolipoprotein E (apoE) is a 34kD glycoprotein that plays a critical role in lipid transport and cholesterol homeostasis. In the brain, apoE is produced primarily by glia and is critical for maintenance of neuronal and synaptic plasticity and function. Three isoforms of apoE exist in human populations: E2, E3, and E4. ApoE4 is the major genetic risk factor and decreases the age of onset for Alzheimer's disease (AD) compared to apoE3, while apoE2 is protective. The mechanism underlying increased susceptibility to neurodegeneration in the presence of apoE4 is unclear. Alterations in cognitive function are correlated with changes in dendritic spine morphology and synapse density in several neurological disorders. ApoE3 enhances spine density compared to apoE4 in vitro and in vivo. However, it is unclear whether alterations in spine formation or spine loss on mature neurons underlies these changes. To determine the mechanism of apoE effect on dendritic spine density, a neuron-glia co-culture model was utilized: Wild-type neurons were co-cultured with glia from mice expressing each human apoE isoform (apoE2, E3 and E4-targeted replacement mice). Three stages of spine development were defined as formation (DIV10-18), maintenance (DIV18-21) and loss (DIV21-26). These stages were identified by the density and co-localization of drebrin (an actin binding protein), NR1 (NMDA receptor subunit) and GluR2 (AMPA receptor subunit) clusters. Quantitative immunocytochemical analysis demonstrated: 1) Spine formation is delayed in the presence of apoE4

compared to apoE2 and apoE3; 2) ApoE4 delays clustering of NR1; 3) ApoE4 delays clustering and accelerates loss of GluR2; and 4) ApoE4 accelerates mature spines loss. These data suggest that apoE4 may increase susceptibility of neurons to degeneration by limiting the formation of new spines and increasing the loss of mature spines. Elucidating the molecular mechanisms involved in apoE4-induced synaptic alterations will help identify therapeutic targets for AD and other apoE4-related neurological diseases.

145. O'Hearn, Aileen; Cordero, Katie; Wang, Minxiu; Booms, Emily; Cheng, Han and Rong, Lijun

High Throughput Screening of the Human Genome: Identification of Host Factors Involved in Viral Infection

Graduate – Microbiology and Immunology

The utilization of host proteins is paramount for all viruses to successfully complete their viral life cycle and propagate. Thus, host proteins can serve as valuable antiviral therapy targets. To identify novel host factors involved in Influenza virus, Marburg virus, and Human Immunodeficiency virus (HIV) infections, we have designed a high-throughput screen of the human genome including 64,755 siRNAs which target 21,585 human genes. We have employed a lentiviral pseudotyping system whereby we create pseudovirions containing an envelope-deficient HIV core that encodes a luciferase reporter, and the surface glycoproteins from either Influenza virus or Marburg virus. By assessing infectivity via luciferase expression, we can evaluate the effect of the mRNA knockdown caused by each siRNA on viral infection of target cells. The genome is screened in parallel by both virus types, facilitating the identification of shared host factors in addition to those that are unique to each virus. Results generated from this screen will allow us to identify host pathways involved in viral replication through gene networking and individual hit analysis.

146. Olvera, Caroline

The Effects of Hormone Therapy in Transgender Adolescents

Undergraduate – Psychiatry

Hormone therapy is used among transgender individuals as a means to stimulate the development of secondary sex characteristics associated with one's gender identity. The aim of this project is to explore the motivations for, and effects of, hormone therapy among transgender adolescents. Data was collected via semi-structured qualitative interviews conducted by the UIC IMPACT Program at the Institute for Juvenile Research. Ten gender nonconforming (GNC) and ten transgender, ethnically diverse adolescents between the ages of 16-20 were matched based on similar ratings of GNC and then interviewed individually. For this project, the interviews of nine participants (three transgender females, a transgender male, a female, a male, a stud female, and two GNC females) were used based on their discussion of hormones.

Both the actual and theoretical effects of hormone therapy, as reported by these participants, are described, as well as the impacts of these effects on the psychosocial and psychological well-being of these adolescents. The *desired effects* are those motivations of participants for having begun or considered beginning hormone therapy. These desired effects include certain physical changes, psychological changes (e.g., identity or self-esteem development), and social changes (e.g., passing). The *reported effects* (both desired and undesired) include physical, emotional, and sexual effects, such as increase in muscle mass, mood fluctuations, and changes in attractions. These effects had profound impacts on both psychosocial and psychological levels among these adolescents which will also be described. Aside from these effects experienced by participants receiving hormone therapy, *feared effects* that led other participants to either

reject or reconsider hormone therapy are described. These include certain risk factors (e.g., mortality), undesired physical changes (e.g., changes in body scent), and feared social impacts (e.g., implications of being perceived as a different gender). Limitations of this research and directions for future studies are also discussed.

147. Ondracek, Caitlin and McLachlan, Alan

The Role of t**he PI3K/Akt/PGC1α Signaling** Pathway in Regulating HBV Biosynthesis

Graduate – Microbiology and Immunology

Hepatitis B Virus (HBV) is a human pathogen that chronically infects approximately 400 million people worldwide. Although a vaccine exists to protect against HBV infection, there is no effective treatment for chronic carriers of this disease. Our objective is to understand the *in vivo* mechanisms regulating HBV transcription. We have demonstrated that the transcriptional coactivator, peroxisome proliferator-activated receptor- γ coactivator 1α (PGC1α), can enhance viral biosynthesis by interacting with nuclear hormone receptors (NHR) and increasing viral RNA synthesis. We also demonstrate that Akt/PKB (v-akt murine thymoma viral oncogene homolog/protein kinase B) is capable of regulating PGC1α activity through phosphorylation at Ser570. Phosphorylation of PGC1α results in the loss of PGC1α:NHR interaction, leading to a loss of HBV biosynthesis. We hypothesize that HBV biosynthesis is metabolically regulated by the insulin/PI3K/Akt/PGC1α signaling pathway. By examining the virus within the context of changing metabolic conditions, a greater understanding of the virus' response to its host environment will emerge.

148. Ondracek, Stephen

A History of Western Electric's Hawthorne Works

Undergraduate – Political Science

Western Electric's Hawthorne Works facility was a historical phenomenon unlikely to be rivaled. The role of the worker and the relationship between the company and employee was rather unique. It is necessary to understand the history of the company and the Cicero facility from its inception to its closing in 1985. After understanding the roots of the company, looking back at an early industrial town helps illustrate the beginning of workers' rights within factories. The Lowell factories during the early to mid 1800s possessed aspects of a modern factory fair treatment and services to workers, but it did not last long. The starting of the company and the ability to understand the workers conditions earlier than most companies helped Hawthorne Works become a success. Many aspects of the worker's significance throughout the years include working conditions, the Hawthorne Studies, the Eastland Disaster, extracurricular activities, and various other appropriate topics. Workers were able to experience upward economic mobility unlike most of their fellow Americans. The company also did its part to give recognition when it was due and took care of their employees for their years of service. In addition to the written works collected through newspaper articles and journals, photographs were an important resource in order to visualize the conditions that were present. Although the Hawthorne Works facility was not the first major factory that tried to create a familial atmosphere, it was able successfully maintain a factory where workers were treated with utmost importance, a feat unable to be matched by many others.

149. Oravec, Tim and Havrelock, Rachel

The Jordan River and Trans-regional Interactions via Waterways

Undergraduate – English

The Jordan River has been a critical boundary throughout history. Research of ancient maps of Israel and Palestine revealed the historical centricity of the Jordan River as a physical marker between two distinct geographical regions; numerous cartographical depictions of the region use the river to separate the "civilized" east from the "wildness" of the west. Attention to these repeating characteristics in all the maps studied became important as I began consolidating my research and providing maps of interest to my faculty advisor, Professor Rachel Havrelock, for consideration in regard to her forthcoming book, River Jordan: The Mythology of a Dividing Line (University of Chicago Press, October 2011). Though initial research focused on exclusively historical and ancient maps of the region, the latter phase of research began questioning the Jordan River's role in relation to contemporary Israeli-Palestinian conflicts in the Middle East. Historical cartography often depicts the Jordan River as a divisive boundary, though contemporary efforts led by the environmentally-concerned Friends of the Earth Middle East focus on historical moments of trans-boundary cooperation at the Al Bakoora / Naharayim and Jeser Al Majama / Gesher to promote future environmental sustainability and cooperation. The proposed creation of a Peace Park at these sites marks a major step in forging unity through pertinent environmental issues and demonstrates the importance of environmental sustainability for maintaining and promoting positive interactions between regions. Research culminated with a more local examination of the international impact of the Great Lakes, ultimately shifting the focus from textual and cartographical analysis to matters of environmental and public policy. Providing one fifth of the world's fresh water, those concerned with the Great Lakes must consider current efforts by organizations like the Friends of the Earth Middle East to promote public awareness and preserve one of the world's most important natural resources.

150. Ouedraogo, Boubacar; Gann, Peter; Ananthanarayanan, Viju; Enk-Reuter, Erika; Deaton, Ryan; Moser, Ann and Wright, Margaret

Determinants of Circulating Phytanic Acid Concentrations in Men with Localized Prostate Cancer

Undergraduate – Biological Sciences

Phytanic acid is a saturated fatty acid found predominantly in high-fat dairy products and red meat. Many studies have shown an increased risk of prostate cancer among the most frequent consumers of these foods, and several new reports also indicate elevated risks among men with higher blood levels of phytanic acid. The principal aim of this study is to assess the influence of demographic, clinical, lifestyle, and dietary factors on circulating concentrations of phytanic acid. 31 men scheduled to undergo radical prostatectomy surgery for the treatment of localized prostate cancer were recruited at the Jesse Brown Veterans Affairs Medical Center (JBVAMC) or the University of Illinois Hospital at Chicago (UICH). Prior to surgery, each participant provided a fasting blood sample and also completed dietary, medical history and lifestyle questionnaires. Phytanic concentrations in blood were determined by gas chromatography-mass spectrometry. Phytanic acid levels did not vary by race, age, body mass index, family history of prostate cancer, or Gleason grade. However, concentrations were suggestively higher in men who reported taking single nutrient supplements such as selenium, vitamin E, or fish oil (p-value=0.10), in those who did not consume alcohol (p-value=0.14), and among participants with lower intakes of vegetables (p-value=0.11). Ongoing analyses will determine whether intake of a wide range of foods and nutrients influence blood levels of this fatty acid. This is the first study to examine whether demographic, lifestyle, and clinical characteristics are important determinants of blood phytanic acid levels in men with prostate cancer. Our

results suggest that men who use vitamin supplements may have higher phytanic acid levels than men who do not, but this finding requires confirmation in other studies.

151. Pable, Chris

CTABOT - A Friendly Way of Getting Transit Arrivals Estimates Over SMS and DIY Helper Robot System Template

Undergraduate – Computer Science

CTABOT is currently designed to be an application to help anyone find when a bus would be arriving at a bus stop. In its inception, it was a tool for private use. The CTA didn't offer a means of finding the bus I wanted to track over SMS, until recently. Because of this, the original vision was to help a freezing student not have to wait so long in the cold outside, in the rain, in a high crime area, etc. by means of a multi-threaded data processing mini web browser that was written for this purpose. Now the program also features a more user centric design compared to the current CTA offering. The discussion of the design of this system is nontechnical and presented in a way so that the steps may be easily followed and to provide an understanding of the process that went into the creation of the client and the server. It also aims to inspire others to write helper applications and realize that the components are not difficult to understand and modify with some very basic technical knowledge. The project was a success and after it's completion, is now used by up to 20 close friends, including several CTA officials in the Bus Tracker division, multiple times daily. This project concludes that creating helper applications is a trivial exercise for someone with minimal programming experience.

152. Packard, Adelaide; Clary, Lynn and Okkema, Peter

Characterizing a New Mutation That Enhances Lethality of a T-Box Transcription Factor in C. Elegans

Undergraduate – Biology

T-box genes encode transcription factors that are important developmental regulators found in all animals. In humans, reduced T-box gene expression results in a variety of congenital diseases, while over expression is associated with cancers. Despite their importance, we do not know the molecular basis for T-box factor function. In the nematode Caenorhabditis Elegans, the T-box gene *tbx-2* is essential for development of the anterior pharyngeal muscles. The hypomorphic allele *tbx-2(bx59)* produces defects in pharyngeal development resulting in a temperature sensitive partially penetrant larval lethality. We have isolated a spontaneous mutation called of *cu13* that enhances the *tbx-2(bx59)* mutant phenotype to produce completely penetrant larval lethality at the non-permissive temperature. We are interested in molecularly identifying the gene affected by *cu13*, and characterizing this phenotype.

In pursuit of this goal the cu13 mutation was mapped through SNP-mapping to the left side of LGII. Two genes, *nfyc-1* and *nfyb-1*, which are located in this region and are known to affect *tbx-2* expression were sequenced, but these genes were found not to be mutated in the *cu13* strain. We have now outcrossed *cu13* from *tbx2(bx59)* and have obtained a *cu13* homozygous strain. These mutants have a wild-type phenotype and do not exhibit larval lethality in the absence of *tbx-2(bx59)*. We are currently investigating whether *cu13* enhances the *tbx-2(RNAi)* phenotype. Through this research we hope to contribute to a greater understanding of T-box gene function, knowledge that has applications in better understanding human disease.

153. Padovano, Joshua and Bedran-Russo, Ana

Grape Seed Extract affects Root Caries Progression in Proteolytic-pH Model

Graduate – Dentistry

Hypothesis: Artificial caries lesions treated with grape-seed extract will impair lesion progression under proteolytic-ph cycling when compared to fluoride treatment. *Objectives*: To evaluate the ability of grape seed extract (GSE), a dentin bio-modifier, to minimize final and advanced lesion depths in bovine root dentin after repeated pH and enzymatic challenges. *Methods*: Bovine roots were sectioned to obtain 5mm x 5mm x 3mm samples of interproximal root dentin. Samples were coated with acid-resistance nail polish to leave a 3x4mm window exposed. Samples were then demineralized for 96hrs. at 37°C and randomized into 6 groups (n=15). All samples were cycled in acid buffer(ph=5.0) for 10min, followed by neutral buffer(pH=7.0) for 30min, then treatment (DI water, 1000ppm NaF, or 6.5% w/v GSE) for 10 min. Cycling was repeated for 8 days, 6 cycles a day. Half the samples were stored in neutral buffer and the other half in neutral buffer containing bacterial collagenase over night. Samples were then sectioned, polished and imaged with a polarized light microscope to determine lesion depths. Data were statistically analyzed using ANOVA and Tukey's test ($p<0.05$). *Results*: The enzymatic degradation promoted by collagenase resulted in more extensive erosion and increased root lesion progression when compared to neutral buffer. GSE treatment impaired lesion progression and consequently reduced the final lesion depth when compared to fluoride treatment and the control. *Conclusion*: Treatment of demineralized root dentin with GSE may be a novel therapy to reduce the impact of further enzymatic and pH challenges.

Funding Sources: NIH-NIDCR (5T32DE018381) and NIH-NIDCR (DE017740)

154. Patel, Keith

Red Fluorescent Proteins as Luminescence Resonance Energy Transfer (LRET) Acceptors for Terbium Protein Labels

Undergraduate – Chemistry

Time-resolved microscopy of luminescence resonance energy transfer (LRET) can be used to image protein-protein interactions in living mammalian cells (Rajapakse, et al. PNAS, 2010, 107:13582). A luminescent terbium complex, TMP-Lumi4, can be introduced into cells, where it binds specifically to Escherichia coli dihydrofolate reductase (eDHFR) fusion proteins. LRET between the eDHFR-bound terbium complex and green fluorescent protein (GFP) can be detected as long-lifetime (~ms), sensitized GFP emission. With time-resolved imaging, the long-lived signal, indicative of a protein-protein interaction, is discriminated temporally from short-lived fluorescence background signals, greatly improving the speed and sensitivity of the method over conventional technologies that image interactions between two fluorescent protein (FP) fusions. Because terbium has multiple emission maxima that span the visible spectrum, it should be possible to detect the interaction of one terbium-labeled protein and two or more proteins labeled with differently colored FPs. Here, I show that red-emitting FPs can serve as LRET acceptors for terbium. Fusions of eDHFR to TagRFP and various other red FPs were expressed in E. coli and purified. The luminescence lifetime of terbium-sensitized FP emission was determined by incubating TMP-Lumi4 with the purified fusion proteins, measuring time-resolved luminescence intensity at different delay times between excitation and detection, and by non-linearly fitting the decay data. By comparing the lifetime of terbium-sensitized, FP emission to the lifetime of terbium, it was possible to calculate the terbium-to-FP LRET efficiency for each tested sample.

155. Patel, Priya; Witek, Marta and Fung, L. W.-M.

Crystallization of a Model Spectrin Protein

Undergraduate – Chemistry

Spectrin cytoskeleton, is a network of proteins on the intracellular side of the plasma membrane found in cells, such as neuron and red blood cells. Caspase 3, a member of the caspase family, cleaves alpha II (brain spectrin). A model spectrin protein, D13, has been prepared and used to study caspase 3 cleavage. This process involves commercially available screening solutions to screen for crystal growth of D13, and the crystals will be used for x-ray diffraction studies for structural information. A hanging drop method was used. This method allows the protein to become dehydrated and stabilized to form crystals. Multiple trials of protein crystallization have been performed and optimized. The trial with the best results used reagent number 24, which consisted of lithium acetate dehydrate and polyethylene glycol 1300 (Hampton Research). In addition, an additive was also used inorder to help the crystallization. The additive was T-cep which was additive number 47 (Hampton Research). The crystals grown under this condition provide useful x-ray diffraction.

156. Patel, Udeshi; Locklear, Tracie; Parker, Christina and Mahady, Gail B.

Chemopreventative Activities of Extracts of *Brassica Oleracea* (Collard Greens) From the Lumbee Tribe of North Carolina

Undergraduate – Pharmacy Practice

Brassica oleracea var. *acephala* L. (Brassicaceae also known as Cruciferae) is the cultivar of *B. oleracea* known as “collard greens” or “collards”is a non-heading form of wild cabbage commonly eaten by populations in southern USA. “Collards” are a staple of Southern cuisine and are typically eaten year-around. Among the vegetable-containing plant families with proven anti-carcinogenic properties, the genus *Brassica* (cabbage family) has been determined to be effective at reducing the risk of cancer. *Brassica oleracea* var. *acephala* L. (collard greens) were collected in North Carolina and deposited in the Herbarium at Chapel Hill, NC. The leaves (5 kg) were dried, pulverized, and extracted in methanol (MeOH, extracted to exhaustion). The MeOH extract was defatted with dichloromethane (3 L) and partitioned into chloroform, ethyl acetate and butanol. The partitions were dried and tested at 20 μg/ml in an MCF-7 ERE-SEAP reporter gene assay. The ethyl acetate partition (EtOAc) was the most active in the MCF-7 cells assay and modified the expression of estrogen-dependent reporter genes. In order to identify the chemical constituents responsible for this activity the EtOAc partition was fractionated using column chromatography (C18 reverse phase silica gel) using increasing concentrations of methanol/water as a solvent (10% MeOH to 100% MeOH), affording 5 fractions (10%, 30%, 50%, 70% and 100% methanol). These fractions were tested again in the reporter gene assay and fraction 70% was found to be estrogenic and fractions 30% and 50% were found to be antiestrogenic. The fractions were each analyzed by HPLC (Dionex), and the 70% fraction was found to be a single compound. Based on mass (*m/z* 309.1) and UV spectrometry and nuclear magnetic resonance (NMR) fraction 70 appears to be a known phenylpropanoid named hydroxycinnamoyl malate. This compound was previously identified in *Brassica rapa.* Further work on fractions 30 and 50 are currently underway.

157. Patel, Vasu; Singh, Rajvir and Jayaraman, Sundararajan

Epigenetic Alteration Leads to the Abrogation of Diabetes-Causing T Lymphocytes in Mice

Undergraduate – Biological Sciences

We have recently demonstrated the usefulness of a well-characterized histone deacetylase inhibitor (HDACi) to prevent the manifestation of spontaneously occurring autoimmune diabetes in female nonobese diabetic (NOD) mice (Patel T, Patel V, Singh R and Jayaraman S. Immunol Cell Biol. doi:10.1038/icb.2010.144). Protection against diabetes was accompanied by histone hyperacetylation in the pancreas and spleen, possibly leading to the alteration in the expression of genes implicated in diabetogenesis and those contribute to protection against the disease. We further characterized the HDACi mediated protection against diabetes and noted that drug treatment abrogated the ability of splenocytes to adoptively transfer diabetes into immunodeficient NOD.*scid* mice. Notably, drug treatment restored the ability of $CD4^+$ T cells to undergo apoptosis through the T cell receptor, a homeostatic mechanism required for the elimination of autoreactive T cells in peripheral lymphoid tissues of non-autoimmune individuals. These results suggest that epigenetic modulation of the genome may accelerate the elimination of potential autoreactive T lymphocytes and minimize the pathogenicity.

158. Patel, Yasin

Scientific Uncertainty: A Motivation for More Research, not Controversy

Undergraduate – History

A quick perusal of news coverage of the science issues shows that uncertainty is a common theme. Consider some of the more recent issues in the news: What is the most effective and sustainable way to create alternative energy? Are stem cells really the answer to all our medical woes? What do we know about the amounts and distribution of toxic chemicals being used and released into the environment, and are they really driving the increase in natural disasters? Are childhood vaccinations in some ways responsible for the increase in childhood developmental disorders?

At a time when science and technology underlie most of the major public issues of the day, and when many of these issues are laced with varying degrees of uncertainty, the understanding of uncertainty becomes a critical endeavor.

This paper, then, aims to shed light on a few uncertainties that have found their way into the growing national and international debate surrounding childhood vaccination. More specifically the paper will address three main issues: how the scientific community creates and communicates uncertainty in general? What are few of the uncertainties that surround childhood vaccination research? And, finally, how these uncertainties get communicated to the public?

159. Pazon, Leo

The Role of the Dystrophin-Glycoprotein Complex in Nicotinic Acetylcholine Receptor Clustering

Undergraduate – Biological Sciences

Proper muscle contraction requires accurate synaptic transmission at the neuromuscular junction. Accurate synaptic transmission requires the clustering of acetylcholine receptors in high densities at the post-synaptic membrane of the muscle cell. The dystrophin-glycoprotein complex is thought to play a role in the

development of these acetylcholine receptor clusters. Failure of proper clustering during development may cause a number of muscle-related complications such as muscle degeneration or muscle dystrophy. The purpose of these experiments was to determine whether mutations of the dystrophin-glycoprotein complex adversely affect the clustering of acetylcholine receptors. *Caenorhabditis elegans* was used as a model organism since the structure and function of the dystrophin-glycoprotein complex in *C. elegans* is highly conserved in comparison to that of vertebrates. Worms possessing either double or triple mutations were studied for accurate synaptic transmission by exposure to aldicarb solution, an acetylcholinesterase inhibitor. The duration of exposure was measured until paralysis among the worms occurred. The time until paralysis was then compared between the mutants and the wild-type worms for any significant disparities. After calculating the average percent of worm paralysis over time throughout several trials, it was observed that mutants were more sensitive to loss of muscle function than the background strain in which they were isolated. However, there was no significant difference in the distribution of acetylcholine receptor clusters or evoked cholinergic post-synaptic response. Together these data suggest that the dystrophin-glycoprotein complex is not required for the normal clustering or function of muscle acetylcholine receptor clusters in *C. elegans*. However, subsequent experiments demonstrated that the enhanced aldicarb-sensitivity uncovered here, reflected an increase in muscle excitability due to the mislocalization of a key potassium channel (SLO-1). These findings provide important insights into the causes of muscular dystrophy.

160. Perez White, Bethany; Zhao, Huiping and Tonetti, Debra A.

Overexpression of PKCα in Breast Cancer Cells Induces Migration Through p120-Catenin Transcriptional Downregulation

Graduate – Biopharmaceutical Sciences

Several factors have been identified that influence epithelial-mesenchymal transition (EMT) in breast cancer cells. We previously reported that overexpression of PKCα in breast cancer predicts tamoxifen resistant secondary tumors (Tonetti, 2003). In breast cancer cells, stable overexpression of PKCα (T47D/PKCα) leads to hormone-independent growth as well as tamoxifen resistance (Chisamore, 2001). In our current study we report that PKCα overexpression increases the metastatic potential of breast cancer cells through induction of a nonclasssical EMT. T47D/PKCα cells are morphologically distinct from T47D/neo cells and do not retain the cuboidal structure of epithelial breast cancer cells. Overexpression of PKCα resulted in significantly enhanced migratory capabilities in the Boyden chamber assay. PKC activation by phorbol 12-myristate 13 acetate further enhanced migration in T47D/PKCα cells. Pharmacological inhibition with the classical PKC inhibitor Go6976 reduced the migratory capacity of T47D/PKCα cells. Transient siRNA-mediated knockdown of PKCα (120 h) significantly reduced both basal and NIH3T3 fibroblast conditioned media-induced migration in T47D/PKCα cells. Levels of adherens junction proteins E-cadherin, α-E-catenin, β-catenin and p120-catenin were significantly downregulated in T47D/PKCα cells compared to T47D/neo cells as determined by western blot. Levels of E-cadherin protein were restored by more than 50% after 168 h of PKCα knockdown in T47D/PKCα cells. E-cadherin transcripts analyzed by SYBR green RT-qPCR were significantly higher in T47D/PKCα cells compared to T47D/neo control cells while there was no change in expression of β-catenin or α-E-catenin transcripts. Only p120-catenin transcript levels were significantly lower. Treatment with proteasomal inhibitor MG132 induces accumulation of E-cadherin but not p120-catenin. Taken together, these data suggest that PKCα may be responsible for EMT in breast cancer cells through upstream signaling that leads to transcriptional inhibition of p120-catenin and subsequent degradation of E-cadherin. Further PKCα expression may not only be predictive of tamoxifen-resistance but of increased potential for metastasis.

161. Perryman, Matthew and Gantner, Ben

Drug Inducible Heterodimerization to Activate Akt Expression and Function

Undergraduate – Biological Sciences

Akt (PKB) is a critically important kinase for normal as well as oncogenic cellular growth. Recently, its role in the immune system has become increasingly recognized. We wished to develop tools to study the role of Akt1 in a way that would allow temporal and dynamic control of enzyme expression and function. We chose to employ "rapamycin analogs" to inducibly heterodimerize two protein tags. This system allows for either inducible transcription by recruiting chimeric transcription factors to an Akt1 construct, or alternatively, inducible enzyme activation by recruitment of Akt1 to the membrane. The goal of this project was to subclone Akt1 into the appropriate vector systems using recombinant DNA techniques, and then test the functionality of the systems to determine their usefulness. Once the vectors were successfully created, functionality was assessed by transfecting HeLa cells overnight, stimulating the cells, and resolving cell lysates via SDS PAGE, and western blotting, followed by staining for total Akt, phosphorylated Akt (an indication of activation), and phosphorylated GSK3-β (a well described Akt kinase substrate). While the inducible expression system demonstrated an unacceptably high level of background protein expression, the inducible activation system appears quite promising. We were able to achieve levels of tagged Akt similar to endogenous Akt expression levels, and demonstrate both inducible increases in phosphorylated Akt, and importantly in phosphorylated GSK3-β within 15 minutes, suggesting that the phosphorylated Akt was functional. An additional functional assay we are hoping to complete will be to test the ability of inducible Akt activation to promote the production of superoxide radicals produced by NADPH oxidase, which has been shown to be critically dependent on Akt. This system appears promising for studies of Akt function in a variety of contexts.

162. Peter-Hagene, Liana; Salerno, Jessica M; Bottoms, Bette L.

Defendant Race Effects on Verdicts in a Murder Case

Graduate – Psychology

According to Gaertner and Dovidio's (1986) theory of modern racism, overt racism is no longer socially acceptable, and therefore people are motivated to avoid racial bias. Racial disparities in trial outcomes continue to exist, however, and suggest that jurors' judgments might still be influenced by racial prejudice. Studies show that jurors are more likely to find African American (versus White) defendants guilty, especially when race is not salient and the evidence is ambiguous. We hypothesized that jurors would be more likely to convict a Black than a White defendant in an ambiguous murder case. In a mock trial study, 104 UIC undergraduates viewed evidence based on an actual murder case, with photographs of either a White or Black defendant. The prosecution argued that he murdered his White wife; the defense argued she killed herself. Surprisingly, jurors who saw a White versus Black defendant were more likely to convict. Jurors who saw a White defendant rated both murder and suicide as equally likely; jurors who saw a Black defendant, however, rated murder as significantly less likely than suicide. Modern racism theories might explain these results. Jurors might be more motivated to believe the suicide (i.e., defense) scenario only for the Black defendant, because a guilty verdict for a Black defendant might make them appear or feel racially biased. But, alternatively, it is possible that jurors vote guilty more in same-race versus cross-race crimes because they find them to be more plausible. In a follow-up study, we asked 89 undergraduates to estimate what percentage of all cases in which a husband killed his wife involved each of the four possible race combinations. As expected, people assumed cross-race (versus same-race) crimes were

less common than same-race crimes. This assumption might be more powerful than Black criminal stereotypes in shaping jurors' verdicts.

163. Pino, Erika and Fung, L. W.-M.

Fluorescent Detection of Spectrin Tetramerization With a GFP Fragment Reassembly Method

Undergraduate – Chemistry

Spectrin functions as a tetramer with the N-terminus of an alpha spectrin interacts with the C-Terminus of the beta spectrin in an alpha-beta hetero-dimer. This interaction is fluorescently visualized when the alpha spectrin is engineered to connect to one part of a split "Green Fluorescent Protein" (GFP), and the beta spectrin is engineered to connect to the remaining part of the GFP. When alpha and beta spectrin interact, the GFP protein parts come together to give its fluorescent property. The C-terminus of alpha spectrin will be fused to the N-terminus of GFP while the N-terminus of beta spectrin is fused to the C-terminus of GFP. This system, once developed, can be use to screen for spectrin mutants generated randomly to study mutational effect on spectrin tetramer formation. This is a method that is very similar to a well established yeast two-hybrid method, which is a method more difficult to use due to its complicated growth and detection methods. My project involves cloning spectrin-GFP cDNA into two expression plasmids of *Escherichia coli* cells. Specific primers are designed and prepared and recombinant DNA techniques are used to prepare the plasmids. Spectrin is an important cytoskeletal protein found in the membranes of most cells, knowledge of its tetramer formation mechanism will give insight towards the involvement of the protein within brain cells and red blood cells, as well as the respective neurological and hemolytic diseases associated with abnormal spectrin tetramers inside these cells.

164. Plurphanswat, Nantaporn

Peer Effects and Young Adult Risky Behaviors

Graduate – Economics

This paper investigates the effects of roommates (peers) on alcohol use, marijuana use, number of sexual partners, and condom use among college students. To address selection, I exploit the quasi-random assignment of roommates at the University of Illinois at Chicago. Further, to address the simultaneity that characterizes peer and own behavior, I use lagged peer behaviors and an instrumental variables (IV) approach. I find that peers appear to have a negative influence on binge drinking, which is qualitatively different from previous findings, and a positive effect on marijuana use. I do not find any effect of peers on the number of sexual partners and condom use.

165. Poomsrikaew, Ornwanya; Berger, Barbara E. and Zerwick, Julie J.

Age Differences in Cognitive Health Beliefs and Exercise Behavior Among Thai People

Graduate – Nursing

The purpose of this study was to examine the effect of age on the relationship between cognitive health beliefs and exercise behavior among Thai people. A convenience sample of people aged 18 years or older (n = 618) was recruited from public locations in Thailand. The mean age was 37 ± 10.88 (18-68) and 51.6% were women. A descriptive cross-sectional design was used. Self-administered questionnaires measured: (a) demographics, (b) perceived risk of heart disease, (c) exercise outcome expectancies, (d) exercise self-efficacy, (e) intention to exercise, and (f) exercise behavior. The questionnaires were translated into Thai language using committee translation. The sample was divided into two groups; middle-aged adults (36 years or older) and younger adults (less than 36 years older). Structural equation models were estimated using AMOS 18. The hypothesized model was fit equally for both the middle-aged and younger samples. The model of exercise behavior was significantly different (chi-square difference (5 df) = 20.799, $p < .01$) between the two groups. The single paths for outcome expectancies and perceived risk on intention were significantly different between the two groups. Moreover, 46% of intention and 19% of exercise behavior was accounted for in the middle-aged sample. In the younger sample, 33% of the variance in intention and 12% of the variance in exercise behavior was accounted for. Exercise behavior was directly predicted by intention in both groups. In turn, intention was predicted by outcome expectancies and self-efficacy in the two groups. In the middle-aged group only, exercise behavior was also directly predicted by self-efficacy, and intention was predicted by perceived risk. In middle-aged adults, beliefs about outcome expectancies and self-efficacy have a significant impact on intention which in turn influences exercise behavior. Interventions should target these variables.

166. Procter, Lindsey; Williams, Sloan. R; Batai, Ken and Rizzo, Kathleen A.

A Phylogenetic Analysis of *Alouatta pigra* Inhabiting the Calakmul Site of Campeche, Mexico

Undergraduate – Anthropology

Howler monkey, *Alouatta*, phylogeny is not well understood and researchers have recognized anywhere from six to ten species of *Alouatta*, and up to nineteen subspecies. We analyzed the mitochondrial cytochrome *b* gene sequence of four Yucatan Black Howler individuals (*A. pigra*) and compared them to published sequences from nine of the ten recognized howler species to better understand howler phylogenetic relationships. DNA was extracted from fecal samples collected from two troops of howler monkeys living at the Calakmul site in the Campeche state of southeastern Mexico. We sequenced the first 800 bases of the mitochondrial cytochrome *b* gene. A neighbor-joining tree was constructed to compare the Calakmul sequences with published *Alouatta* sequences, including *A. pigra* samples from two collection sites in Tabasco and Chiapas, Mexico. The Calakmul samples were identical to each other, but did not match the Tabasco and Chiapas samples. We identified four substitutions among the Calakmul howlers. Two substitutions were synonymous, but the other two changes were non-synonymous mutations that resulted in new amino acids. In all, three different sequences were found among the ten *A. pigra* samples collected from the three locations. Although the Calakmul sequences differed from published *A. pigra* sequences, they clustered with them on the neighbor-joining tree and support the identification of *A. pigra* as a separate species. The genetic relationship among the individuals in the two Calakmul howler troops is currently unknown, but these identical sequences suggest the possibility of close maternal relationships that will be further explored in future studies.

167. Pyrzynski, Geoffrey and Theys, Mitchell

Improving Content Management System Performance and the Web

Undergraduate – Computer Science

The amount of information available on the Internet is expanding at an exponential rate. Often the difference between a frequently visited site and a one time visit site is whether the site is well designed and gives the impression of responsiveness. But what separates a site that people are comfortable visiting often from the rest of the web? What are the characteristics or factors that contribute to a website's performance? This research was conducted on geoffresh.com that utilizes the Joomla Content Management System (CMS) for the sites infrastructure. The research explores component, module, and plugin upgrades; XHTML and CSS Validation; page load times; page generation times; and attributes of a well designed website. After performing speed test trials, updating and validating code, and redesigning the website, the research has shown that it is possible to use a CMS on a shared server (a more affordable solution) and have it perform comparable to a private server (a more expensive solution).

168. Raguimova, Olga; Moser, Bettina A. and Nakamura, Toru M.

Telomere Maintenance: Identification of Ccq1 Separation of Function Mutants that Disrupt Ccq1-Tpz1/Est1 or Ccq1-Clr3 Interactions in Fission Yeast

Undergraduate – Biological Sciences

The fission yeast telomere shelterin complex includes the interaction Tpz1-Ccq1. Tel1 and Rad3 kinases promote telomerase recruitment to telomeres, possibly by phosphorylation of Ccq1. Current findings suggest that Ccq1 phosphorylation is essential to directly bind and recruit Est1, the regulatory subunit of telomerase. Ccq1 also recruits a Snf2/histone deacetylase (HDAC)-containing repressor complex (SHREC) by interaction with the SHREC component Clr3. The present investigation is intended to identify specific Ccq1 separation of function mutants that either disrupt Ccq1-Tpz1 and/or Ccq1-Est1 or Ccq1-Clr3 interaction. We characterize the Ccq1-Clr3 interaction through a mutagenesis approach utilizing truncation and point mutants. To date, we have identified that the C-terminus of Ccq1 is sufficient for interaction with Clr3, but known to be inadequate for interaction with either Est1 or Tpz1. On the other hand, the N-terminus of Ccq1 is known to be sufficient for interaction with Est1 and Tpz1, and as we have identified with Clr3 as well. Currently, we are generating additional protein truncation and point mutants to position the specific Ccq1-Clr3 interaction sites. Since telomere maintenance is well conserved among fission yeast and mammalian cells, the current study might give insight on telomere maintenance in humans.

169. Rajapakse, Harsha E. and Miller, Lawrence W.

Imaging Protein-Protein Interactions in Living Cells With Time-Resolved LRET Microscopy

Graduate – Chemistry

The dynamic observation of protein-protein interactions in living cells can provide vital insight into many cellular functions. Förster resonance energy transfer (FRET) microscopy detects changes in fluorescence that occur when one protein labeled with a donor fluorophore is bound to a second protein labeled with a differently colored, acceptor fluorophore. However, conventional steady-state imaging of intermolecular

FRET requires multiple control images and complicated mathematical processing to correct for non-specific fluorescence background signals. Here, in contrast, we used a lanthanide complex (TMP-Lumi4) in time-resolved luminescence resonance energy transfer (LRET) microscopy within living cells to image protein-protein interactions at high signal-to-background ratio (SBR). Transgenically expressed *Escherichia coli* dihydrofolate reductase (eDHFR) fusion proteins were specifically and stably labeled with a luminescent terbium complex, TMP-Lumi4, in cultured Madin Darby Canine kidney (MDCK) cells. LRET between the eDHFR-bound terbium complex and green fluorescent protein (GFP) was detected as long-lifetime, sensitized GFP emission with 50-fold greater SBR and 5-fold better temporal resolution than conventional FRET methods. Long lifetime (2.3 ms) of the lanthanide complex permitted successful elimination of short-lived (ns) fluorescence background signals by imposing a time delay (10 μs) between excitation and detection. The technique was used to detect interactions between two epithelial tight junction protein domains (first PDZ domain of ZO-1 and the C-terminal YV motif of claudin-1) in single microscope images at sub-second time scales. We observed a highly significant ($P < 10^{-6}$), six-fold difference between the mean, donor-normalized LRET signal from cells expressing interacting fusion proteins and from control cells expressing non-interacting mutants. Ongoing development of this technique will make a greater variety of molecular interactions amenable to real-time visualization within living cells.

170. Rao, Sapna; Lin FJ; Ojo O; Patel V; Yu S; Zhan L and Touchette DR

A Decision Modeling Approach to Evaluate the Cost-Effectiveness of Prasugrel Vs. Clopidogrel in Patients With Planned Percutaneous Coronary Intervention

Graduate – Pharmacy Administration

Objectives: To evaluate the cost-effectiveness of prasugrel versus clopidogrel, in combination with aspirin, in patients undergoing planned percutaneous coronary intervention (PCI) from the healthcare provider's perspective in United States. Methods: Second-order Monte Carlo simulation was conducted using TreeAge Pro (2009) following the ISPOR task force guidelines for modeling. Model branches included PCI type (bare metal stent and drug eluting stent), CYP2C19 polymorphisms, and clinical outcomes. Model inputs such as costs (2009 dollar value), age-adjusted quality of life, and probabilities were identified through systematic literature review. All future costs and QALYs were discounted by 5%. Life expectancy was estimated using declining exponential approximation of life expectancy (DEALE) method. Acceptability curve was plotted to determine the most cost-effective strategy at various willingness-to-pay (WTP) thresholds ($0-$250,000/QALY). One-way sensitivity analyses were performed to determine if the model was sensitive to variation in probabilities, costs and disutilities associated with myocardial infarction (MI), stroke and major bleeding. *Results*: Clopidogrel therapy resulted in lifetime costs and utilities of $17,208 and 10.4124 QALYs compared with $16,780 and 10.4057 QALYs for prasugrel therapy. The ICER for clopidogrel was $63,840/QALYs. The acceptability curve showed that prasugrel was not likely cost-effective with >80% certainty at any WTP threshold. One-way sensitivity analyses (WTP decision threshold: $100,000/QALY) showed that prasugrel is the most cost-effective strategy when probability of MI is increased by >12%, probability of bleeding is decreased by >24%, and disutility associated with MI is >0.1634. When only patients with variant CYP2C19 were considered, the ICER was found to be $2,313,333/QALY for clopidogrel. *Conclusions*: Inconclusive results indicate that there is no benefit in prescribing one therapy over the other for the entire patient population. CYP2C19 polymorphism should be given consideration during the decision making process. For the base-case scenario, prasugrel therapy was the preferred strategy in patients with variant CYP2C19.

171. Raskin, Yevgeniy; Nelson, Brady D.; Sarapas, Casey; Campbell, Miranda L.; Altman, Sarah E.; Robison-Andrew, Jenna; Shankman, Stewart and Bishop, Jeffrey

Relationship Between the Serotonin-2A Gene (*HTR2A*) T102C (rs6313) Genotype and Sexual Functioning

Undergraduate – Biological Sciences

Background: Sexual dysfunction related to treatment with the most commonly used class of antidepressants, selective serotonin reuptake inhibitors (SSRIs), is a subject of growing concern. The *HTR2A* gene in the brain's serotonin pathway is associated with SSRIs-associated side effects like sexual dysfunction. The purpose of this capstone project was to develop and validate a genotyping assay for the rs6313 genotype and to assess samples collected from healthy subjects who participated in a study of personality traits to identify whether T102C (rs6313) genotype affects sexual functioning only as part of antidepressant response, or whether it affects sexual function in general. The goal was to determine whether the T102C (rs6313) genotype was related to sexual well-being in persons without significant mood symptoms or antidepressant exposure. *Methods*: One hundred and ten subjects (44 male, 66 female, 18-30 years of age) were previously administered the validated Changes in Sexual Functioning Questionnaire (CSFQ). DNA samples were extracted from saliva, amplified using polymerase chain reaction, and analyzed through Pyrosequencing and were genotyped for the T102C (rs6313) polymorphism. *Results*: Mean Inventory of Depressive Symptomatology (IDS) scores were 15.6 +/- 9.4 and were not significantly related to T102C (rs6313) genotypes. Genotypes did not significantly deviate from Hardy-Weinberg Equilibrium. No significant difference was found in total scores on the CSFQ, orgasm rating scores, or presence of sexual dysfunction between genotypes. In males, arousal subscale scores were significantly lower in carriers of the CC genotype compared to T allele carriers ($F=4.75$, 2df, $p=.01$). *Conclusion*: The results suggest that T102C (rs6313) genotype may play a role in mediating sexual well-being independent of antidepressant treatment. More research is needed to determine whether other genetic markers and their interactions influence sexual response.

172. Rastogi, Monika and Cassidy, Marsha F.

Beyond the "Morbid Gaze": Today's Televisual Doctors and the Crisis in Healthcare

Undergraduate – English

When the medical drama first became a staple on network television in the 1950s, American audiences welcomed the projection of handsome, infallible physicians such as Dr. Kildare. Modern medical dramas reveal analogous leading figures; from the prodigious Dr. Meredith Grey to the unerring Dr. Gregory House, series creators are intent to retain a niche for the stereotypical physician hero though health care reform has redefined the physician's role in patient care. Previous studies support the claim of medical dramas serving as cultural reassurance to an audience troubled about the state of health care; however, no research has been conducted regarding the vastly disparate media portrayals of hospital-based care and care given in private practices. My research addresses this question by doing a comprehensive content analysis of randomly selected episodes of *Grey's Anatomy*, a hospital-based program, and *Private Practice*, a private practice-based program. The results show that the latter program's patients are more holistically treated and have a more personal doctor-patient relationship than their hospital-treated counterparts. Moreover, the physicians of *Grey's Anatomy* spend far more time dealing with financial and administrative concerns than those of *Private Practice*. *Grey's Anatomy* also devotes more time to displaying the patient's body in pieces, a phenomenon that televisual scholar Jason Jacobs terms the "morbid gaze." This study interprets the morbid gaze as being a visual analogy for non-holistic patient care. Certain aspects of both dramas are remarkably

similar; both attribute to the physician heroic qualities and depict him/her as the sole source of patient care, indicating that the physician's primacy transcends administrative and institutional limitations. Because television is a pervasive source of health care information for many individuals, these findings are critical in their identification of the underlying messages in today's primetime medical dramas.

173. Raya Custodio, Jesus; Boyer, Christopher

Teaching History and a Portrayal of the Mexican Revolution

Graduate – History

The research seeks to explore the multiple perspectives that affected the interpretation of the Mexican Revolution in the early twentieth century. This research is based on the use of primary documents from various periodicals such as *El Diario, El Imparcial, and The New York Times*; and secondary sources including those that pertain to revolutionary leaders such as Francisco I. Madero and Francisco Villa. The findings illustrate that the image of the Revolution was greatly influenced by the press and thus affected the portrayal of the Revolution.

When teaching History in the high school classroom, it is important help students think historically and to emphasize the tools used by historians to make history. An important aspect of thinking historically is being able to recognize multiple perspectives as used in the research paper. Using various periodicals in the form of primary resources is an accessible way to illustrate multiple perspectives and how such affect the interpretations of events, in this case the Mexican Revolution. Furthermore, a lesson plan has been developed as an example to demonstrate how multiple perspectives could be used in the classroom.

174. Relja, Lidija; Patel, Shital and Bishop, Jeffrey

Investigation of the *HTR2C* C-759T Polymorphism and its Effect on Weight in Individuals Taking Risperidone

Undergraduate – Pharmacy

Background: Weight gain is a common, unfortunate side effect from antipsychotic medications, but the extent of weight gain differs among patients. Genetic variation in the serotonin-2C receptor gene (*5-HTR2C*) may play a role in gaining significant weight. Specifically, the *5HTR2C*-759T/C (rs3813929) variant is associated with weight gain in studies of olanzapine and clozapine. We investigated the relationship between the *5HTR2C*-759T/C variant and obesity and the satiety hormone leptin in patients taking antipsychotic agents. *Methods*: This project required the development and validation of a genotyping assay for the *5HTR2C*-759T/C polymorphism. This assay was used to genotype subjects in a pharmacogenetic study of patients taking antipsychotics. Sixty-eight subjects (65% male, mean age of 22+/-7 years) requiring antipsychotic treatment for a four-week minimum were studied. The three antipsychotic medications utilized included risperidone (n=64), aripiprazole (n=3), and olanzapine (n=1). Subjects were genotyped for the *(HTR2C)* C-759T polymorphism, using the polymerase chain reaction and Pyrosequencing methods on previously extracted genomic DNA samples. *Results*: Genotype distributions were assessed separately for each sex (males: CC n=44, TT n=4); females: CC n=21, TC n=2, TT n=1). BMI measurements significantly correlated with leptin levels in males (r=0.76, p=0.003), while the correlation did not reach statistical significance for females (r=0.56, p=0.15). The relationship between the -759T/C variant and BMI and serum leptin levels did not reach statistical significance. *Conclusion*: The data collected showed no statistical difference between genotype and BMI and leptin levels. The relatively small subject number with the TT

genotype may have limited the ability to detect relationships with genotypes in this considerably smaller subject sample size.

175. Rezavi, Gibran

Financial Development and Economic Growth: Investigating the Indicators of Financial Structures

Graduate – Economics

This paper investigates the impact of financial development on economic growth using the financial intermediaries, stock and bond market indicators from the Database on Financial Development and structure. Cross-country averages are constructed for 210 countries for the period of 1960-2008. The study aims to explore the rationale and consequences of choosing certain indicators in previous empirical work. It further analyzes the relationship between the comparable measures of the size, efficiency and liquidity of the financial system. The analytical framework presented here allows us to better understand the variations between past studies and inconsistent results.

176. Rokita, Matthew

Gonatocaris decora in the rock?

Undergraduate – Earth and Environmental Sciences

A rock from the Silurian (443 to 417 million years ago) was discovered by Dr. Roy Plotnick in the Pittsford Shale in Pittsford New York with over 30 fossilized specimens of what looked like to be some type of unclassified phyllocarid. The rock was found in the same area that fossilized specimens of phyllocarid classified *Gonatocaris decora* were found by Yale Peabody Museum. These specimens were then borrowed from Yale Peabody Museum. The specimens of the fossils from the rock discovered by Dr. Plotnick were compared to the Yale Peabody Museum specimens to further aid in the classification of these unknown fossils. Many of the fossils on the rock discovered by Dr. Plotnick were found to be aggregated next to each other. The same observation was seen for some the rocks from the Yale Peabody Museum, but not all.

Appendages or tails were also of great concern. Most fossils looked similar in the way they were preserved and the shape of the carapace although a select few individuals possessed what looked like to be a tail or even an appendage. From the little evidence that was available to classify these specimens, it was possible to classify them under the subclass of phyllocarids but unclear as to if they were truly the same species as the ones that were classified as Gonatocaris decora by the Yale Peabody Museum.

177. Ross, Amy; Tang, Mary; Lee, Bao-Shiang and Gemeinhart, Richard A.

Matrix-Metalloproteinase-2-mediated Drug Release from Poly(ethylene glycol) Diacrylate Hydrogels

Graduate – Bioengineering

Matrix metalloproteinase-2 (MMP-2) is an extracellular matrix (ECM) degrading enzyme that is overactivated in many forms of cancer, including brain tumors. We have developed an implantable chemotherapy system in which the drug is attached throughout the matrix of a poly(ethylene glycol) diacrylate (PEGDA) hydrogel via an MMP-2 cleavable peptide. MMP-2 cleaves the peptide, resulting in drug release from the hydrogel.

PEGDA hydrogels (M_n=3400) were fabricated using the MMP cleavable peptide sequence GPLGVRG with the model drug, fluorescent molecule tetramethyl rhodamine (TAMRA), attached to the C-terminus of the peptide. Hydrogels were swollen in deionized water to determine the swelling ratio and mesh size. Release studies with MMP-2 were conducted by incubating the hydrogels in tris-buffered saline with or without MMP-2 and measuring the buffer fluorescence. These studies demonstrated a greater release of TAMRA in the presence of MMP-2. *In vitro* studies were conducted by inserting the hydrogels in collagen with embedded U-87 MG cells to provide a 3-D model of a tumor environment. Gelatin zymography confirmed the production of MMP-2 by U-87 MG cells. High-pressure liquid chromatography (HPLC) and mass spectrometry (MS) demonstrate cleavage of the peptide released from the hydrogel in the presence of cells. These data indicate that MMP-2 can be utilized to mediate release from a hydrogel-based controlled drug delivery system.

178. Rossdeutscher, Rebecca and Barrett, Richard

Cohabitation in the United States: Prevalence and Attitudes

Undergraduate – Liberal Arts and Sciences

What is the level of acceptance and prevalence of cohabitation in the United States? What do recent data show about attitudes towards the role of cohabitation versus marriage or singlehood? Recent surveys from the National Survey of Family Growth (NSFG) were used to document the changing prevalence of pre-marital cohabitation and changing attitudes towards cohabitation and the attitudinal and background correlates of these attitudes. While the data are available for individuals, they are not identifiable. These findings were evaluated in relation to what past researchers (including Cherlin 1992, Smock 2000, Phillips and Sweeney 2005, Stanley et al. 2010, and Soons and Kalmjn 2009) have found. Attitudinal data items were correlated to determine a) whether there was consistency of attitudes among respondents, and b) whether these items were associated with attitudes towards cohabitation. Finally, the same type of analysis was used for those who had or had not cohabited before marriage to see if the experience of cohabitation was associated with these attitudes.

179. Roy, Nilotpal; Stoyanova, Tanya; Kopanja, Dragana; Bachi, Srilata and Raychaudhuri, Pradip

DDB2, A Critical Mediator of Reactive Oxygen Species

Graduate – Biochemistry and Molecular Genetics

Oxidative stress is an imbalance between free radical formation and anti-oxidant defense. Reactive Oxygen Species (ROS) have been implicated in several pathological disorders. Here, we reveal a novel function of the nucleotide excision repair protein DDB2 in ROS accumulation. DDB2 deficient cells fail to accumulate ROS following DNA damage. The lack of ROS accumulation in DDB2 deficiency results from high-level expression of the anti-oxidant genes, in vitro and in vivo. In the absence of DDB2, the antioxidant genes MnSOD and Catalase are expressed at high levels leading to an inhibition of ROS accumulation. DDB2 represses the expression of these anti-oxidant genes by recruiting Cul4a and Suv39h and by increasing Histone-H3K9 tri-methylation. Moreover, expression of DDB2 also is induced by ROS. Together, our results show that upon oxidative stress, DDB2 functions in a positive feedback loop by repressing the ROS scavenger genes, such as MnSOD and Catalase, to cause a persistent accumulation of ROS in the cell.

180. Rutter, Maxwell; Gutka, Hiten; Movahedzadeh, Farah and Patwell, Ryan

Preparing a Soluble Protein From an Essential Gene of *M. Tuberculosis* Using a Non-Pathogenic Bacterium for Production

Undergraduate – Liberal Arts and Sciences

Tuberculosis is a deadly disease which has scoured this planet for centuries. After more than half a century since its discovery, no cure has been found for this deadly disease. A thick, waxy outer cell membrane prevents lysis by antibiotics at an increasing rate world-wide. Several genes have been found to be essential in the survival of these bacteria; however the specific function of these genes is largely unclear. Of particular interest is the *Rv0100* gene, which participates in the synthesis of the waxy outer membrane. Finding the structure of the protein which comes from this gene could potentially be used to create a new type of anti-tuberculosis drug. To synthesize the structure of this protein, large amounts of the protein needed to be created. Since *tuberculosis* is a poor producer of this protein due to its increased growth phase, a faster-growing bacterium was needed to produce the protein. Recombinant DNA of the gene of interest was transferred from a wild-type *M.tuberculosis* to *E.coli*; however the result was an insoluble dimerized protein which is not compatible with the protein found in the host cell. The purpose of this study was to find an appropriate vehicle to carry the *Rv0100* gene and produce the resulting protein in soluble form similar to the form produced in *M.tuberculosis*. Of similar structure is *Mycobacterium smegmatis*, in that they both carry the proper machinery to synthesis the characteristic waxy outer membrane of the mycobacteria. With an increased growth rate compared to that of *M.tuberculosis*, *M.smegmatis* was found to grow exceptionally well in an auto-inducing media and produced a soluble, monomerized protein, identical to that found in *M.tuberculosis*.

181. Saeed, Fatima

A Willow in the West: The Adaptations of the Madrasa Institution for the Western-born Muslim

Undergraduate – Psychology

The nature of Islam has oft been compared to the example of a clear river that reflects the color of the bedrock over which it flows. Like such a river, Islam too is a colorless body that reflects the cultural hue of the people who practice it. This is evidenced in the idea of the Western Muslim –a Muslim that is vastly different in mindset from the Muslims of the traditional Islamic world, but is just as practicing upon the tenets of Islamic faith. The result of this is a Muslim whose needs are hugely different from the needs of Muslims from the traditional Islamic world.

Alongside this phenomenon, we are seeing an increased self-awareness and pursuit of Islamic knowledge among the Muslim population of the West. As a byproduct of this, the number of madrasas, schools of traditional Islamic learning, has also increased. The learning system of such institutions is immensely different from that of typical American schools. From the material taught to the very motive for learning, the madrasa institution is a seeming misfit in the West. Given this, the question arises of how such institutions are resolving the incongruity of Western and Islamic ideology for an audience that is inherently tied to both. This paper specifically explores what adaptations madrasa institutions are making to meet the unique socio-cultural needs of their Western students and what the implications of such adaptations are.

To this end, observations were made at four US-based madrasas. These observations were analyzed for common trends and compared against traditional Islamic pedagogical standards. Analysis showed that many adaptations were being adopted, particularly in the areas of technology, social culture, and student-teacher interaction. It was concluded that this has created a hybrid learning system less rigorous but more openly accessible to the general Muslim population.

182. Sahni, Sumit; Hickok, Jason; Mikhed, Yuliya and Thomas, Douglas D.

Anti-Metastatic Effects of Nitric Oxide in Triple Negative Breast Cancer (TNBC)

Graduate – Medicinal Chemistry and Pharmacognosy

Tumor cell metastasis is an important clinical problem, responsible for almost 90% of cancer related deaths. Nitric oxide (•NO) is a small free radical known to play important role in tumor cell metastasis. Inside the cell, one of its primary interaction occurs with iron and thiols leading to formation of dinitrosyl iron complexes (DNIC). Formation of these complexes renders iron inactive towards various physiological functions it performs. We observed formation of these paramagnetic complexes on exposure of nitric oxide to triple negative breast cancer (TNBC) cells. Thus •NO, due to its ability to form DNIC, behaves as an intracellular iron sequestering agent. Recently N-myc downstream regulated gene 1 (Ndrg-1), a well known metastasis suppressor gene, has shown to be up-regulated by iron chelation and HIF-1α stabilization. We also observed HIF-1α stabilization in TNBC (HCC 1806, MDA-MB-231 cell lines) on exposure to •NO. Given the similarities between Ndrg-1 regulation and actions of •NO in TNBC, we hypothesize that Ndrg-1 upregulation on exposure of nitric oxide to cells results in decreased metastatic ability. We observed dose dependent increase in Ndrg-1 expression at both mRNA and protein level in TNBC exposed to •NO (DETA/NO, 50μM-1mM). Moreover, Ndrg-1 protein once expressed was stable for prolonged period of time (~48hrs), which makes it a clinically significant target. In addition, using a real-time migration/invasion/cytotoxicity assay, we observed ~50% decrease in metastatic (migration/invasion) potential without affecting viability of TNBC on exposure to •NO at doses corresponding to Ndrg-1 up-regulation (DETA/NO, 250-500μM). In conclusion, these results will aid in understanding and development of nitric oxide based chemotherapy targeting TNBC metastasis for which limited therapeutic options are available.

183. Sanghavi, Avanti; Patel, Kaushal; Galang, Maria Therese; Kusnoto, Budi; Viana, Grace and Colville, Clark

Treatment Effects of **Carriere Distalizer™: A Cephalometric Evaluation**

Graduate – Dentistry

Introduction: Class II malocclusion is a common type of malocclusion affecting about 15% of the population wherein the upper jaw/ teeth are significantly ahead of the lower jaw/ teeth. Common appliances for Class II correction are headgear, elastics, and functional appliances. The Carriere Distalizer™ is an alternative treatment method for Class II malocclusion and few studies have been published regarding its actual treatment effects and predictability of its treatment results. *Objective*: The objective of this retrospective study is to evaluate and compare the skeletal and dentoalveolar changes associated with the Carriere Distalizer™ in treating patients with Class II malocclusion. *Hypothesis*: There is no significant mean difference in distalization with no significant tipping, lower incisor proclination and increase in maxillary protrusion during maxillary first molar and canine distalization using Carriere distalizer™. *Materials and Methods*: Forty subjects with age ranging between 10 and 20 years old treated by a single orthodontist in a private practice were included in this study. Pre-treatment lateral cephalometric radiographs (T1) and post-treatment lateral cephalometric radiographs after Carriere Distalizer™ treatment (T2) were meticulously traced, analyzed, and compared to evaluate changes based on various skeletal and dental landmarks. Student's paired t-test was performed to evaluate significant differences on those variables. *Results*: Seven out of seventeen pairs of variables show statistically significant mean differences: Convexity (degree), ANB (degree), U1SN (degree), L1GOGN (degree), L1Protrusion (mm), L1NB (mm) and MXBA25 (mm). The results indicate that there is no significant maxillary molar and canine distalization, and no significant

increase in maxillary protrusion. There is a significant increase in lower incisor proclination and protrusion, distal canine tipping and a significant increase in skeletal convexity after treatment. *Conclusions*: This alternative Class II corrector mainly had dental treatment effects in the form of lower incisor proclination and protrusion and had no significant favorable skeletal effects.

184. San Juan, Oliver

The Netherlands, the United Kingdom, and the Eurozone: Why States Develop Different Policies Towards the Euro

Undergraduate – Political Science

On February 7, 1992, various members of the European Community signed the Maastricht Treaty. This treaty established the European Union, which is a political and economic union, and the Eurozone, which is a monetary union. All nation-states that signed the Maastricht treaty are members of the European Union; however, not all are members of the Eurozone. Political scientists offer various theories and models explaining why states choose to join or abstain from currency unions. One prominent model, called the Sector Model, asserts that a state's attitude towards exchange rates and currency unions are affected by the actions of various interest groups. This research paper will explore the explanatory power of the sector model by applying its theories to the Netherlands and the United Kingdom, which are two nation-states that developed contrasting policies towards the Eurozone. This research paper asserts that despite the sector model's accuracy in predicting various interest groups' behaviors, it suffers from various drawbacks. Furthermore, this research paper aims to identify the conditions that are conducive to a state's decision to enter or opt out of currency unions.

185. Sansone, Christina

Complexities Associated with Assessment of Local Level Sales Taxes on Sugar-Sweetened Beverages

Undergraduate – Nutrition

Aims: Over the last thirty years obesity rates have steadily increased to 16% of children and 33% of adults, affecting both sexes and all age groups. Because obesity is associated with a number of co-morbidities, including diabetes and cardiovascular disease, policymakers are debating the merits of taxing sugar-sweetened beverages (SSB's) at the state and local level. Sales taxation schemes vary from state to state, and even within the individual state there can be considerable variation at the local level. Many local sales tax rates are a combination of true local sales tax plus special purpose taxes. Examples of special purpose taxes include water commission taxes, public transportation taxes, and sports arena taxes.This project is the first of its kind to collect and assess SSB sales tax rates at the county and municipal level, and to disentangle true sales taxes from special purpose taxes. *Methods*: Local sales tax rates were obtained via internet research and verified with the county and municipal department of revenue (DOR). Once obtained, special purpose taxes were disentangled from true local sales taxes. After separation of rates, another round of DOR verification calls confirmed special purpose tax rates and applicability to specific districts and circumstances. *Findings*: Local sales tax rates are frequently a combination of true sales taxes and special purpose taxes. This is not immediately apparent in collection, and determination of special purpose rates requires substantial follow-up to ascertain true sales tax rates. *Conclusions*: Local sales tax rates can be complicated in structure and applicability. Because of the substantial contribution to combined sales tax rates, true local sales taxes and special purpose rates should be examined separately and in combination to determine overall impact on consumption of sugar-sweetened beverages.

186. Schlink, Bryan; Foucher, Kharma; Shakoor, Najia and Wimmer, Markus

Hip Motion Reversals During Walking are Associated With Disease Severity and Poorer Function in Subjects With Hip Osteoarthritis

Graduate – Bioengineering

Recent gait studies have shown a trend in which a midstance reversal in the sagittal plane hip motion exists for subjects with hip osteoarthritis (OA). To further explore this motion discontinuity (MD), a retrospective analysis was performed using data from the Rush University Motion Analysis Laboratory. Three specific aims were explored: (1) To determine if subjects with OA walk with the MD at a greater proportion than normal subjects; (2) To determine if increased hip OA severity was associated with increased prevalence of the MD; and (3) To compare the dynamic hip range of motion and magnitude of peak external moments in OA subjects with and without the MD. Subjects from the data repository were divided into two groups: those with known unilateral hip OA and asymptomatic control subjects. Sagittal plane motion and peak external moments were collected for each of the subjects at a normal walking speed. Subjects were identified as having the MD if there was a reversal in the slope of their hip flexion angle curve during stance. Overall, 53% of OA subjects, compared to 7.5% of control subjects, had the MD ($p<0.001$). Additionally, the presence of the MD was associated with increased OA severity ($p=0.009$). Within the OA group, the MD was associated with a decreased dynamic range of motion, as well as decreased peak flexion, extension, internal rotation and external rotation moments ($p<0.046$). Pain was not statistically different between OA subjects with and without the MD ($p=0.083$-0.570). Overall, sagittal plane MDs were associated with both OA presence and increased OA severity, and significant differences in the dynamic range of motion and peak flexion, extension, internal rotation and external rotation moments were observed in OA subjects with the MD. Ultimately, the MD may be a useful predictive or prognostic marker of hip degeneration.

187. Sehgal, Vinod; Patel, Ravi; Ilkhanoff, Leonard; Kadish, Alan and Ng, Jason

Vectorcardiography of Early Repolarization to Predict Ventricular Arrhythmias

The surface electrocardiogram (ECG) is the most common method to non-invasively assess heart function. Recent research has shown that patients with ECGs exhibiting notching or slurring in the early repolarization (ER), or recovery, phase of the cardiac cycle are at greater risk for deadly arrhythmias than patients without these features. Here, we analyzed ER using vectorcardiography, which is a method where two or more ECG leads are plotted against each other to provide sequential directional information during the cardiac cycle. We hypothesized that obtaining magnitude and direction information from vectorcardiography could more easily identify at risk patients than analyzing multiple lead recordings separately. Data collection involved retrospectively obtaining ECGs from 118 previously identified patients with coronary artery disease with implantable cardioverter/defibrillators. Fifty-nine of these patients had a discharge of their defibrillator, meaning they likely had a ventricular arrhythmia. The other 59 had no arrhythmic events. Computer software developed with MATLAB was used for analysis. Using the program, the first step was to identify the time of ER. The program then created the vectorcardiogram from which we obtained the peak magnitude and angle of the ER vector. Receiver-operator characteristic curves for XY, ZY, and XZ were used to determine the angles needed for optimum sensitivity and specificity in predicting ventricular arrhythmias. The area under curves for the XY, ZY, and XZ vectorcardiogram angles were 0.65, 0.635, and 0.681, respectively. The optimal sensitivity and specificity for the XY, ZY, and XZ vectorcardiogram angles were 69.5% and 52.5%, 54.2% and 64.4%, and 57.6% and 66.1%, respectively. There were no significant differences between the vector magnitudes of the patients with and without arrhythmias. There may be a possible predictive value of anticipating future arrhythmic events using vectorcardiogram angles of ER. Whether this is useful in the clinical setting requires further investigation in a prospective study.

188. Shah, Jarna; Macias, Virgilia; Henry, Brian; Hartung, Grant; Nazir, Talat and Balla, André

Transferrin Receptor (TfR1) Expression in a Nested Case-Control Prostate Cancer Cohort

Undergraduate – Biological Sciences

Background: Transferin receptor (TfR1) is a 190 kDa type II transmembrane homodimer glycoprotein that regulates the cellular uptake of iron through binding and internalizing iron loaded transferrin. Its expression is related to iron requirements associated with cell proliferation. Overexpression has been demonstrated in cancer cells, including prostate carcinoma (PCa); and is thought to be of prognostic value in breast and colon cancer. We previously reported lower concentrations of iron (Fe) in cases with biochemical PSA recurrence after surgical removal of the prostate. The present study evaluates the prognostic significance of TfR1 expression in PCa cells. We performed a digital analysis of TfR1 immunoreactivity in prostate cancer epithelial cells to determine differences in TfR1 expression between recurrence and non-recurrence groups in a prostate cancer (PCa) nested case-control cohort. In addition, we tested the hypothesis of an association of TfR1 expression with iron levels found within the non-neoplastic areas adjacent to tumor obtained from same donor block. *Design*: We analyzed an outcome-based tissue microarray (TMA), which is a collection of minute fragments of tissue samples from various patients with recurrent and nonrecurrent cases of prostate cancer. Four different cores from 40 pairs of PCa tumor samples (n=80) were cut and placed on the TMA slides (0.6 mm in diameter). Cases with PSA recurrence were matched 1:1 with cases without recurrence by race, age, year of surgery, Gleason grade, and pathological stage. All cases without recurrence had at least five-years follow up. TMA slides were immunostained using a mouse monoclonal anti-human transferrin antibody (1:100 dilution; Zymed Laboratories). Expression levels of TfR1 were assessed by Colocalization Algorithm (ScanScope®, Aperio Corp). Differences in TfR1 intensity between case-control pairs were calculated by Wilcoxon signed rank paired test. *Results*: Automated data from the digital scoring was available in 29 pairs (n=58). The Wilcoxon signed rank test indicated a statistically significant difference of TfR1 expression between cases of recurrence and non recurrence, with higher intensity levels of TfR1 in the first group ($p<=0.04$). This result implies that cancer cells from cases with worse outcome may have more avidity for iron. The correlation between TfR1 expression and Fe concentrations was not statistically significant ($rs = -0.16$, $p=0.20$). *Conclusion*: Results indicate that TfR1 is a potential prognostic marker for cases of PCa with biochemical recurrence, when cases are matched according to race, grade, stage, and age. Further evaluation of TfR1 levels in matched cases of Caucasian and African American patients is being conducted in order to determine whether TfR1 can be used successfully as a biochemical marker across different races. Also, evaluation of a larger TMA cohort, including 320 cases as a validation set is being conducted to establish the prognostic value of this parameter in prostate cancer outcome.

189. Shah, Saloni

A Case-study of Stress and Procrastination Intervention

Undergraduate – Psychology

Studies report 22 - 33% of college students procrastinate academically. It is known that stress and procrastination are both interrelated. The purpose of this study was a single case study intervention and observation. Stress was defined as the body's reaction to a change that requires a physical, mental or emotional adjustment and response. Procrastination was defined as to put off doing something, especially out of habitual carelessness or laziness; also as to postpone or delay needlessly. This study observed the extent of procrastination and level of stress before implementing the intervention, during the intervention stage, and during post intervention period. Changes in average procrastination scale score and stress scale score were observed between the three stages of intervention (baseline, intervention, and post intervention). The stress

and procrastination intervention involved keeping a calendar to set up a schedule that used time blocks and task breaks, ventilation, reframing, and ensuring sufficient sleep. The intervention was withdrawn during the post intervention period. The study found a decrease in stress and procrastination from baseline stage to the intervention (stress = 3.16 procrastination = 2.78; stress = 2.78 procrastination = 2.44 respectively). There was increase in both stress and procrastination in the post intervention period (stress = 3.10 procrastination 2.81). Changes were observed between the three stages with some clinical significance; however, no statistical significance can be observed. The study can be repeated with more participants to find statistically significant results.

190. Shaikh, Dooniya and Zhou, Guofei

cAMP-dependent Protein Kinase is Essential for Hypoxia-Mediated Epithelial Mesenchymal Transition and Migration in Lung Cancer Cells

Undergraduate – Pediatrics

Lung cancer is the leading cause of cancer-related death in the United States. Cancer cells proliferate at a rate that exceeds the oxygen supply, resulting in regions of low oxygen tension (hypoxia). Hypoxia is known to increase cancer cell invasiveness and metastatic potential. Previously, we have reported that in lung cancer cells hypoxia induces epithelial mesenchymal transition (EMT), a process contributing to tumor cell migration, invasion, and metastasis. However, the underlining mechanism remains elusive. Our aim is to investigate whether cAMP-dependent protein kinase (PKA) contributes to hypoxia-mediated EMT and migration in lung cancer cells. First, we incubated A549 lung cancer cells in normoxia (21% O_2) or hypoxia (1.5% O_2) for various time periods and measured PKA activity by performing kinase assay. We found that hypoxia increased PKA activity after 8 hours exposure to hypoxia and PKA activity was highest after 24 hours of exposure. We then measured the mRNA and protein levels of PKA catalytic and regulatory subunits by quantitative real time RT-PCR and Western blot analysis after exposing A549 cells to normoxia or hypoxia for 24 hours. Our results showed that hypoxia upregulated PKA catalytic subunit α (Cα). To address whether PKA is necessary for hypoxia-mediated EMT, we pretreated A549 cells with the PKA inhibitor H89, then we exposed the cells to hypoxia for 48 hours, and measured the EMT markers. We found that H89 prevented hypoxia-induced expression of vimentin and smooth muscle actin, suggesting that PKA is required for hypoxia-mediated EMT. To address EMT related migration, we pretreated cells with H89, exposed them to hypoxia for 24 hours, then measured the rate of migration by wound healing assay. We found that H89 prevented hypoxia-mediated cell migration. Combined together, our results suggest that during hypoxia, elevated expression of PKA increases its activity, leads to EMT, and cancer cell migration.

191. Shakir, Amal

The Effects of Exercise on Stress and Quality of Life in the Mentally Ill

Undergraduate – Psychology

There is a broad range of research in support of the idea that exercise can alleviate symptomatic behavior for the chronically mentally ill, yet more research and application of findings remain pending. Stress is a common factor in both social and environmental situations which can make vulnerable populations, such as the mentally ill, more susceptible to physical comorbidities. This study will examine the relationship between exercise and stress and quality of life for chronically mentally ill people. Participants from a large, suburban mental health center who exercised about 5 times a week took the Perceived Stress Scale and Quality of Life Scale at pre and post intervention. Data collection is currently ongoing and will be analyzed

using a repeated-measures analysis of variance (ANOVA). The likely implications of this research will be to help improve the quality of the exercise program offered at the facility.

192. Shilka, John

Determining Genes Associated with Pheromone Internalization and Polarization in *Saccharomyces Cerevisiae*

Undergraduate – Biological Sciences

Introduction: Chemotropism, directed cell growth in response to a chemical messenger, is an important mechanism for many biological processes, such as wound healing, angiogenesis, pollen tube growth, and more. We used *S. cerevisiae* as a model organism to analyze the directional sensing involved in producing polarized growth. *S. cerevisiae* has two mating types, *MAT* a and *MAT* α. These two mating types will grow towards each other in a straight line in response to pheromones (a-factor and α-factor) produced by the opposite mating type. Receptors for the pheromones are evenly distributed on the cellular membrane, but will aggregate to an isolated area where the greatest concentration of pheromone is detected. It was previously thought that actin-dependent secretion of pheromone receptor was involved in the polarized growth, however, recent experiments have shown polarization happens before actin synthesis occurs (Suchkov et al. 2009). This discovery has lead us to seek out genes (PDE1 and 012W) associated with polarized growth that are not involved in actin synthesis.
Methods: We first transformed mutant *MAT* α PDE1 and 012W deleted strains. We then used these strains, along with previously transformed *MAT* a PDE1 and 012W deleted strains to create mating assays. Microscopic pictures were taken of the agar plates and were then analyzed with the program ImageJ. Angles were then measured between zygotes.
Results: Of all the mating assays, 012W *MAT* a when mating with wild-type *MAT* α produced angled zygotes. All other assays were not significantly different than bilateral wild-type mating assays.
Conclusion: The 012W *MAT* a strains showed evidence of difficulty in directional sensing indicating a mutation. It is believed to be caused by the confusion of multiple mating partners due to the decrease in polarization of the α-factor receptor. This hypothesis will be tested in future experiments.

193. Sink, Elizabeth; Greene, George; Birkett, Michelle and Mustanski, Brian

Conduct Disorder and its Relationship to HIV Risk in LGBTQ Youth

Undergraduate – Psychiatry

According to incidence rates reported by the Centers for Disease Control and Prevention (2005), nearly half of all newly reported HIV cases are under the age of 25. In addition, lesbian, gay, bisexual, transgender, and questioning (LBGTQ) youth, particularly gay men, are at the greatest risk for HIV transmission. Certain psychiatric disorders have shown associations with increased sexual risk; one of which is Conduct Disorder because of its association with impulsivity (Borek, Allision, & Cáceres, 2010). A study by Brown et al. (2010) found a relationship between externalizing disorders which included Conduct Disorder and sexual risk. This study examined the relationship between Conduct Disorder symptom count and HIV risk. A secondary data analysis was conducted on the baseline portion of a longitudinal study of 246 16-20 year old LGBTQ youth. Measures included the Conduct Disorder symptom count as assessed by the DSM-IV based computerized diagnostic interview schedule for children (CDISC; Shaffer, Fisher, Lucas, Dulcan, & Shwab-Stone, 2000). Also measured was HIV risk as defined as unprotected anal sex, total number of male and total number of female partners. Preliminary data analyses indicated no relationship was found to be significant (p

>0.05) for Conduct Disorder and unprotected anal sex for males or females. Additionally, there was no significant relationship between Conduct Disorder and number of male sexual partners. A significant correlation was found between number of female sex partners and conduct disorder ($p < .01$). A follow up multiple regression analysis was run with total number of female partners as the dependent variable. The final model indicated that being female and having a higher Conduct Disorder symptom count predicted an increased number of female sexual partners in this sample. Race and age were not found to be significant predictors of number of female sex partners. Although a relationship was not found between Conduct Disorder and unprotected anal sex, the data suggests a relationship between Conduct Disorder and sexual risk taking behaviors, which are associated with HIV risk. Further research is needed to explore these findings.

194. Sinkala, Elly and Eddington, David

Oxygen Sensitive Microwells

Graduate – Bioengineering

Oxygen tension is critical in a number of cell pathways but is often overlooked in cell culture. One reason for this is the difficulty in modulating and assessing oxygen tensions without disturbing the culture conditions. Toward this end, a simple method to generate oxygen-sensitive microwells was developed through embossing polystyrene (PS) and platinum (II)-octyaethylporphine-ketone (PtOEPK) thin films. In addition to monitoring the oxygen tension, microwells were employed in order to isolate uniform clusters of cells in microwells. The depth and width of the microwells can be adapted to different experimental parameters easily by altering the thin film processing or embossing stamp geometries. The thin oxygen sensitive microwell substrate is also compatible with high magnification modalities such as confocal imaging. The incorporation the oxygen sensor into the microwells produces measurements of the oxygen tension near the cell surface. The oxygen sensitive microwells were calibrated and used to monitor oxygen tensions of Madin-Darby Canine Kidney Cells (MDCKs) cultured at high and low densities as a proof of concept. Wells 500 μm in diameter were seeded with an average of 330 cells exhibited an oxygen level of 12.6% where as wells seeded with an average of 20 cells per well exhibited an oxygen level of 19.5%, a 35.7% difference. This platform represents a new tool for culturing cells in microwells in a format amenable to high magnification imaging while monitoring the oxygen state of the culture media.

195. Smith, David

Fruit Fly Hemolymph Amino Acid and Protein Study by CE and MS

Undergraduate – Chemistry

The fruit fly, *Drosophila melanogaster*, is a useful transgenic model because over evolutionary time the fruit fly has maintained many genes expressed in *Homo sapiens*. As a result, they can be studied and used as a model for advanced physiological systems. One particular chemical of interest is the amino acid and neurotransmitter glutamate. It has implications in the circadian rhythm which is the innate sleep-wake cycle animals experience. So to disturb the sleep-wake cycle of the animal would cause a change in the levels of glutamate. Two studies were done using single fruit fly sampling, which employed a method of using a capillary probe to take nanoliter samples of hemolymph from the abdomen of the fruit fly. For the first study fruit flies were raised in all darkness and at constant temperature. Samples were collected at “daytime” and “nighttime” corresponding to the light cycle. The samples were diluted and fluorescamine added to fluorescently tag amino acids. Then the concentration of glutamate was determined from samples by

capillary electrophoresis. In a second study collected nanoliter volumes of hemolymph were digested and run through a chip cube-nanoESI-LTQ-FTMS instrument to scan for protein content. In the first study the concentration of glutamate was significantly higher during the day cycle than the night. Thus, they maintain their circadian rhythm independent of their environment. In the second study, proteins involved in transport, for neurological implications, and for clotting were observed with high sequence coverage. This demonstrates the ability to perform proteomic analyses of hemolymph from a single fruit fly.

196. Smith, Cedar Nicole and Nyberg, Dennis

At the Prairie's Edge: The Effect of Suburban Backyards on a Remnant Tall-grass Prairie

Undergraduate – Biological Sciences

The tall-grass prairies that once stretched across the Midwest are now limited to fragments isolated in a human landscape. These remnants of the once great prairies are subject to numerous threats, including invasion by exotic species and conversion to non-prairie by woody vegetation. These negative impacts often manifest themselves first at the prairie edges-- where it abuts other ecosystem types or, as is very often the case, agricultural or urban areas-- creating an edge effect. The James Woodworth Prairie is a 2.1 ha remnant tall-grass prairie surrounded on the east and west by roads, to the south by commercial developments, and to the north by backyards. The north edge is discernibly different from the rest of the prairie. Vegetation composition and height were studied on ten transects randomly located along the north fence and running 24 m into the prairie. Data was aggregated by distance from the fence. Rank correlations of distance from fence with weighted mean C (a measure of quality) and native species richness were positive and significant, those with vegetation height were significant and negative. Plots 0-12 m from the north fence had both lower vegetation quality (as measure by the mean coefficient of conservatism) and were dominated by two species, *Helianthus grossesseratus* and *Solidago canadensis*. Six common species were selected to investigate if the height of individuals within a species is related to distance from the fence. In four species individuals closer to the fence were significantly taller than those far from the fence. The most likely cause appears to be excess moisture and fertilizer associated with backyard maintenance.

197. Smith, Vessela

Reference Values for Quantitative Sensory Testing (QST) in Healthy Individuals

Undergraduate – Nursing

Aims: Although previous studies have attempted to define reference values for Quantitative Sensory Testing (QST), questions persist regarding normal variations across body regions, gender, age, and race. The purpose of this research was to define reference values for thermal and mechanical QST measures in healthy individuals, and to visually profile their variations as reported in the literature. *Methods:* Five studies were included with a combined sample of 979 healthy subjects of different races and ages between 6 and 86 years. The subjects were tested at various body sites for warm and cold detection threshold (WDT, CDT), heat and cold pain threshold (HPT, CPT), and mechanical detection threshold (MDT). Two different types of thermal sensory analyzers were used to test for all thermal thresholds. Subjects pressed a button when a specified sensation was perceived, which discontinued the stimulus. Twelve Von Frey monofilaments with intensity forces from 0.25 to 512 mN were used to test for mechanical detection. *Results:* The most significant differences were among various body regions. In general, the face was more sensitive than the hand; the hand was more sensitive than the foot. Age significantly influenced thermal and mechanical thresholds. Sensitivity gradually decreased with age. Gender was a significant factor in thermal but not in mechanical

thresholds. Females were more sensitive than males for WDT, CDT, HPT and CPT. There were no significant differences between African Americans and Caucasians for HPT. *Conclusions:* When using the above methods to test patients, it is important to consider their age, gender and the specific body region. Taking these factors into account would help determine whether QST measures fall within the normal ranges, and would lead to the formulation of an accurate diagnosis.

198. Smrt, Sean and Lucas, Nathan

In Vivo examination of AKT and PDK Localization Dependency

Undergraduate – Chemistry

The phosphorylation of phosphatidylinositol (4,5)-bisphosphate (PIP2) by phosphatidylinositol 3-kinase yields a phosphatidylinositol (3,4,5)-triphosphate (PIP3) that is capable of binding AKT through its pleckstrin homology (PH) domain. This binding localizes the free AKT in the cytosol to the inner cellular plasma membrane. Once bound to the membrane, phosphatidylinositol-dependent kinases (PDK) is able to phosphorylate AKT at Thr308. AKT must also be phosphorylated at the Ser473 residue by either self-phosphorylation or via integrin-linked kinase. Once fully phosphorylated, AKT becomes free of the membrane in order to localize in the cytosol and nucleus. Once re-localized, AKT phosphorylates downstream targets that are responsible for cell cycle regulation and growth as well as insulin- dependent translocation of glucose transporters.

Examination of localization dependencies were undertaken through use of cloning techniques providing protein mutagenesis. Preliminary testing of binding through surface plasmon resonance was undertaken. This was followed by in vivo studies on mammalian cells, with final results to be determined.

199. Snyder, Tess

Urban Math Education

Undergraduate – Mathematics, Statistics, and Computer Science

In this research project I looked at the challenges of education in society in particularly in an urban environment. My knowledge is in math and so I took the more broad ideas found in research of urban education and focused them on math education. In addition I did a case study on one math enrichment program in a Chicago high school.

200. Song, Bo; Yuan, Huajun; Jameson, Cynthia J. and Murad, Sohail

Permeation of Nanoparticle across Lipid Membranes using Coarse-Grained Molecular Dynamics Simulation

Graduate – Chemical Engineering

The interaction of nanoparticle with cells and lipid membranes plays a critical role in the applications of nanoparticles for therapy, cellular image, biodiagnostics and drug delivery systems. It has been shown that such interactions and the deformation of lipid membranes are often determined by physicochemical properties of nanomaterials, such as size, shape and surface composition. Here, we carry out molecular dynamic simulations using various sizes of nanocrystals as a probe to explore the transport of nanomaterials

across dipalmitoylphosphatidylcholine (DPPC). A Coarse-Grained model was used to provide insight at large time and length scales. The dynamics properties of the nanocrystals, as well as the structural properties of lipid membrane arising from the interaction between the nanocrystal and the lipid membrane are investigated. Our simulation results are in satisfactory agreement with available experimental. We found that the minimum pressure for penetrating the first layer is almost independent of the size of the particles while the minimum pressure for permeating both layers is smaller for the larger size particles. Observation of the lipid curvature profile shows the elastic property of the lipid membrane. The thickness of the lipid membrane exhibits recovery ability to the original status. We found that the order parameter of the tails of the bulk lipids change only slightly, while the tails of those surrounding lipids are more ordered than the remote lipids during the permeation of nanocrystals. All these findings are consistent with the ability of lipid membranes to heal after penetration by bare nanocrystals, which have no strong or specific interactions with lipid molecules. We also investigate the interactions between lipid membrane and gold nanoparticles functionalized with hydrophobic surface coatings. The findings described in our work will lead to better understanding of nanomaterial-lipid membrane interactions and the mechanical and dynamic properties of lipid membranes during nanoparticle permeation.

201. Song, Yang; Peng, Kuanwei; Zhang, Nan; van Breemen, Richard and Franzblau, Scott G.

Simultaneous Measurement of Fifteen Anti-Tuberculosis Compounds Using LC-MS-MS

Graduate – Medicinal Chemistry and Pharmacognosy

Introduction: Anti-tuberculosis drugs are typically used in combinations in order to preclude the emergence of drug resistant mutants. However, there are no analytical methods available to simultaneously detect the established drugs within a single run for clinical plasma samples. For some of the older TB drugs there is no published data on in vitro metabolic stability. Herein, a LC-MS/MS-based method was established to simultaneously quantify in human plasma fifteen drugs (moxifloxacin, ethambutol, isoniazid, levofloxacin, pyrazinamide, linezolid, LL3858, PA-824, rifampicin, ethionamide, thioridazine, TMC 207, clarithromycin, clofazimine, OPC 67683) used experimentally or clinically for tuberculosis. The metabolic stability of those drugs in human and mouse microsomes were then evaluated by the developed LC-MS/MS method.
Methods: Standard solutions: The final concentrations in plasma of the standards were 50, 20,10, 5, 2, 1, 0.5, 0.2, 0.1, 0.05, 0.02, 0.01, 0.005, 0.002, 0.001 μg/mL for moxifloxacin, ethambutol, isoniazid, levofloxacin, pyrazinamide, linezolid, LL3858, PA-824, and rifampin; 5, 2, 1, 0.5, 0.2, 0.1, 0.05, 0.02, 0.01, 0.005, 0.002, 0.001, 0.0005, 0.0002, 0.0001 μg/mL for ethionamide, thioridazine, TMC 207, clarithromycin, clofazimine, and OPC 67683.
Sample preparation procedures : 400 μL of acetonitrile containing 200 ng/mL of internal standards were added to a 100μl aliquot of plasma. The sample mixture was vortexed for 1 min and put at -20 °C for 30 minutes before being centrifuged at 10,000 g for 30 min to remove the protein precipitate.
LC-MS/MS : Applied Biosystems 4000 Q TRAP LC/MS/MS
Preliminary data:

1) The lower limit of quantitation (LLOQ) of each compound in human plasma: moxifloxacin: 0.05μg/mL, ethambutol: 0.01 μg/mL, isoniazid: 0.05 μg/mL, levofloxacin: 0.02 μg/mL, pyrazinamide: 0.5 μg/mL, linezolid: 0.05 μg/mL, LL3858: 0.05 μg/mL, PA-824: 0.05 μg/mL, rifampin: 0.02 μg/mL, ethionamide: 0.02 μg/mL, thioridazine: 0.001 μg/mL, TMC 207: 0.2 μg/mL, clarithromycin: 0.005 μg/mL, clofazimine: 0.001 μg/mL, OPC 67683: 0.01 μg/mL.
2) The half lives of each compound in human microsomes: moxifloxacin: >300min, ethambutol:>300min, isoniazid:262min, levofloxacin:>300miin, pyrazinamide: >300min, linezolid: 50min, LL3858: 40min, PA-824: 67min, rifampin: 62min, ethionamide: 31min, thioridazine: 35min, TMC 207: 193min, clarithromycin: 89min, clofazimine: >300min, OPC 67683: 92min.
3) The half lives of each compound in human microsomes: moxifloxacin: 287min, ethambutol: 280min, isoniazid: 59min, levofloxacin:>300miin, pyrazinamide: 221min, linezolid: 172min, LL3858:

36min, PA-824: 79min, rifampin: 171min, ethionamide: 6min, thioridazine: 18min, TMC 207: 63min, clarithromycin: 125min, clofazimine: 281min, OPC 67683: 103min.

Novel Aspect: This is the first report of a method enabling the simultaneous quantitative analysis of fifteen established anti-tuberculosis drugs in clinical plasma samples.

202. Soni, Vikas; Zhang, Wei

Analysis of Gene Variation and Expression Between CEU and YRI populations for Candidate Genes for Sarcoidosis

Undergraduate – Biological Sciences

The goal of this research is to find significant differences in quantity of single nucleotide polymorphisms (SNPs) and gene expression between two populations Utah residents with Northern and Western European ancestry (CEU) and Yoruba in Ibadan, Nigeria (YRI). The genes studied in this project are candidate genes for Sarcoidosis. The list of candidate genes were found through published research articles concerning Sarcoidosis. A paper by Ryuicki et. al. 1997 found that African American, when compared to Caucasians, have significantly greater incidence of Sarcoidosis. This research uses data from the 1000 Genome Project and published data of gene expression. The two population groups in this analyzed are specific study groups in the 1000 Genome Project as well as the Hapmap Project. The list of candidate genes was first analyzed by using the online database www.pacdb.org to find the specific set of genes that has significant difference in gene expression. From this list the analysis of the data set from 1000 Genome Project was used to find specific SNPs which is significantly different between the CEU and YRI populations given through statistical calculation of Fst greater than 0.15. This developed list of SNPs was further filtered by using the www.scandb.org database to identify which specific SNPs is associated with exon strains or function of protein coding. In addition to these SNPs the www.pacdb.org database was used to find expression quantitative trait locus (eQTLs) from the candidate gene, to look for significant difference in expression of these eQTLs SNPs between the two populations. The outcome of this project has found that a collection of genes that have significant difference in expression and variation between, along with the associated eQTLs which contribute the differential gene expression between the two populations. The results of this research have confirmed some of the candidate genes for Sarcoidosis, giving further understanding of the complex disease.

203. Srinivasan, Venkatakumar; Comi, Marco; DasGupta, Bhaskar and Schapira, Michael

On Approximate Privacy: Existence, Complexity and Further Results

Graduate – Computer Science

In this paper, we further investigate the approximate privacy model recently introduced by Feigenbaum, Jaggard and Schapira. Our results indicate that for a large class of functions which we call as the “tiling functions”, a protocol exists that provides a constant average privacy approximation ratio and such a protocol involves a number of communication rounds linear in the number of monochromatic regions of the function; however, we show that such a good privacy approximation ratio for tiling functions do not exists in the worst case. We also discuss extension of the basic setup to more than two players as well as to non-tiling functions, and provide calculations of average and worst case privacy approximation ratios of the bisection protocol for several new non-tiling functions.

204. Stachura, Eric and Gerber, Cecilia

General Silicon Trigger Board for the CMS Pixel Readout Chips

Undergraduate – Physics

Radiation studies are conducted in order to prolong the life of the electronics of the Compact Muon Solenoid (CMS) pixel detector. A new kind of trigger based on silicon pixel sensors was developed in order to aid in the commissioning of the current CMS pixel detector. This trigger improved on prior trigger systems by using pixel technology and a printed circuit board that assimilates the signal processing circuitry by decreasing size and complexity. The board's purpose is to alert the experiment that particles have arrived, and to communicate with the computer software and other hardware so as to begin taking data. Initial testing showed the trigger's effectiveness despite a few problems, which resulted from aggressive time constraints for the project. After this initial testing, work began on upgrading the board. Most of the issues encountered during testing were corrected. The board was also made more accessible by implementing more practical technology.

205. Stoia, Jonathan

Cartilage-On-Cartilage Articulating System as a Wear Benchmark for Artificial Replacement Systems

Graduate – Bioengineering

To treat the progressively degenerative effects of osteoarthritis, severely damaged cartilage in synovial joints may be replaced with artificial material. A common treatment is replacement of cartilage with cobalt-chromium (CoCr) metal. Methods of articulating artificial materials in vitro against cartilage exist, however a benchmark with which to compare the outcome is needed. The purpose of the study was to investigate the effects of articulating cartilage on cartilage (CoC) and compare them to metal-on-cartilage (MoC) wear experiments. Thirty-six cartilage explants were obtained from bovine femoral condyles of six 24-week old animals and cultured in standard Mini-ITS media. Explants were placed into three groups of 12 explants: 1) free-swelling controls without mechanical stimulation, 2) samples articulating against a CoCr metal ball, and 3) samples articulating against cartilage secured to a polymer cylinder. It was hypothesized that the CoC group would have higher explant viability and less matrix loss measured in the testing medium than the CoCr group. The cell viability was measured using fluorescent light microscopy. Matrix loss was estimated by measuring the PG/GAG content in media using the dimethylmethylene blue (DMMB) assay. The PG/GAG content value for the CoC group was halved to account for the dual-cartilage interface. Average cell viability percentages of the superficial zone for the CoCr and CoC groups were 45% and 86% ($p=0.0001$), respectively. Average PG/GAG contents for both groups were 599µg/ml and 402µg/ml ($p=0.012$), respectively. Average cell viability percentages for the control group was 85% ($p=0.903$ versus CoC) and the average PG/GAG content was 341µg/ml ($p=0.682$ versus CoC). The results show that the CoC cell viability and matrix loss was similar to the control group, and superior to the MoC. Based on these results, we conclude that the CoC setup has been established as a benchmark.

206. Strutynsky, Roxanne and Schmidt, Jennifer

Molecular Phylogenetic Analysis of the Filter- Feeding Sharks

Undergraduate – Biological Sciences

The filter-feeding sharks, the whale shark (Rhincodon typus), the basking shark (Cetorhinus maximus), and the megamouth shark (Megachasma pelagios), remain relatively unstudied at the molecular level. Genetic studies are often vital in answering questions that morphologic and behavioral studies cannot address, particularly for large pelagic animals that are difficult to study in the wild. The filter-feeding shark species are overall similar in morphology, and on this basis are believed to be only distantly related. Phylogenetically, each species is the sole member of its own family, Rhincodontidae, Cetorhinidae and Megachasmidae, respectively. Molecular data, however, can sometimes refute morphological characteristics and might find undiscovered affiliations between these three species.

This study involves sequence analysis of key genes across these and related species; genes currently being analyzed include HoxA11, Dlx2 and the mitochondrial control region. These genes are useful for molecular analysis because they are highly conserved, and HoxA11 and Dlx2 have roles that might underlie the morphological similarities observed between the three species. This analysis can provide information as to possible convergent evolution within the filter-feeding shark species that may explain the morphological similarities.

This analysis has two potential outcomes, either of which provides interesting new research possibilities. It is possible that existing classifications of the filter-feeding shark species will be confirmed, offering the possibility to study those genes responsible for the amazing convergent evolution between the three species. If this analysis refutes the existing classification, comparative molecular analysis will be expanded and morphological features and criteria will be reexamined.

207. Strutzenberg, Travis

Development of ilpad Mount for Use by Neurologically Impaired Patients Restricted to Wheelchair Mobility

Undergraduate – Mechanical Engineering

The introduction of the iPad into society has given people throughout the world an opportunity to learn, play, and express themselves in unique ways. However, because this device requires specific motions and gestures to operate, there are groups of people that are unable to fully utilize it potential. For neurologically impaired patients restricted to wheelchairs, it is difficult, if not impossible, to hold and manipulate the iPad to get the full benefit of its abilities. Through research into similar products, required motions, and the limitations of a wheelchair ridden patient, it was possible to design a mounting device that would allow for functionality of the iPad while still facilitating the reduced abilities of various patients. Material of the device would be dependent on weight restrictions, desired functionality, and safety concerns for both the iPad and the patient. Analyzing material properties and how people actually use the iPad was necessary to make proper choices. Confirmation of material strength and design via finite element analysis in ProEngineer CAD software was necessary to assure proper safety requirements were met. Combining the results of the various aspects of research and developmental ideas of the members of the engineers of the group, the decision was made to fabricate an Aluminum framework mounted on aircraft-grade hardened plastic ball and socket joints that would keep costs, weight, and production time at a minimum. Through completion of this design and delivery of the finished product to Easter Seals of DuPage, it is now possible for the patients of their therapeutic center to fully utilize the iPad as part of their learning and entertainment.

208. Swanson, Eric; Warren, Chad M.; Solaro, R.J.; Samarel, Allen M. and Russell, Brenda

Cyclic Mechanical Strain Alters CapZ β1 but not CapZ β2 Dynamics and Phosphorylation via PKCε-Dependent Mechanisms

Graduate – Physiology and Biophysics

The mechanisms of sarcomere remodeling in cardiomyocyte hypertrophy are complex, and our previous studies have identified an important role for protein kinase C-ε (PKCε) and the f-actin capping protein CapZ in this process. We now hypothesize that CapZ undergoes PKCε-dependent phosphorylation, which affects its binding kinetics in response to cyclic mechanical strain (CS). Neonatal rat ventricular myocytes were subjected to 10% CS at 1Hz for 1h. CapZ dissociation rates were analyzed by fluorescence recovery after photobleaching (FRAP) using adenoviruses expressing wildtype (wt) GFP-CapZβ1 or wt GFP-CapZβ2. To examine the role of PKCε-dependent phosphorylation of CapZ, cells were infected (33 moi, 24h) with adenoviruses expressing dominant-negative (dn) or constitutively active (ca) PKCε prior to CS. CS enhanced dissociation rates for CapZβ1 (413%, $P<0.05$) above resting controls, but CapZβ2 was unchanged. caPKCε had no effect on CapZß1 dissociation rate. Additionally, CapZ phosphorylation was investigated with quantitative 2-dimesional gel electrophoresis (2DGE) and 1-dimensional phos-tag gel electrophoresis following 24 h of CS at 1hz. 1-dimensional phos-tag Western blotting identified two phosphorylations of CapZβ1 and one of CapZβ2. Cyclic strain deceased the unphosphorylated CapZβ1 and increased the doubly phosphorylated form while the addition of dnPKCε with CS reversed this effect (all $P>0.05$ compared to resting controls). While caPKCε might be expected to mimic the effects of strain, it only increased the mono-phosphorylated form, and reduced the doubly phosphorylated form ($P<0.05$ compared to resting). Neither CS nor either PKCε adenovirus had any effect on CapZβ2 dynamics or phosphorylation. Taken together, our data strongly suggest that CS produces phosphorylation of CapZβ1 but not of CapZβ2. Furthermore, since caPKCε does not recapitulate the effects of CS, other mechanisms must also be operative. It seems likely that PKCε phosphorylation and other pathways are both needed for CapZ regulation leading to the actin filament capping necessary for cell remodeling and hypertrophy.

209. Sweetman, Brian and Linninger, Andreas

Multi-scale Modeling of Biomechanical Interactions in the Brain

Graduate – Bioengineering

We present a computational method to quantify the interactions between pulsating cerebral vasculature, brain tissue, and cerebrospinal fluid (CSF). Pulsating blood flow is known to drive the oscillatory motion of the CSF. Despite this insight, there are no computational methods capable of describing the interactions between cerebral vasculature, deformable brain tissue, and displaceable CSF. The computational challenge stems from three major hurdles: an anatomically consistent model for the cerebrovascular network, the force interactions between the vascular bed and the brain parenchyma, and the force interactions between blood and brain as well as brain and CSF.

We outline a multi-scale modeling approach which utilizes the finite volume method for spatial discretization of the brain and CSF spaces and a network-based model for the cerebral vasculature. The network-based model allows for analytical solutions of cerebral blood flow, blood pressures, and vessel expansion by treating discrete segments of the vasculature network as cylinders. The complete vessel network is created by extending image-derived vasculature networks with microvasculature structures generated by an automatic vessel growth algorithm. To simulate blood flow and blood pressures, equations for mass and momentum conservation are applied to the vasculature network. Vessel expansion is governed by a stress-strain constitutive law that accommodates vessel expansion or contraction due to pressure differences between the vessel lumen and surrounding brain tissue. Any changes in vessel caliber were transmitted to the brain mesh as a volumetric strain. Brain tissue displacement was governed by a steady-state momentum balance with an underlying linear elastic constitutive model. Incompressible CSF flow was governed by mass and momentum conservation and solved using the SIMPLE method. Because the CSF space is deformable at the CSF-brain tissue boundary, the fluid equations were written an Arbitrary-

Lagrangian-Eulerian (ALE) framework.

To maintain the integrity of the fluid mesh, a mesh displacement scheme was developed and implemented.

210. Szczygiel, Karolina; Emerson, Kathy and Murphy, Mary

Essentialist Beliefs and Prejudice: Mental and Physical Disability Stigma

Undergraduate – Psychology

Extensive research exists on how having a concealable stigma affects the individual, but there isn't as much on how concealable stigmatized identities are perceived by others. The belief in essentialism, that a social category has a fixed, inherent, and identity-defying nature has been associated with prejudice towards certain groups. Haslam, Rothschild & Ernst (2002) found that the relationship between prejudice and essentialist beliefs is more complex and category specific. Of the two factors associated with essentialism - natural and entitative, the latter predicted prejudice towards homosexuals a concealable stigmatized group. We would like to see if this pattern of attitudes is unique, or if it can be generalized to other groups with concealable identities. This study focuses particularly on attitudes towards individuals with physical and mental disabilities/illnesses. There was a significant relationship between essentialist beliefs and attitudes toward individuals with physical disabilities as well as mental disabilities. However, our research showed that there may be more than one way of interpreting stigma related to illness and disability. Instead of categorizing disabilities as mental or physical, they can be categorized as obtaining a behavioral factor where individual choice or control is associated with the disability/illness.

211. Szymulanska, Karina; Tanoye, Urszula M. and Murphy, Brian T.

Biogeography of Actinomycetes From the Massachusetts Coastline

Graduate – Medicinal Chemistry and Pharmacognosy

The rapid development of bacterial resistance to antibiotics necessitates the search for novel secondary metabolites from unique sources. Although terrestrial actinomycetes are historically well-known producers of antibiotics, the biosynthetic potential of their oceanic equivalents has been completely overlooked. Little is known about their habitation patterns and factors responsible for variation in their distribution. In addition, environmental conditions in the ocean may vary greatly even within small distances, and these unique microenvironments select for the biodiversity found within. We hypothesize that taxonomic diversity will be a successful determinant of chemical diversity; as a result, the biogeographical study of these marine actinomycetes is critical toward progress in drug discovery. In the current study, we utilized culture-dependent methods to assess the occurrence of Actinobacteria within sediment collected from five locations from a north/south transect of the Massachusetts coastline. Using 16S rRNA analysis, we evaluated 1) the distribution of Actinobacteria from different SCUBA collection sites, 2) the effectiveness of pre-treatment methods that select for typical antibiotic-producing genera, and 3) the effects of media composition on actinomycete diversity. Results from this study will be presented.

212. Talarico, Anastasia and Berger, Barbara

Describing nurse anesthesia student opinions on factors relating to success in Nurse Anesthesia School

Undergraduate – Nursing

The purpose of this study is to describe nurse anesthesia student opinions on factors contributing to success in nurse anesthesia school. This exploratory study has a descriptive design claimed exempt status by the UIC Institutional Review Board. Data is currently being collected using a questionnaire distributed over the internet on Survey Monkey. The anticipated sample includes 1000 nurse anesthesia students that have begun their clinical components of nurse anesthesia school. Subjects are expected to be within the age range of 18 and 65 years old, and no vulnerable subjects are being targeted by in this research study. Participants are to complete the 3 part questionnaire one time using whatever internet connection they like. Estimated total time for questionnaire completion is 15 minutes. The first section asks participants to give their opinions on which personal and professional characteristics in addition to which clinical skills most affect success in nurse anesthesia school. The second component is a checklist of clinical proficiencies that participants will fill out to describe their own personal experiences and competencies in critical care nursing. Lastly participants are asked for limited demographic information. The survey will close for entry submission on February 14th and data analysis will begin at that point.

213. Topchiev, Borislav

Financial Planning for Recent College Graduates

Undergraduate – Finance

This project involves a research on determining variety of investment strategies applicable to people from the middle class range, with incomes ranging from 50K to 100k. In particular, young family made of two recent graduates is analyzed in detail. The goal is to show portfolio management strategy which purpose is to promote current income and sustainable growth for conservative and moderate conservative investors. Such strategy is constructed by implementing domestic and international diversification of variety of investment vehicles, while taking into consideration the tradeoff between risk and return, trading fees, time horizon, taxation, personal risk (job loss), personal improvement (higher education, certifications), insurance policies, behavioral finance, credit score, etc. This research highlights the importance of evaluating companies past performance, based on which the future value of investments can be derived to an extent.

214. Tuntland, Mike; Santarsiero, Bernard D.; Johnson, Michael E. and Fung, Leslie Wo-Mei

Structures of N5-carboxyaminoimidazole Ribonucleotide Synthase (PurK) from Bacillus anthracis

Graduate – Chemistry

In the purine biosynthetic pathway of *Bacillus anthracis*, N^5-carboxyaminoimidazole ribonucleotide synthase (PurK) is involved in the formation of N^5-carboxyaminoimidazole ribonucleotide (N^5-CAIR) from 5-aminoimidazole ribonucleotide (AIR). PurK is unique to prokaryotes. A recombinant PurK protein was prepared and found to be a dimer in solution. We have solved the structures of the apo-enzyme with magnesium ions, as a dimer, and a complex with adenosine diphosphate (ADP), but without magnesium, each to 2 Å in resolution. The apo-enzyme and the complex structures are similar with a RMSD of 0.12 Å. The ADP binding site involves residues R107, K147, E182, K183, V185, E190 and N267. The conformations of these residues in the apo-enzyme and the complex remain similar. A difference in the conformation of the B-loop, residues 150-157, is observed. The ß-phosphate of ADP is able to rotate and assumes two conformations, 70% in one and 30% in the other. These results suggest the importance of magnesium in supplying structural adhesion to ADP in the active site, and may be important for the

understanding of the binding of potential inhibitors. We also compare our structures with previously published structures of PurK from *E. coli* and *A. clavatus*. The segment consisting of residues 51-71, which is absent in PurK of *E. coli*, is a beta sheet and alpha helix. Little sequence homology is observed for this segment between *A. clavatus* and *B. anthracis*. The understanding of differences and similarities of these PurK structures will allow us to develop inhibitors as potential antibiotics.

215. Tymen, Stephanie; Fang, Zong Juan Fang and Marucha, Phillip

Role of MicroRNAs in the Regulation of the Toll-like Receptor 4 pathway in Stress-impaired Wound Healing

Graduate – Periodontics

Stress delays wound healing and impairs bacterial clearance at the wound site, increasing the risk of opportunistic infection. Toll-like receptor 4 (TLR4) signaling pathway, which is crucial for bacterial clearance, is regulated by small non-coding RNA called microRNAs (miRs). We hypothesis that stress induces differential expression of miRs that regulate TLR4 pathway contributing to impaired inflammation and bacterial clearance during wound healing.

SKH-1 mice were either food-and-water (FWD) deprived to serve as controls or stressed by restraint (RST) 12h/day for 3 days prior and 5 days post–wounding. Two punch biopsy wounds of 3.5mm were created on their backs. Wounds were harvested for each condition 0, 1 and 5 days post-wounding and processed for qRT-PCR and miR profiling (n=5) to determine the expression of members of TLR4 pathway and TLR4-related miRs, respectively.

We observed that stress down-regulates the expression of molecules involved in TLR4 signaling cascade at Day1 post-wounding compared to Day5 in controls.

TLR4-related miRs levels change during the course of wound healing, and they are differentially regulated under stress. MiR-21 and its target, PDCD4, show inverse expression profiles in controls, whereas miR-146b and IRAK1 levels follow opposite trends in stress-impaired wound healing.

Our study suggests that stress affects miRs regulating members of TLR4 signaling cascade, dampening their expression, which could compromise the inflammatory response and bacterial clearance during stress-impaired wound healing.

216. Urbanski, Colleen; Collins, Jennifer and Milosevic, Gordana

The Prevalence of Pharmacy Deserts and the Effect on Health Disparities

Undergraduate – Sociology

With the recent passage of the Health Care Reform Bill, the idea that citizens should all equally have access to health care has been foremost on the nation's mind. Pharmacies were designed with a similar goal: to allow citizens in nearby neighborhoods access to treatment for and prevention of disease through providing medication, as well as information about their medication. This study is an analysis of the correlation of the presence, or lack thereof, of pharmacies to socioeconomic factors and death rates. Data is grouped according to census tract,which prevents arbitrary or biased sections of data. The indication of a pharmacy desert, or area that is not served by a close pharmacy, would also indicate health disparities between the census tract of the pharmacy desert and census tracts without deserts. If there is a consistent pattern of pharmacy deserts in census tracts with specific characteristics (such as high poverty level) then there exists a bias in the determination of pharmacy locations. This work demonstrates the extent to which pharmacies are evenly distributed and encourages further investigation into pharmacy deserts.

217. Vagvala, Saivenkat and Izaguirre, Gonzalo

Characterization of Structural Elements That Contribute to Specificity in The Inhibition of Furin by Serpin B8

Undergraduate – Center for Molecular Biology of Oral Diseases

Furin is a member of the Proprotein Convertase (PC) family of serine proteinases, and its activity is regulated by the inhibitor serpin B8. Serpins present themselves as substrates to their target proteinases leading to a suicide mechanism of inhibition that results in the formation of an inhibitory covalent complex. The specificity of the proteinase-serpin reactions is determined by the binding of the enzyme active-site to a selective amino acid sequence located in the reactive center loop (RCL) of the serpin, and by additional discriminatory exosite binding interactions. There are two furin recognition sequences in the RCL of serpin B8. We hypothesize that the targeting of only one of them leads to inhibition of furin. Furin has four highly variable surface loops, compared to other PCs, which surround its catalytic site. We also hypothesize that these loops establish specific exosite binding interactions with serpin B8. Our goal is to determine those structural elements involved in selective active-site and exosite binding interactions that provide specificity for the reaction of furin with serpin B8. We produced the recombinant protein forms of furin and serpin B8, and their mutants, by expressing them in insect cells. Both types of proteins were purified by chromatography using nickel-affinity and gel filtration. The inhibition reactions were studied by kinetic methods and protein electrophoresis. We were able to determine structural elements in the RCL of serpin B8 and in a loop of furin that contribute to specificity for the inhibitory reaction through selective active-site and exosite binding interactions, respectively.

218. Valenzuela, Morgan

Doctor Bertha Van Hoosen: "Surgical Daughters" and Mother-Love

Undergraduate – History

Prominent Chicago-based doctor, Bertha Van Hoosen was born in 1863 at Stony Creek Farm, her family's ancestral home in Rochester, Michigan. A graduate of the University of Michigan (1884) Van Hoosen went on to settle in Chicago, briefly establishing her own private practice. Her presence in Chicago would mark the beginning of a distinguished career. From her first appointment as an emergency physician for the 1893 World's Fair she moved on to become head obstetrician at Northwestern University and later served as the first female faculty member at the University of Illinois at Chicago. She is recognized for her pioneer use of "twilight sleep" in childbirth and as the founder of the Medical Women's National Association (MWNA, 1915); additionally, she became head of obstetrics at Loyola in 1918. Though she operated as a woman in a man's profession, her closest and most significant personal relationships were with other women. Though Van Hoosen fits the generalized profile for a participant in a romantic friendship – one of a white, comparatively well-off/affluent, college-educated woman who never married – an examination of Van Hoosen's memoir (Petticoat Surgeon) and various letters to a student she mentored (a "Surgical Daughter", achieved in UIC's Special Collections) a unique facet to same-sex love is revealed. Historian and queer theorist, Julian Carter's Mother-Love separates itself from framing all same-sex relationships as lesbian-esque relations and romantic friendships and provides a historical element in same-sex love. The application of Mother-Love to Van Hoosen's accounts of close relationships with female mentors, her own students, and her female family members provides a more accurate understanding of past same-sex relationships and provides insight to the broad realm of expressing affection that we tend to overlook in today's world.

219. Valika, Insiya; Mehta, Yasmin; Bartlett, Laura; Gonzalez, Kay and Morgan-Short, Kara

Adjective Agreement & Syntactic Position: An ERP Study of Adjectives in Mexican Spanish

Undergraduate – Neuroscience

Neurolinguistics is an exciting new field that can bridge the gap between theoretical linguistics and biological perspectives on language processing. Our pilot study looks at theories of adjective placement in Spanish using experimental techniques, specifically Event-Related Potentials (ERPs). The ERP technique utilizes EEGs time locked to a stimulus to show real- time cognitive processes. In Spanish, adjectives can appear before the noun (prenominal) or after the noun (postnominal), and they agree with their noun in gender and number in both positions, but it is not known if these positions are processed differently. Studies on agreement with prenominal adjectives in German (Davidson & Indefrey, 2009) and in Dutch (Sabourin & Haverkort, 2003) found a P600 for non-agreeing adjective-noun word pairs embedded in sentences. However, Barber & Carreiras's (2005) ERP study on postnominal adjectives in Spanish found a LAN/P600 for adjective-noun word pairs in sentences. Thus, there appear to be differences in cognitive processing according to adjective position. This difference, however, has not been explored within a language that has both pre- and postnominal adjectives. Our pilot study fills this gap by investigating different types of adjectives in both pre- and post-nominal position types in Spanish. To this aim, we recorded ERPs from 12 native speakers of Mexican Spanish while they read sets of three words in Spanish with the order of either article-adjective-noun (prenominal; la simpática vaca 'the nice cow'), or article-noun-adjective (postnominal; la vaca simpática 'the cow nice'), which they judged as being "Good" or "Bad". The ERPs elicited to gender agreement violations on prenominal adjectives generally show sustained frontal negativities and posterior P600-like components. However, postnominal adjective agreement violations tend to elicit sustained frontal negativities without P600s. These pilot results indicate that agreement processing may be dependent upon the position of the agreeing element, regardless of word category.

220. Valika, Murtaza

The Differences Between a Large Accounting Firm, Small Accounting Firm and the Classroom

Undergraduate – Accounting

I will be doing my research on the differences between a large accounting firm, a small accounting firm, and the classroom. I will be comparing the differences and the similarities between the accounting classroom between a small and a large accounting firm. I will be focusing mostly on the "hard" skills and the "soft" skills between these three areas. For example, the biggest "hard" skill I will be focusing on will be the technical skills. I will examine how the tax accounting curriculum compares to the daily work in a small as well as a large accounting firm.
My research paper will be focusing mostly on the "soft" skills, such as networking, leadership, team work, and spontaneity. I have taken an accounting class that has focused on these soft skills. From using the classroom experience from that class, I will be able to come up with my observations. I have worked in various small and large accounting firms as well as to help come up with my research.

221. Vargas, Alejandro; Shroff, Adhir R. and Vidovich, Mladen I.

Reporting of Radiation Exposure in Contemporary Interventional Cardiology Trials

Graduate – Medicine

Interventional cardiology procedures are a significant source of ionizing radiation, which can have detrimental effects on patients and medical personnel. We examined contemporary interventional cardiology randomized trials published in leading journals to determine reporting of radiation exposure and procedure time. The EuroIntervention 2010 Supplement served as a source of randomized trials in interventional cardiology published in scientific literature from 2000 to 2010.

Of all the trials in the supplement, 204 represented original research and were examined for reporting of radiation dose and procedure times. Only 15 trials (7.35%) reported radiation exposure or procedure time, covering 22,343 patients (6.14% of the total patient population of 363,727). Of these trials, 14 were published after 2006, with 1 published in 2000. The average fluoroscopy time reported in 7 trials was 13.6 minutes, the mean radiation dose reported in 3 trials was 58.67 Gy/cm2 and the average procedure time reported in 7 trials was 63 minutes.

Radiation exposure is not consistently reported in contemporary interventional cardiology trials. Even when reporting occurs, trials may not report detailed data such as radiation dose, fluoroscopy time, or procedure times. Although identification and reporting of radiation exposure has never been a requirement of any current research study or catheter laboratory, researchers owe it to patients to provide medical treatment with as little harm as possible.

222. Vidal-Ruiz, Annabella

Social Control Theory Among Adult Male Perpetrators in Regards to Recidivism of Domestic Violence Offenses

Undergraduate – Psychology

Studies of the Social Control Theory as a deterrent for violence have shown mixed results regarding whether social bonds can truly affect whether or not a person commits a crime. However, most of these studies have focused on juvenile delinquents and general crime. This study will focus on adult perpetrators and whether their social bonds prevent a second domestic violence offense. Participants consisted of 1,396 male domestic violence perpetrators from a rural and urban district, River County and Lakefront, respectively. Demographic information was taken from each male through the probation office. The three markers that assessed social bonds were marriage, education, and employment. Probation offices then gave information about domestic violence recidivism among the participants. . Results demonstrated that male perpetrators who were employed or married were less likely to commit a second domestic violence offense. Furthermore, male perpetrators that had a lower education level were also more likely to commit a second domestic violence offense.

Previous research on the social control theory has demonstrated inconsistent findings on delinquency and social bonds. Most of the previous research has been done on juvenile delinquents. This research not only addresses the social control theory in the context of adult violence but also demonstrates how the theory may pertain to interpersonal violence. Though the research suggested that social bonds and recidivism are negatively correlated, there are other possible explanations. One possible explanation could be that the perpetrators with higher social bonds saw the consequences of their first offense and, in order to avoid the consequences, found better ways to hide their second offense.

223. Walthers, Matthew; Grewal, Gurtej; Bareither, Mary Lou and Najafi, Bijan

The Impact of Running on the Propagation of the Shock Received at the Tibia and Lower Back During Barefoot and Shod Running

Undergraduate – Kinesiology and Nutrition

Different patterns of foot strike have been associated with varying amounts of shock propagation in the bones of runners and may have an effect on injuries sustained during running. High amounts of transient shock are found during the heelstrike of a rear foot strike in shod runners and may contribute to such injuries. Past research has shown that experienced barefoot runners favor a forefoot strike which can reduce high transient shock and may have implications for injury prevention. The main objective of this study was to explore the kinematics of knee and lower back of shod and barefoot runners during over ground running instead of treadmill running which may better replicate the environment where the risk of injury is higher. Twelve subjects with varying running experience were recruited. Five wearable sensors, tri-axial accelerometer, gyroscope and magnetometer (LegSys, Biosensics, MA, USA), were attached to each subject. One attached at each tibial tuberosity, proximal to each patella, and at the sacrum. Each subject ran a shod trial and a barefoot trial on an indoor running track while the sensors continuously recorded kinematic data. The sensors allowed estimation of 3D joint angles and knee joint range of motion (ROM), as well as the amplitude and timing of collision impact at each body segment. Wearing shoes increased knee ROM in the flexion-extension (F-E) direction by 6.2% ($p=0.03$) and ROM was reduced in the internal-external direction (I-E) by 18.9% ($p=0.001$). The medial-lateral shock amplitude recorded at the sacrum was reduced by 14% during the shod trial ($p=0.03$). Our results suggest that wearing shoes may improve overall kinematics of running. Specifically, M-L and I-E knee ROM and M-L lower back shock were reduced, indicating improved knee joint stability and a potential reduction of lower back pain.

224. Wardak, Heelai; Jerome-Morais, Anita and Diamond, Alan

Genetic Variations in the GPx-1 Gene Influence its Response to Selenium Form and Dose

Undergraduate – Pathology

Studies on the essential trace element selenium have revealed an inverse association between its dietary intake and the risk of several types of cancer, as well as other diseases. My research has been focused on one selenium-containing protein, glutathione peroxidase (GPx-1), a protein that detoxifies potentially mutagenic peroxides. Naturally occurring genetic variants of the gene that encodes GPx-1 have been shown to be associated with increased risk of cancer and several of diseases. To date, human supplementation trials have yielded uncertain results. To gain an understanding of the impact of the form of selenium used and the effects of the genetic variations that occur, I used a human breast cancer-derived cell line (MCF-7), which does not express GPx-1 and was genetically engineered to exclusively express the distinct GPx-1 alleles. These cells, expressing combinations of an alanine-repeat variation in the amino-terminus of the protein (5 or 7 alanines) or a leucine (L) or proline (P) at codon 198 were exposed to an inorganic (selenite) or an organic form (selenomethionine) of selenium over a range of doses. The effects of selenium form and dose, as well as the genetic identity of the GPx-1 gene, on GPx-1 enzyme activity were investigated using an assay that measures the reduction of hydrogen peroxide to water in a spectrophotometer. Higher doses of selenomethionine were required to achieve maximum enzyme activity as compared to selenite and the maximum amount of activity obtained was typically higher for the selenite. Clear differences in both the response to the different forms and doses of selenium used among the cell lines expressing distinct GPx-1 alleles were observed. These data indicate that future investigations examining the benefits of selenium

supplementation should consider the form of selenium being provided and the genetic make-up of those participating in the studies.

225. Wattanakul, Boontuan

Validation of Diabetes Knowledge Test in Thailand

Graduate – Biobehavioral Health Sciences

Background: There is no reliable and valid instrument to measure knowledge of self-care activities in Thai patients with type 2 diabetes. Conceptual framework: Diabetes education standard of American Diabetes Association guided this research. *Purpose*: To validate the psychometric properties of a Thai translation of the Diabetes Knowledge Test (DKT) (Fitzgerald et al). *Methods:* A cross-sectional survey of 124 convenient subjects was conducted in diabetes clinics in rural Thailand. Participants completed an interviewer administered survey of demographic information, along with the DKT, a reliable and valid instrument designed to measure general knowledge of diabetes self-care. The DKT was translated and modified for cultural equivalency by three bilingual Thai nurses. The DKT contained 14 general knowledge items and 9 items related to insulin use. Non-insulin users completed 14 general knowledge items, while insulin users completed entire 23 items. The most recent HbA1C levels were recorded. *Findings:* Characteristics of the participants were: gender (female[91.0%]); age(54.63±10.28 years[Mean±SD]; range: 30-78); duration of diabetes(6.05±5.69 years; range: 1-31); BMI(26.46±4.21 kg/m^2; range(16.15-43.11); family history of diabetes(53.3%); educational level (grade 6 or less[75%]); low-income(37.9%); treatments included oral medications (74.2%), insulin (6.5%), both (13.7%), and diet alone(5.6%); HbA1c levels: (8.63±1.92%; range: 5.1-13.1). Reliability coefficient was low both in non-insulin (α=0.363) and insulin users(α=0.547). Approximately 76% of subjects missed items on *insulin reactions*, *insulin treatment*, *ketoacidosis* and *unsweetened fruit juice*; 62.5% provided incorrect responses about *urine ketones*; 59.7% incorrectly identified the purpose of HbA1C. The reviewer noted that subjects had difficulty understanding the questions and/or discriminating multiple choice options. *Conclusions:* The Thai translation of the DKT demonstrated low reliability. Subjects did not understand meaning of terms such as insulin reactions, ketoacidosis, HbA1C, free food, unsweetened fruit juice, and carbohydrate. Possible modification of the DKT for rural Thai sample would be yes/no choices. In addition, guessing can be mitigated by an option to select 'do not know'.

226. Williamson, Rebecca and Cassidy, Marsha

Conflicting Paradigms in the Study of Emotion in Bioculture and the Humanities: A Case Study of KRAMER VS. KRAMER

Undergraduate – English

The study of film has been predominantly conducted through the lens of the humanities, most recently from the viewpoint of cultural studies. Torben Grodal's new book *Embodied Visions* seeks to alter this paradigm by introducing bioculture to film studies. My research project examines the claims Grodal makes in his book and compares and contrasts them to the claims made by another scholar interested in bioculture, Daniel Gross. While both authors incorporate the theories of Charles Darwin, they support two polar views on the analysis of emotion in film and the humanities. By examining these two scholars and their varying points of view, I attempt to bring to light the strengths and weaknesses of each perspective. Drawing on studies in neuroscience, Grodal makes the claim that films should be analyzed from a biological/evolutionary point of view. He introduces his theory of the PECMA flow (Perception, Emotion, Cognition, Motor Action), which describes the film viewing process from an evolutionary perspective and thus supports his claim that film

viewing is a deeply neurobiological process. Ironically, Gross likewise makes use of Darwin's ideas to prove his claim that using the tools of the humanities is the only proper way to analyze emotion in films. He claims that Darwin "foregrounds the inherent rhetoricity of emotion," which destabilizes theories that support the "science of emotions." In comparing the work of Grodal and Gross, I conclude that film studies should incorporate aspects of biology/evolution and culture in order to accurately analyze and interpret emotion. These scholars' viewpoints complement each other, but one alone cannot fully explain our responses to film viewing. To support my conclusion that film studies must include aspects of the humanities and biology, I have screened the film *Kramer vs. Kramer*. My project closely analyses three emotional scenes to offer both a cultural and biocultural reading.

227. Witek, Marta and Fung, Leslie W.-M.

Caspase-3 Action on Alpha II Spectrin

Graduate – Chemistry

Sjögren's syndrome (SS) is a common autoimmune rheumatic disease. The most evident symptoms are dry eyes and dry mouth. Major proteins identified in the salivary gland cells of SS patients include the breakdown products of alpha II spectrin (II), a major cytoskeletal protein contributing to membrane organization and integrity. The spectrin fragmentation leads to morphological changes during apoptosis. Caspase-3 cleavage of II generates two fragments with molecular masses of 150 & 120 kDa. These are also the spectrin breakdown products often found in traumatic brain injury. We have designed and expressed model spectrin proteins (fragments) to investigate the action of caspase-3 on spectrin. Three model proteins containing first, second, and both cut sites were prepared and characterized. Recombinant caspase-3 was also prepared, and its protease activity was examined by the cleavage of a commonly used fluorogenic peptide substrate Ac-Asp-Glu-Val-Asp-Amino-4-methylcoumarin. Both spectrin cleavage sites were predicted to be located in unstructured and exposed regions. However, properties of caspase cleavage at those sites are different. Systematic studies of caspases allow us to understand the molecular difference in caspase cleavage of spectrin. We have used the intrinsic tryptophan fluorescence as a quantitative method to analyze caspase-3 activity on spectrin fragments. This approach has allowed us to describe the first time quantitative cleavage of spectrin fragments.

228. Wright, Laurel; Mercurio, Lara and Murphy, Mary

The Effect of Gender Roles on STEM Performance and Attitudes Among Gay and Straight Women

Undergraduate – Psychology

Although the relatively small numbers of women within the science, technology, engineering and mathematics (STEM) domains has been offered as evidence for their intellectual inferiority, additional theories offer alternative explanations for this underrepresentation without impugning women's intelligence and STEM abilities. Stereotype threat theory, in particular, suggests that when a negative stereotype applies to a domain, the pressure to disprove the stereotype to oneself and to others can ironically cause individuals to confirm the stereotype. This theory suggests that although women have the ability to successfully engage and enjoy STEM disciplines, the stereotypes that question their abilities, combined with their minority status in STEM, discourage them from pursuing such fields (Steele, J. 2002). STEM careers have a negative reputation for being both dominated numerically by men, but also for being relatively hostile toward work-family concerns and balance (Ceci, 2009). In a 2 X 3 factorial design, this experiment primed heterosexual and homosexual women (who were highly identified with math) with maternal images. We expected that

these primes would decrease women's interest in STEM compared to non-STEM and traditionally female careers. Because the prime is meant to cue the roles of mother and potentially, wife, this experiment examines whether maternal primes have the same effect for heterosexual women as for homosexual women—who have rejected traditional sexual roles and relationships. We expected to find similar patterns for hetero- and homosexual women who hope to have children in the future because the societal stereotype about women's primary caregiver role is deeply embedded in society. Additionally, we expected the effect of the prime to be tempered for women (both heterosexual and homosexual) who were uninterested in having children in the future. The role of stereotypes and work-family balance in depressing women's STEM interests will be discussed.

229. Xie, Qian; Sroussi, Herve and Wu, Christine D.

In vitro Evaluation of Cariogenicity of Candida Species

Graduate – Endodontics

Candida species have been associated with dentinal caries. The prevalence of Candida dubliniensis, a non-albicans candida (NAC), has been reported in root caries lesions in the elderly and immunocompromised populations. A recent study by our research collaborators identified C. dubliniensis as one of the frequently present NAC in dentinal tubules of carious lesions of HIV-positive patients. However, its cariogenic potential and its interaction with S. mutans have not been well documented. Objectives: To investigate in vitro the cariogenic potential of C. dubliniensis or C. dubliniensis / Streptococcus mutans using a microbial model. Methods: S. mutans Ingbritt, Candia albicans ATCC 10231 and C. dubliniensis (clinical isolate from HIV-positive patient), were used in this study. Tooth fragments obtained from the cervical portion of the roots of sound human third molars were used. The teeth fragments were cultured with S. mutans, C. dubliniensis, C. albicans, C. dubliniensis / S. mutans or C. albicans / S. mutans in BHI containing 1% sucrose for 7 days with daily changes of growth medium. The pH values of the cultures were recorded daily. Samples were sectioned and evaluated using polarized light microscopy (PLM) and confocal laser scanning microscopy. Results: The pH values of culture containing root fragment and C. dubliniensis ranged from 4.5 to 5.3. Average lesion depth of 91 ± 16 μm was noted. When root fragments were cultured with both C. dubliniensis and S. mutans, significantly lowered pH values (4.1 to 4.3) and larger lesion depths of 156 ± 20 μm was observed. While C. albicans ATCC 10231 did not induced carious lesion using the current model, it produced the deepest lesion (233 ± 15 μm) among all experimental groups when co-cultured with S. mutans. Conclusion: The NAC C. dubliniensis may play an important role in root caries development of the immune-compromised population.

This study was supported by the Pediatric Dentistry Department, UIC.

230. Yaghoubi, Poupak

Biochar Amended Landfill Cover Soil for Landfill Gas Mitigation

Graduate – Civil and Materials Engineering

Landfill gas mainly consists of methane (CH_4) and carbon dioxide (CO_2) and is receiving increased attention worldwide due to its contribution to the global climate change. Higher moisture content in the soil cover may be required for enhanced methanotrophs activity to occur naturally within landfill soil covers; however, such high moisture may hinder the transport of CH_4 and diffusion of oxygen through the soil cover. This study investigated the amendment of biochar to the soil to overcome these contrasting challenges and enhance CH_4

oxidation efficiency. Two large columns, one filled with soil only and another with biochar amended soil were prepared in laboratory. Various CH_4 influx flow rates from 0.038 to 0.055 ml/ cm^2.min were applied to each column. Gas samples were collected from the inlet, the outlet, and side sampling points along the column after steady performance of CH_4 oxidation occurred. The temperatures at reaction area in column 1 were lower than that of column 2. Reaction depth in column 2 was more than 3 times that of column 1. The CH_4 concentrations rose accordingly as the CH_4 influx rate increased for both columns, but the buffering capacity to increasing CH_4 influx rate of column 2 was better than that of column 1. The concentration profile of CH_4 in column 1 decreased obviously after adding water, but didn't change very much for column 2. Biochar amended soil had a better adaptability to water addition than soil only. The fractional oxidation of CH_4 in column 2 was up to 19.2 times of that of column 1.All evidences showed that biochar amended cover soil had a much better performance in oxidizing CH_4 than traditional cover soil.

231. Yang, Linglan; Marucha, Phillip T. and Engeland, Christopher G.

Restraint vs. Isolation Stress: The Effects on Wound Healing in Mice

Graduate – Periodontics

Hypothesis: Isolation stress impairs dermal wound healing in mice. *Objectives*: Wound healing in humans and rodents is impaired by exposure to chronic psychological stress. Restraint stress reliably delays dermal healing in mice and has become a model used by many investigators. Evidence also suggests that isolation stress, which is akin to loneliness/isolation in humans, negatively affects immunity. This is important as mice are often separated in scientific studies to prevent potentially confounding interactions. This study compared the effects of isolation and restraint stress on wound healing and gene expression in dermal tissue. *Methods*: 80 male SKH-1 mice were divided into four groups: Restraint stress (RST), and food/water deprived controls (FWD); isolate-housed (ISO), and group-housed controls (GRO). RST mice were placed in well-ventilated tubes from 7pm to 7am for 8 days, starting 3 days before wounding. ISO mice were individually housed 3 weeks before wounding until sacrificed. Under anesthesia, two 3.5 mm biopsy punch wounds were placed dorsally on each mouse and harvested at day 1, 3, 5 or 7 after wounding. Wound closure was assessed through daily pictures and image analysis. Biopsies were analyzed by RT-PCR. *Results*: Isolation stress impaired wound closure similarly to restraint. RST mice exhibited lower gene expression for KGF and α-SMA at day3 compared to FWD mice. ISO mice had lower gene expression for IL-1β and KGF at day1; and KC, MIP-1α, KGF and α-SMA at day3 (all $p<0.05$ or less). ISO mice wounds had less bacteria than all other groups ($p<0.01$ or less). *Conclusions*: Surprisingly, isolation impaired wound healing to the same extent as eight 12h sessions of restraint stress. The data suggest that isolation impairs wound healing through alterations in inflammation, re-epithelialization and wound contraction. Importantly, a high bacterial burden was not necessary to induce stress-impaired healing in this relatively naturalistic stress model.

This study was supported by the UIC College of Dentistry.

232. Yarkhan, Adnan; Hosi, Y.; Kamischke, A.; Guinasaca, N.; Mirkowicz, M. and Gurr, O.M.

Lost Youths: Executions Of Eighteen, Nineteen, And Twenty-Year-Olds In The U.S. Since 2000

Undergraduate – Criminology, Law and Justice

Without empirical evidence that the death penalty has a deterrent effect in general, or specifically when utilized against youths, and considering that the brain – which controls behavior – continues to develop until approximately age 21, the practice of disproportionately executing minority youths merits increased

attention from investigators scientists interested in social justice. Since the Supreme Court reaffirmed the use of capital punishment in the U.S. in Gregg v. Georgia (1976), the application of the death penalty has been restricted to youths who were above the age of eighteen when they committed the offense (Roper v. Simmons, 2005). The purpose of this poster is to present initial findings from a database assembled to characterize 112 "youths," individuals who were eighteen, nineteen, or twenty years old when they committed the offenses for which they were executed in the U.S. between January 1, 2000 to present day. Despite the ruling in McCleskey v. Kemp (1987) that "a racially discriminatory purpose," and not merely a "racially disproportionate impact," must be established to overturn a guilty capital verdict, it is noteworthy that racial minorities are disproportionately represented in the sample, both in terms of the general population and those ages 21+ who are executed. A number of patterns pertaining to the legal cases and individual characteristics of the 105 youths will be described and contextualized within the literature. The lack of legal protections for youths might merit consideration as a mitigating factor, just as future criminality and dangerousness are considered aggravators.

233. Yasar, Temel; Liu, Yifei and Royston, Thomas

Microscopic Magnetic Resonance Elastography

Graduate – Mechanical Engineering

Magnetic Resonance Elastography (MRE) was introduced in 1995 as a way to noninvasively estimate regional mechanical stiffness and viscosity of certain materials, tissues and organs. A phase contrast MR technique is used to essentially capture an image of shear wave propagation through the medium caused by an external vibratory source synchronized with the MRE imaging sequence. From this a value of "shear stiffness" at the shear wave frequency can be estimated. In vivo implementations of it in clinical-strength MR systems (1.5 and 3 Tesla) have shown success in quantifying diffuse disease, such as hepatic fibrosis. Other applications of it to assess more localized viscoelastic variations, such as caused by tumors, would benefit from higher resolution implementations of MRE. Additionally, there are in-vitro applications of MRE in development, including monitoring engineered tissues prior to implantation and assessing biopsied tissue specimens, which would also benefit from an ability to estimate viscoelastic property variations with tighter resolution. Microscopic resolution MRE requires a combination of the use of higher static and gradient field magnet systems, as well as higher frequency shear wave actuation. We are currently pushing the resolution limits of MRE in small bore high field MRI systems. We review the unique challenges faced in developing the mechanical system to generate higher frequency shear waves of sufficient amplitude throughout the field of view while working in a very confined space. Implementing MRE with higher shear wave frequencies to assess viscoelastic variations with sub-millimeter resolution also leads to new challenges in the inversion, the process of estimating properties based on the imaged shear wave field. We review our use of improved multiscale viscoelastic models of tissues, as well as the use of finite element analysis for model-based optimization of property values.

234. Yildiz Arslan, Sevim and Lipton, Howard L.

Mcl-1 Acts as a Critical Factor That Protects Against Apoptosis in p53-Dependent Manner, Restricting the Production of Infectious Virus

Graduate – Microbiology and Immunology

Theiler's murine encephalomyelitis virus (TMEV) is a highly cytolytic RNA virus that causes CNS infection and immune-mediated demyelination in susceptible strains of mice. TMEV infected macrophages, e.g. M1-D cells,

undergo apoptosis and restrict infectious virus production to <10 pfu/cell. In contrast, TMEV infection in other rodent cells, e.g., baby hamster kidney cells (BHK-21), mouse neuroblastoma cells and mouse oligodendrocytes (N20), produce necrotic cell death with high virus yields of 200-500 pfu/cell. The balance between pro- and anti-apoptotic pathways has been shown to be critical in determining cell fate. We discovered that Mcl-1, an anti-apoptotic member of Bcl-2 family of proteins, was highly expressed in BHK-21 cells but barely detectable in M1-D cells. Knock-down of Mcl-1 in virus infected BHK-21 cells resulted in ~50% of the cells undergoing apoptotic cell death, whereas only ~16% of the infected wild-type BHK-21 cells underwent apoptosis. Imunoblotting revealed that BeAn virus infection of a stable Mcl-1 knock-down cell line was associated with elevated levels of caspase-9 and -3 cleavages, the former a hallmark of the intrinsic apoptotic pathway. To determine the effect of Mcl-1 on BeAn virus replication, virus titers were determined in the wild-type and Mcl-1 knock-down BHK-21 cells. Infection of the stable Mcl-1 knock-down cell line resulted in restricted virus production compared to infection of wild-type BHK-21. Finally, immunoblot analysis indicated that TMEV infection resulted in the activation of tumor suppressor protein p53 compared to the mock-infected BHK-21 cells. In summary, these studies revealed that Mcl-1 acts as a critical prosurvival factor in infected BHK-21 cells, protecting against apoptosis in p53-dependent manner and restricting production of infectious virus.

235. Youkhana, Mary and Fung, L.W.

Site-Directed Mutagenesis and Characterization of αIIW1533F

Undergraduate – Chemistry

Spectrin isoforms are members of a large protein family that bind actin and form skeletal network in cells. Each spectrin is comprised of two subunits, α-spectrin and β-spectrin. The α-spectrin has two isoforms (I and II), while β-spectrin has five (I-IV and H). α-Spectrin and β-spectrin join together to form a heterodimer at the C-terminal end of α-spectrin and the N-terminal of β-spectrin. Two heterodimers of the αβ spectrin then associate to form a functional tetramer. αI and βI are also known as erythroid spectrin found in red blood cells (erythrocytes), and are responsible for maintaining the integrity of the cell. αII and βII are known as non-erythroid spectrin, and they are found in brain cells.

Domain 13 of αII-spectrin consists of 116 amino acid residues, with a notable cleavage site for Caspase-3. Caspase-3 is part of a larger signaling cascade responsible for activating apoptosis within a cell. Caspase cleavage of αII-spectrin fragments spectrin protein. Excessive fragmentation can lead to many disorders, including Sjögren's syndrome.

Through the usage of recombinant DNA technology and site-directed mutagenesis, substitution of the amino acid residue 93, from phenylalanine to tryptophan, within the DNA sequence was prepared. Residue 93W is not at the Caspase-3 cleavage site. With such substitution, D13 now has only one tryptophan residue near the cleavage site at residue 20. This single tryptophan D13 model protein will be useful to study Caspase-3 action on spectrin fluorescence methods.

236. Youmans, Katherine; Tai, Leon; Yu, Chunjiang and LaDu, Mary Jo

ApoE Effects on the Progression of Ab Pathology *in vivo*

The genetics of Alzheimer's disease (AD) includes causal factors, specifically autosomal dominant mutations that increase the 42 amino acid form of amyloid-b (Ab) peptide and apolipoprotein E4 (apoE), the primary risk factor compared to apoE3, with apoE2 reducing risk. While the neurotoxic form of the peptide remains unclear, our working hypothesis is that apoE isoform modulates Ab42-induced neurotoxicity. Amyloid plaques are a pathological hallmark of AD but the regional progression and number of plaques do not correlate with the degree of dementia. Soluble oligomeric Ab42 and/or intraneuronal accumulation of

Ab42 both correlate with synaptic dysfunction and are neurotoxic. While apoE4 increases extracellular Ab42 plaque load, an apoE isoform-specific effect on the accumulation of intraneuronal Ab42 remains unclear. Based on *in vitro* and *in vivo* data, we propose that apoE2 delays intraneuronal accumulation of Ab42, reducing Ab-induced neurotoxicity. Mice expressing each human apoE isoform (apoE2, E3 and E4-targeted replacement mice) were crossed with mice that significantly over-produce Ab42 (5xFAD mice) to generate EFAD mice. This is one of the few AD transgenic mouse models where Ab42 pathology accurately recapitulates the regional development in humans, initiating in the subiculum and deep frontal cortex. In EFAD mice: 1) Intraneuronal Ab accumulation and severity are lowest with apoE2; 2) Plaque load increases with apoE2 and E4 compared to apoE3; 3) apoE2 and E3 maintain Ab as diffuse plaques while apoE4 accelerates compact plaque deposition; and 4) synaptic volume is significantly greater in the presence of apoE2 compared to apoE3 and apoE4. Thus, apoE2 delays and apoE4 accelerates the progression of Ab pathology and neurodegeneration in a new transgenic mouse model of AD. Results of this study will impact our understanding of the role(s) of apoE in the progression of Ab pathology.

237. Yukilevich, Daniel

India's Economic Development: An Analysis of the Emergence of Electronic Banking

Undergraduate –Information and Decision Sciences

India's economy has shown significant strength in the past decade. However, despite investments towards ATM's, online banking, electronic fund transfers, and mobile banking, the country maintains a poor implementation of electronic banking services. The following research is focused on the socio-demographic, structural, and economic factors that have affected the adoption of electronic banking services in Indian banks and amongst the majority of the population. Through a review of recent literature, the paper identified various factors that have contributed to India's poor progress in this technological innovation. The studies chosen to be examined come from Indian institutions that used the local population for sampling, which provides a greater degree of credibility to the topic.

Regarding socio-demographic factors, electronic banking is more likely to be first adopted by "self-starters" who have technological aptitude (Srinivasan, 2007). Furthermore, using PCI psychological testing measuring a respondent's social attributes and values, studies found that a consumer's perceptions of gains in social image due to electronic banking significantly increases the odds of adoption (Gournaris & Koritos, 2008). In terms of economic factors, private banks tend to adopt electronic banking faster than public sector banks (Sharma, 2009). Moreover, public sectors banks focus their services on India's rural population, which limits adoption since rural customers invest their savings into physical rather than financial assets (McKinsey, 2005). From a structural perspective, current logistical, security, and regulatory conditions in India are severely deterring the implementation of electronic banking (Boston Consulting Group, 2008). Taking into account these multi-dimensional factors, this study outlines steps that need to be taken by banking and public policy officials to move toward an efficient implementation of electronic banking. The adoption of these services is important towards integrating India's banking sector into the world economy.

238. Zhao, Junjing; Chatterjee, U.; Ai , D. and Campuzano, J.

Doping Versus Disorder in Cation-doped Bi2212 High-Tc Superconductor

Graduate – Physics

Parent compounds for High temperature Superconductors (HTSCs) are antiferromagnetic Mott insulators. As they are doped with holes, superconductivity emerges through a dome shaped region in the temperature

versus doping phase plane. In $Bi_2Sr_2CaCu_2O_{8+\delta}$ HTSCs doping levels can be altered either via changing oxygen concentration or via substituting Sr or Ca with some cations. Quite naively, one could think that both ways of changing carrier concentration would lead to similar results. However, by comparing our systematic and detailed Angle-resolved Photoemission Spectroscopy (ARPES) measurements on both $Bi_2Sr_2CaCu_2O_{8+\delta}$ and $Bi_2Sr_2(Ca,Dy)Cu_2O_{8+\delta}$ samples, we found that the two ways of changing carrier concentration give rise to qualitatively different behaviors.

We previously found that irrespective of carrier concentration, the momentum dependence of superconducting gap follows a simple d-wave form in $Bi_2Sr_2CaCu_2O_{8+\delta}$ samples[1]. Moreover, we observed that quasiparticel (QP) peak exists all around the underlying Fermi Surface (FS) for all doping levels in the superconducting state. But in $Bi_2Sr_2(Ca,Dy)Cu_2O_{8+\delta}$ samples, QPs vanish even in the superconducting state for lower carrier concentrations. In addition, the anisotropy of superconducting gap shows a strong deviation from the simple d-wave form, especially in underdoped side. Most likely, the addition of Dy not only changes carrier concentration, but also leads to disorders in the samples, which could be responsible for non d-wave gap and the destruction of QPs at lower dopings.

Reference

[1] U. Chatterjee. et al. "Observation of a d-wave nodal liquid in highly underdoped $Bi_2Sr_2CaCu_2O_{8+\delta}$." Nature Phys. 6, 34 (2010).

239. Zivrev, Kristina

Signaling Function of Dentin Matrix Protein 1 Activates Osteoblast Differentiation at Specific Time Points

Undergraduate – Biological Sciences

Osteoblasts are cells responsible for bone formation and they arise from precursor cells such as MC3T3 cells. Osteblasts can develop through many different activation pathways; one of these pathways is the ERK Map Kinase pathway. The pathway includes proteins Raf, p53, MEK, and Ras among many others which get activated at different steps along the pathway. DMP1 (Dentin Matrix Protein 1) has shown evidence of mediating the ERK activation signaling cascade by activating some proteins in the pathway. The purpose of this study was to see how DMP1 mediated activation of proteins was at specific time points. Seven 6-well plates of MC3T3 cells were cultured in DMEM/F12 media until 80% confluence and then six of the seven plates were exposed to DMP1 protein for 15, 30, 45, 60, 90, and 120 minutes, respectively, with the last plate acting as the control with no DMP1 exposure. The proteins were then extracted from the cells and gel electrophoresis and Western blotting resulted in blots showing at what time points specific proteins in the ERK pathway had been activated by DMP1. A majority of the proteins showed the most activation at the 15 and 30 minute DMP1 exposure. These findings could prove to be significant in determining different methods of activating and deactivating proteins in the pathways of differentiation of certain cells. This is especially important in the development of certain drugs which might contain elements such as DMP1 and can eventually be used in the control and treatment of particular cancers.

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We are grateful to the more than 100 alumni who have returned to campus today to serve as judges. Their insight and encouragement enhance the educational experience for the participants. Our alumni will certainly be impressed with the work they see. This event also gives alumni the opportunity to interact with some of their former faculty, many of whom have been instrumental and valuable advisors and teachers.

We encourage all alumni judges, students and faculty to visit the UIAA offices on the 5th floor of Student Center East and the UIAA website at www.uiaa.org for information on the many programs and services made possible by contributions to the UIAA.