

# 16<sup>th</sup> Annual Petersheim Academic Exposition Abstracts

*Tuesday, April 17 – Saturday, April 21, 2012*



This document lists the submitted abstracts. See the “2012 Academic Exposition Program Schedule” for a complete list of all events

## **MONDAY, April 16**

- [College of Education and Human Services: CORE3881](#)

## **TUESDAY, April 17**

- [University Honors Program, I](#)
- [Neuroimmune Pharmacology Posters](#)
- [School of Health and Medical Sciences Poster Session](#)
- [Chemistry and Biochemistry Poster Session](#)

## **WEDNSDAY, April 18**

- [Interdisciplinary Poster Session](#)
- [Health & Physical Education: Bits and Bites of Nutrition and Physical Fitness](#)



- [Department of Sociology, Anthropology, and Social Work](#)
- [College of Nursing Symposium](#)
- [Whitehead School of Diplomacy and International Relations](#)
- [Department of Professional Psychology and Family Therapy](#)
- [Department of Biological Sciences Poster Session](#)

#### **THURSDAY, April 19**

- [Department of Communication & The Arts](#)
- [Department of English](#)
- [University Honors Program, II](#)

#### **FRIDAY, April 20**

- [Permaculture Design Project](#)
- [College of Nursing and College Seminary: The Ripple Effect](#)

#### **SATURDAY, April 21**

- [Psychology Department Research Symposium](#)

#### **Online Presentations**





## **College of Education and Human Services**

Monday, April 16 1:00 - 4:00 PM

Jubilee Hall, Room 223

### **CORE 3881 LEADERSHIP THROUGH SERVICE LEARNING**

Paula R Zaccone

Educational Studies

Fourth grade students from Berkeley School, Bloomfield will experience "Bits and Pieces of Education". Numerous mini programs include: "Bits of Math"; "Singing and Signing; performance by SHU dancers; "The Bully Bulletin: Antibullying Education Program; Physical Activities, and "The Visiting Lunchbox: lessons to guide healthy eating.

Student Presenters: Dajon Alfred, Elizabeth Berger, Bryana Blanchard, Jessica Card, Melissa Cunningham, Samantha Gavares, Christopher Gray, Laura Lehman, Kristina Lembo, Breanna Mc Millan, Melissa Novo, Kerri Rogers, Heater Rothwell, Michael Ruzek, Jennifer Santiago, Christine Velardi, Delores Sarfo-Darko

## **ORAL PRESENTATIONS**

### **University Honors Program, I**

Tuesday, April 17, 10:15 AM– 11:15 AM, Fahy Hall, Room 108

### **University Honors Program, II**

Thursday, April 19, 10:15 AM– 11:15 AM, Fahy Hall, Room 101

### **LIFE EXAMINED: HONORS PROGRAM SENIOR THESES**

Mary Mountcastle, Peter Ahr, John Ranieri

University Honors Program

Fourth-year Honors students will provide an overview of their senior thesis projects.



Presentations will highlight:

- the various topics the students have been researching;
- their research methods;
- their findings.

Presenters will be encouraged to share their personal sense of the extent to which they succeeded in the original goals of their research and how the thesis process may have changed them or changed their thinking. Each student will present for approximately 5-7 minutes with 5 minutes for Q&A between presentations.

## **NeuroImmune Pharmacology Posters: Convergence of Neuroscience, Immunology and Pharmacology**

Tuesday, April 17 11:45 AM

University Center, Chancellor's Suite

### **TREATING MENTAL ILLNESS WITH ANTI-INFLAMMATORY DRUGS**

Z. Alvi<sup>1</sup>, J. Gleason<sup>1</sup>, S. Sarkar<sup>1,2</sup>, R. Settar<sup>1</sup>, S.L. Chang<sup>1,2</sup>

<sup>1</sup>Department of Biological Sciences and <sup>2</sup>Institute of NeuroImmune Pharmacology, Seton Hall University, South Orange, NJ 07079

Neuroimmune pharmacology is a discipline that combines the important disciplines of neuroscience, immunology, and pharmacology, and provides for a better evaluation of diseases of the central nervous system (CNS). The brain, the major control center of our body, has its own immune response system that can be altered by diseases processes and also by drugs. Immune cells in the body secrete inflammatory mediators (proteins) known as cytokines, which can affect the brain. In some cases there is over-secretion of cytokines due to pathogens and drugs of abuse, which can lead to excessive inflammation in the brain, causing a variety of brain-related diseases, such as psychiatric disorders, neurodegenerative diseases, and cerebral dysfunction. Current research is investigating various anti-inflammatory pharmacological interventions. This presentation will highlight the role of neuroinflammation as a cause of neurodegenerative diseases and discuss potential anti-inflammatory therapies that can reduce the severity of such CNS-related brain disorders.

This work was supported by NIH grant, K02 DA016149, to S.L. Chang.

### **THE BRAINS BEHIND IT ALL**

Stacie-Ann R. Creighton, MS<sup>1,2</sup>, Maria Gordish, MS<sup>1,2</sup>, Natasha Homji, MS<sup>1,2</sup>, Sulie L. Chang, Ph.D.<sup>1,2</sup>

<sup>1</sup>Institute for NeuroImmune Pharmacology and <sup>2</sup>Department of Biological Sciences Seton Hall University, South Orange, NJ 07079



Neuroimmune pharmacology is an emerging discipline with wide-reaching effects, including advancements in treatment approaches for nervous system disorders. Research in this new field bridges the gap between three historically separate disciplines: neuroscience (the brain), immunology (the immune system), and pharmacology (drugs). The segregation of these disciplines was based on the concept that the brain was 'immune privileged', meaning that a foreign substance could enter the brain without triggering a peripheral immune reaction, such as inflammation. However, immune privilege in the brain is no longer widely accepted as fact because we now know that there is crosstalk between the brain and the peripheral immune system that can result in neuroinflammation. In this presentation, we will focus on the role of neuroinflammation in neurodegenerative diseases, drug abuse, and aging. We will first provide an overview of common neurodegenerative diseases, such as Parkinson's Disease (PD), Alzheimer's Disease (AD), and Multiple Sclerosis (MS), and then explore the role that substances of abuse, such as cocaine (a psychostimulant), marijuana, and morphine (an opiate) play in neurodegeneration and in immune alterations.

This work was partially sponsored by National Institutes of Health grants, DA R01 DA007058, R01 DA 026356, K02 DA016149, and RC2 AA019415, to S.L. Chang.

\*The first three authors are listed in alphabetical order.

### **IMMUNOLOGY: CAN'T LIVE WITH IT; CAN'T LIVE WITHOUT IT**

Nicholas Colletti<sup>1</sup>, Jun Taek Oh<sup>1</sup>, Lee Anne Talbot<sup>1</sup>, Kari Wiedinger<sup>1</sup>, Sulie L. Chang<sup>1,2</sup>

<sup>1</sup>Department of Biological Sciences and <sup>2</sup>Institute of NeuroImmune Pharmacology, Seton Hall University, South Orange, NJ 07079

Immunology is an essential part of a rapidly advancing field called neuroimmune pharmacology. Current research is providing a clearer picture of the relationship between the nervous and immune systems and the role that neuroimmune integration plays in degenerative human diseases. Recently, immunologic mediators have been found that play a part in the communication between the periphery of the body and the brain. New methods of defining neurodegenerative disease onset and progression, and improved detection and identification of immune cells will allow researchers to gain a better understanding of the interrelationship between the nervous and immune systems, which can impact the development of novel therapeutic strategies that are safer and more effective for patients suffering from neurodegenerative diseases.

This study was supported by National Institutes of Health (NIH) grant, DA-016149 (S.L. Chang).

**School of Health and Medical Sciences Poster Session**

Tuesday, April 17 2:00 –4:00 PM

University Center, Main Lounge



## **WRITING PROCESS PERFORMANCE OF TWO CHILDREN WITH AUTISM**

Elisabeth A. Mlawski & Anthony D. Koutsoftas

School of Health and Medical Sciences, Seton Hall University

The present investigation is a descriptive study which reports how two students with Autism attend to the three components of the Hayes and Flower (1980) writing process model including planning, translating, and revising. Data were collected from one inclusive classroom where typically developing classmates served as comparison for a higher and lower functioning student with Autism. The students participated in a three day writing task whereby they planned, wrote, and revised narrative stories on three separate days. Results indicated different patterns of performance of the two students with Autism compared to their typically developing classmates. Findings provide an initial examination into the key differences in writing ability of children with Autism. Clinical implications will be discussed.

## **MULTIPLE SCLEROSIS: A COMPREHENSIVE REVIEW FOR THE PHYSICIAN ASSISTANT**

Victoria Browning PA-S, Michelle Joseph PA-S, and Mona Sedrak PA-C PhD.

School of Health and Medical Sciences

Multiple Sclerosis is a chronic demyelinating neurological disorder that affects 2.5 million people worldwide and 400,000 in the US. MS is a complex syndrome with substantial variability in presentation leading to a high number of misdiagnosis each year. It can be classified into four main subtypes: relapsing remitting, secondary progressive, primary progressive, and progressive relapsing. Common presenting symptoms include optic neuritis, fatigue, difficulties in gait and balance, spasticity, and Uthoff's phenomenon. The McDonald Criteria can be used by clinicians to diagnosis multiple sclerosis earlier by demonstrating dissemination in time and space, the hallmark of multiple sclerosis. MRI has arisen as the single most useful imaging tool in suspected cases of multiple sclerosis. Various views are used to demonstrate characteristic deep white matter lesions which include ovoid lesions and "Dawson's fingers", perpendicular trajectories along the long axis of ventricles. CSF analysis can be used to support a diagnosis of multiple sclerosis; approximately 95% of patients' CSF will demonstrate oligoclonal bands after protein electrophoresis. Treatment of multiple sclerosis is multi-faceted and requires various pharmacologic and non-pharmacologic strategies. Goals of treatment include treating and decreasing the number of acute exacerbations and preventing progression. The mainstay of pharmacologic treatment involves disease-modifying drugs, particularly,  $\beta$ -interferons and glatiramer acetate. Non-pharmacologic treatment includes physical therapy, occupation therapy, nutritional counseling, and counseling for the patient and their family. The



degree of disability and overall course of multiple sclerosis varies in each patient. Therefore early diagnosis and treatment is important for reducing the severity of relapses and progression.

## **THE KNOWLEDGE AND WILLINGNESS TO PERFORM BASIC LIFE SUPPORT AMONG COLLEGE AGE STUDENTS**

Michael McQueeney, Kelly Daingerfield, Marjorie Nazon, Peter Peregrin, & Mona Sedrak  
School of Health and Medical Sciences

**Introduction:** According to the American Heart Association, cardiac arrest claims the lives of around 310,000 Americans every year in a home or public setting. Of those who suffer from cardiac arrest, only one third of victims actually receive help by a bystander. Cardiopulmonary resuscitation is essential to help prevent brain damage due to lack of oxygen flow to the brain. The immediate initiation of resuscitation by bystanders, prior to medical help arriving, is critical in the prevention of irreversible brain damage. However, studies have shown that many bystanders are apprehensive in performing CPR. Through research, it has been determined that the major barriers found to deter one from performing CPR include: health concerns, sanitary conditions, social and legal consequences. The purpose of this study is to examine the relationship between college students' knowledge of the updated Basic Life Support (BLS)/Cardiopulmonary Resuscitation (CPR) recommendations and willingness to performing BLS/CPR. Also, the study will examine the barriers to performing BLS/CPR in college students.

**Methodology:** This study is an IRB approved, non-experimental, quantitative analysis of the knowledge of BLS/CPR and willingness to perform BLS/CPR among the college student population at a local university. The survey instrument used in this research was created by the authors and validated. This survey was composed of 29 dichotomous questions that were divided into sets assessing knowledge and willingness to perform BLS/CPR respectively. A convenience sample comprising undergraduate and graduate students at the local university was used. The survey was distributed utilizing a broadcast email to the students' university email addresses using the Academic Survey System and Evaluation Tool (ASSET). Analysis of the data was performed using SPSS 18.0, inferential statistics were applied using the Chi-Square test and further evaluated with the Pearson Correlation test to determine the linear relationship of the collected data, and both set at a p value of 0.05. **Results:** Out of 129 participants, data suggested basic life support involving mouth to mouth resuscitation is a hindrance to performing BLS/CPR as opposed to performing BLS/CPR without the use of mouth to mouth resuscitation. Further data suggests the following to be a deterrent to performing mouth-to-mouth BLS/CPR among both CPR certified and uncertified individuals: patient vomited (77.5%, p-value 0.041), fear of contracting a disease (75%, p-value 0.003), fear of legal consequences (57.4% p-value 0.000), and fear of not having the proper CPR skills (48.1% p-value 0.007). Only 45% of those certified and uncertified were aware of the newly released 2010 BLS recommendations. After being made aware of the new recommendations, 90.7%, of certified and uncertified survey participants, were



more willing to take initiative and perform CPR with chest compression resuscitation.

**Conclusions:** Physician Assistants should be able to educate the public on the importance of the new BLS/CPR recommendations as it is a life saving measure. Results of the study indicate that the public is not aware of the newest BLS recommendations; therefore, physician assistants must take the initiative in educating the public that performing chest compressions alone is in itself a life-saving measure.

## **THE SHORT TERM EFFECTS ON BALANCE USING A 4-WEEK HOME TRAINING PROTOCOL**

Happli, A; Campbell, A; Hostnik, K. Maher, C; Hill-Lombardi, V  
School of Health and Medical Sciences, Seton Hall University

**Introduction:** Balance interventions lasting greater than 6 weeks have beneficial effects.. The purpose of this study was to identify the significant short-term effects on balance using a 4-week home training protocol. **Methods:** Cross-sectional repeated measures design, tests occurred once/week for 5 weeks. Subjects matched BESS ranges. IV: at-home balance training versus no training. DV: BalanceMaster® Sensory Organization Tests (SOT) and Functional Tests.

Responses measured included foot movement times, impact forces, sway times. Repeated-measures ANOVA for within and between subject differences ( $p < 0.05$ ), SPSS 16.0. **Results:** Control group: 1 female, 2 males; mean age 24 ( $\pm 2.65$ ), mean BMI 23.12 ( $\pm 1.81$ ), mean BESS of 9.33 ( $\pm 3.06$ ). Experimental group: 1 female, 2 males; mean age 22.67 ( $\pm 0.58$ ), mean BMI 25.93 ( $\pm 4.29$ ), mean BESS of 9.67 ( $\pm 1.53$ ). SOT: significant improvement all subjects (Condition 4:  $p = .038$ ; Condition 5:  $p = .019$ ; Condition 6:  $p = .023$ ). TW: significant change in scores for speed ( $p = .037$ ), non-dominant step width ( $p = .044$ ). SQT: significant changes turn time left ( $p = .02$ ), turn sway left ( $p = .021$ ), turn sway right ( $p = .041$ ). FL: significant improvement time right ( $p = .049$ ), impact right ( $p = .009$ ). SUO: significant improvements between subjects lift-up right ( $p = .035$ ), movement right ( $p = .023$ ). **Conclusions:** Since there were significant improvements with all subjects in many tests, regardless of intervention, the improvements may have been a learned response to the BalanceMaster® tests.

## **THE EFFECT OF DYNAMIC STRETCH ON THE STRENGTH OF THE ROTATOR CUFF**

Vorters B, Misuraco A, Kunzmann M, Kowalski S, Testa A, Hill-Lombardi V  
School of Health and Medical Sciences, Seton Hall University

**Introduction:** This research study investigates the effect of dynamic stretching on strength of the rotator cuff. The purpose is to determine if different types of dynamic stretching before activity affects strength outputs of the shoulder musculature during internal (IR) and external rotation (ER). **Methods:** IV levels: dynamic stretch 30 bpm; dynamic stretch 60 bpm; no-stretch. Stretch: shoulder IR, ER- 90° shoulder abduction/90° elbow flexion, 60 seconds. No-stretch- neutral shoulder 90/90, 60 seconds. DVs: peak torque (PT-ft-lbs); time to peak torque (TTPT-seconds); angle of peak torque (APT-degrees); DVs tested pre, post intervention. Repeated measures



ANOVAs to determine differences in change scores across interventions. Paired t-tests to determine differences from pre to post test scores. (SPSS 16.0,  $p < 0.05$ ). Results: PT: no significant differences. TTPT: between 60bpm and no-stretch ER showed a small effect size (.176) though not significant ( $p = .261$ ); APT: between 60bpm and no-stretch for IR there was a significant difference ( $p = .03$ ) and large effect size (.511). Conclusion: Though the intervention utilized in the study did not significantly affect the dependent variables, there was a moderate to large effect size. The data indicates that increases in strength parameters occurred following the no-stretch protocol. Therefore dynamic stretching with a Thera-band does not show any significant strength or explosive gains as measured by the Biodex.

## **INTERDISCIPLINARY NATURE OF CAATE ACCREDITED ATHLETIC TRAINING EDUCATION PROGRAMS**

Kennedy C, Wollar S, Charles R, McElroy B, Hill-Lombardi V  
School of Health and Medical Sciences, Seton Hall University

Introduction: Previous research regarding interdisciplinary education suggests these programs ultimately improve the quality of education. Currently there is no research that evaluates the effectiveness of interdisciplinary Athletic Training Education Programs (ATEPs). Purpose: to determine how many ATEPs are interdisciplinary and effectiveness regarding first-time BOC exam pass-rates, overall BOC exam pass-rates, student retention rate. Methods: A web-based survey link emailed to program directors of CAATE programs. IVs: retention rate, first time BOC exam pass-rate, overall pass-rate. DVs: frequencies of other disciplines interacting with athletic training students as classmates and instructors. (SPSS v16.0,  $p < 0.05$ ). Results: Respondents undergraduate ( $n = 97$ ; 93.3%) Graduate ( $n = 7$ ; 6.7%) program directors totaling 104 participants (of 368 contacted). Programs with a first-time BOC exam pass-rate of 90-100% ( $n = 27$ ) included: PT faculty (59.3%), MD/DO faculty (40.7%), PA faculty (18.5%), EMT faculty (25.9%), shared coursework with PT students (25.9%), and shared coursework with PA students (11.1%). Overall BOC exam pass-rates of 90-100% ( $n = 71$ ) included: PT faculty (62%), MD/DO faculty (39.4%), PA faculty (22.5%), EMT faculty (25.4%), shared coursework with PTs (31%), and shared coursework with PAs (12.7%). Conclusions: All responding programs were interdisciplinary. Advantageous to be enrolled in a program featuring faculty with PT or MD/DO certifications since those students passed the BOC exam in higher percentages than programs with PA or EMT faculty. There was less impact on BOC regarding students sharing coursework with other disciplines.

## **NEW JERSEY ATHLETIC TRAINERS' PERCEPTIONS OF THEIR PROFESSION**

Burille P, Esperon C, Arce M, Yacoub J, Lombardi V  
School of Health and Medical Sciences, Seton Hall University

Introduction: The study purpose was to provide validity for the survey instrument previously utilized to determine the perceptions of athletic training in a variety of populations. Methods: Cross Sectional design, conducted online via SurveyGizmo. Survey created by simplifying the



5th edition Role Delineation Study from the Board of Certification. IVs: ranges of years certified as an ATC, ranges of years working as an ATC in NJ, the ATC's certification route. DVs: frequency counts of correct responses to survey questions. Krustal-Wallis test differences between demographic groups ( $p < 0.05$ , SPSS 16.0). Results: Link emailed to 792 ATCs working in NJ; 152 respondents. Overall percent correct response rate, was 84%. Questions 4, 6, 9, 22, 32, and 38 had a percent correct of  $\leq 80\%$ . Questions 22 and 38 had  $\leq 50\%$  correct response rate. Significant difference between groups was noted for questions 4 ( $p=.000$ ), 9 ( $p=.018$ ), 10 ( $p=0.004$ ), 22 ( $p=.042$ ) and 30 ( $p=.020$ ) in regard to years certified and for questions 4 ( $p=.000$ ) and 10 ( $p=.010$ ) for years working as an ATC in NJ. Conclusions: Compared with previous studies on university population, coaches/ administrators and general public which had  $\leq 50\%$  overall percent correct to survey questions, the results indicated that the survey is a valid instrument.

## THE EFFECT OF DUAL TASK PERFORMANCE ON SPATIOTEMPORAL GAIT PARAMETERS OF OLDER ADULTS DURING INCLINE WALKING AND FUNCTIONAL BALANCE: PRELIMINARY DATA.

Pinto Zipp, G., Miceal, H., Molina, P., Byrne, A., Mehta, S., Ferraro, R., Maher C.  
School of Health and Medical Sciences

**Purpose.** Navigating inclines is a frequent occurrence in the community especially for older adults who prefer not to stair ambulate because of balance and muscular changes as they age. Recent work on gait on inclines in older adults (Ferraro et al, 2010) suggests that cadence, step length and velocity all decreased on inclines while GSR increased relative to subjects' level ground walking patterns. One looming question which emerged from this research is, "Does the performance of dual tasks affect the spatiotemporal gait parameters in adults during incline walking?" In daily life, humans are subjected to a variety of stimuli, often requiring them to do more than one thing at a time. Interestingly, the effects of dual task performance have not been assessed to date when individuals are asked to walk up an incline. Thus the purpose of this study was 1) To examine the effects of dual task performance on spatiotemporal gait parameters in older adults during incline walking, and (2) To examine if a difference exists between spatiotemporal gait parameters in older adults based upon the specific characteristics of the dual task performed during incline walking. **Design.** Within-subjects repeated measures study design. **Methods.** Twelve self-reported independent community ambulators (mean age = 75 years, SD = 6.88) participated in this study. After completing the Berg Balance Scale (BBS) and Dynamic Gait Index (DGI) all subjects were asked to walk on the GaitRite® on an incline surface ( $10^\circ$  slope) for 3 passes under 5 differing task conditions (walking W, counting backwards by 5 from 100 WN, color association task WC, plastic water pitcher task  $\frac{3}{4}$  full WW (carried with preferred hand), tray carrying task with plastic water pitcher placed on top filled  $\frac{3}{4}$  full WT) in a random order and counterbalanced across subjects. A repeated ANOVA was performed to determine differences in means among the differing dual tasks during incline walking. The level of significance was set at  $p = 0.05$ . **Results.** Mauchly's test found that an assumption of sphericity is plausible ( $p=.006$ ). The overall test for differences in means in the repeated-measures ANOVA was significant,  $F(4, 44) = .010$ . Pairwise comparisons indicate at the overall 0.05 level that WC ( $M=1.141$ ,  $SD=.081$ ) task was significantly different from the WW ( $M= 1.282$ ,  $SD= .063$ ) and WN ( $M= 1.284$ ,  $SD=.061$ ) for velocity only. **Limitations.** Limitations included using a sample of convenience and small sample size presented in this preliminary data pool. **Conclusions.** In order to successfully complete the



requirements of both tasks concurrently, healthy older adults adapt a more stable pattern on inclines as noted by their decrease in velocity with the most tasking cognitive task (WC) resulting in the greatest decrease. This finding further supports the finding of Ferraro et al, 2010 when walking on inclines without dual tasking. Clinically, this finding supports the need for dual task specific training on diverse surfaces in order to provide the learner the environment needed to use trial and error given the new task requirements and their impairment level.

### **INFLUENCE OF BACKPACK CARRYING STYLE ON GAIT IN COLLEGE AGED STUDENTS 18 TO 30 YEARS OLD**

Brianna Bradfield, SPT, Michael Grembowiec, SPT, Christopher Macphee, SPT, Michael Silletti, SPT, & Doreen Stiskal, PT, PhD

Department of Physical Therapy, School of Health and Medical Sciences

Backpack carrying is a common everyday activity for the typical college student. Pending on the course load, a backpack can potentially weigh as much as 20% of an individual's body weight. Repetitive use at such a heavy weight can eventually cause students to fall victim to numerous pathologies resulting from altered posture and movement. One idea to the altered postures is the method of the carrying style the student may use. The purpose of this study is to analyze the kinematic changes in the hip and knee while walking on a treadmill carrying a backpack using 3 different carrying styles. Adult volunteers aged 18-30 years old ambulated at 1.5 m/s for 60 seconds on a treadmill while wearing a commercial backpack three different ways; one strap, two straps, and all straps (two anterior and two posterior straps). Each carrying style was carried at 0% and 15% of the subject's body weight. Six Qualysis Proflex ® cameras recorded 3D movement from 28 reflective markers placed on specific body landmarks on the legs and pelvis. Hip, knee, and ankle range of motion (ROM) values were viewed and processed with Qualysis Track Manager® and Visual 3D® software packages . Data supports our hypotheses that individuals who use all straps remain more upright and walk similarly when the backpack is empty and at 15%.

### **COMPARING THE INTERVENTIONAL EFFECTS OF STAND-RETRAINING THERAPY AND BODY WEIGHT SUPPORTED TREADMILL TRAINING ON BONE MINERAL DENSITY IN PERSONS WITH SPINAL CORD INJURY**

*Student Authors* (Seton Hall University DPT Class of 2013): Nolan Horowitz, Elizabeth Kennedy, Alexandra Maus and Candace Sedereas

*Faculty Sponsor:* Michael F. LaFountaine, EdD, ATC

*Off-site collaborators:* William A. Bauman, MD, Christopher Cirnigliaro, MS, CBDT, Gail Forrest, PhD

School of Health and Medicine Science, Seton Hall University



Clinical interventions focusing on ambulatory strategies are becoming more common for persons with spinal cord injury (SCI). As a consequence of the injury, sedentarism ensues and contributes to a rapid decrease of bone mineral density (BMD), which increases the risk of osteoporosis and fracture. The purpose of this study was to compare the interventional effects of different locomotor training interventions and determine their effect on compartmental BMD in persons with SCI. Clinical trials were performed at a specialized rehabilitation hospital over a several year period. The interventions included: standing retraining therapy (SRT), SRT with functional electrical stimulation (FES) to lower extremity muscle groups and body weight supported treadmill training (BWSTT). Dual energy x-ray absorptiometry (DEXA) scans were performed at baseline and following specific time points to quantify total body, dual femur, dual knee and posterior – anterior spine BMD. We hypothesized that the BWSTT trial would lead to the greatest improvements in BMD compared to the other interventions. We anticipate that the results of this study will provide additional evidence to the growing body of literature on the benefits of locomotor training for persons with SCI.

#### **A REVIEW OF 22 iPad APPS FOR AUGMENTATIVE AND ALTERNATIVE COMMUNICATION PURPOSES**

Alliano, Ashley; Herring, Kimberly; Koutsoftas, Anthony; Bartolotta, Theresa  
Speech-Language Pathology, Seton Hall University

The use of the iPad tablet for Augmentative and Alternative Communication (AAC) purposes can facilitate many communicative needs, while being cost effective and socially acceptable. iPad applications (Apps) can be used for many individuals with communication difficulties for the purposes of augmenting communication, providing an alternative form of communication, or to target receptive and expressive language goals. The purpose of this project was to review a collection of iPad Apps that can be used to address a variety of receptive and expressive communication needs. Based on recommendations from (Gosnell, Costello, & Shane, 2011) we describe the features of 22 Apps that can serve as a reference guide for speech-language pathologists. We systematically identified 22 Apps that use symbols only, symbols and text-to-speech, and text-to-speech only. We provide descriptions of the purpose of each App along with the following feature descriptions: speech settings, representation, display, feedback features, rate enhancement, access, motor competencies, and cost. Our review suggests that these Apps can be used for a variety of communication purposes for individuals with and without verbal abilities to target a variety of treatment goals. Information is presented in a user-friendly table format that clinicians can utilize as a reference guide.

#### **AUTONOMIC NERVOUS SYSTEM FUNCTIONING AS A CORRELATE TO HEALTH AND RECOVERY**

Thomas J. Mernar, PhD, OTR; Nicole Halliwell, OTS; Erin Ramos, OTS; Caitlyn Ryan, OTS;  
Esther Simon, OTS

Occupational Therapy Program, School of Health and Medical Sciences



The health of the human autonomic nervous system (ANS) can have profound influences on body functions that impact the quality of performance skills used for engagement across all areas of occupation. Autonomic dysregulation involves the malfunctioning of the ANS. It is sometimes unclear if autonomic dysregulation contributes to the development of particular clinical conditions or if the clinical conditions contribute to the autonomic dysregulation. Autonomic dysregulation has been noted to occur in clinical conditions such as migraine, diabetes mellitus, major depression disorder, myocardial infarction, tachycardia, hypertension, coronary artery disease, and renal failure, as examples (Arora, R., et al, 2008; Lampert et al, 2008; Winter, R. et al, 2003; Ryff & Singer, 1998). Occupational therapy practitioners frequently pay attention to the signs and symptoms of various clinical conditions as they affect client occupational performance and participation. However, occupational therapists need to attend to and understand how autonomic dysregulation can contribute to the quality of client occupational performance and quantity of their occupational participation. This poster will review various ways that occupational therapists can measure client autonomic nervous system health.

### References

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### POSTURAL SWAY RESPONSES OF CHILDREN AGED 6-14 USING THE SENSORY ORGANIZATION TEST ON COMPUTERIZED DYNAMIC POSTUROGRAPHY

Catherine Maher, PT, DPT, GCS, Ingrid Kruk, Jamie Manzo, Marjan Poposki, Jillian Rementilla  
Department of Physical Therapy, Seton Hall University

The purpose of this study is to determine the age at which children display adult-like balance responses to resolve sensory conflicts provided by environmental disturbances measured on the Sensory Organization Test utilizing computerized dynamic posturography. This study also looked at the different patterns of sensory utilization between genders. We hypothesized that adult-like balance responses will emerge in children as early as 7 years old, with females exhibiting such balance responses earlier than males. Eighteen typically developing children whose average age was 10 years old were recruited from a convenience sample, and assents and informed consents were obtained. Anthropometric measures, BMI, and preferred leg were documented for each subject. Subjects performed a series of tests including: the Bruininks-Oseretsky Test of Motor Proficiency's balance subtest, the Functional Limitation Assessment,



and the Sensory Organization Test. Trends were seen in children's balance responses as they mature. As children approach puberty, their ability to adjust to perturbations in standing becomes fine-tuned, and balance responses are similar to those of an adult. When reviewing gender, trends showed that females demonstrate adult-like reactions at an earlier age than males. This study suggests children as young as 7 years old have developed visual and somatosensory systems to interpret information during situations that perturb their base of support. Children begin to show adult-like balance responses to external perturbations utilizing the vestibular system by age 12.

### **ANALYSIS OF THE 8.5 STANDARD DEVIATION CUT-OFF FOR FIVE POSITION GRIP STRENGTH VALUES IN PERSONS UNDERGOING FUNCTIONAL CAPACITY EVALUATION**

Dr. H. James Phillips, Ariel Castro, Brandon Christman, Sean Loges

Dept. of Physical Therapy, School of Health and Medical Sciences, Seton Hall University

**Introduction:** Five-position grip strength testing is purported to assess sincerity of effort in persons undergoing a physical performance evaluation. Clinicians often use an 8.5 standard deviation (SD) as a cut-off to determine self-limitation of effort. However, several studies have shown that females show less deviation between hand positions even when exerting true maximum effort, yet only one cut-off is used between the sexes. The purpose of this study was to determine the percentage of men versus women meeting the 8.5 SD cut-off in a clinical setting. **Methods:** 5-position grip strength testing data from 176 consecutive patients aged 18-72 who underwent a functional capacity evaluation between 1/1/05 and 12/31/10 were analyzed.

**Results:** Forty-eight percent of all patients were found to meet the 8.5 cutoff, including 32.8% of all males and 80.8% of all females. Further analysis of the narrative report for the female subjects found that the clinician, using other behavioral anchors, did not deem the individual as having self-limited effort in approximately 40% of cases. **Conclusion:** The results suggest that the 8.5 SD cutoff score may not be appropriate in determining self-limitation of effort in female patients, and that a lower SD cut-off may be needed. Further research is needed to determine the

### **DETERMINING THE EFFICACY OF ZOLEDRONATE ON THE RETENTION OF BONE MINERAL DENSITY DURING THE FIRST YEAR OF SPINAL CORD INJURY**

*Faculty Sponsor:* Michael F. LaFountaine, EdD, ATC

*Student Authors (DPT Class of 2013):* Katherine Cano, BS, Monique Dupree, BS, Garry Gilbert, BS, and Kathleen Leninger, BS

*Off-site collaborators:* William A. Bauman, MD, Christopher Cirnigliaro, MS, CBDT, Steven C. Kirshblum, MD

Physical Therapy, School of Health and Medical Sciences

Acute spinal cord injury (SCI) is associated with a rapid loss of bone mineral density (BMD) below the level of injury. In some reports, as much as 50% of regional BMD was lost during the first year of injury, which increases the potential for low-energy fractures below the level of



injury. In this study we evaluated the efficacy of zoledronate, a bisphosphonate, on the retention of BMD during the first year of injury. Sixteen subjects with acute SCI (0-12 weeks) who were admitted to a specialized rehabilitation facility were recruited: 8 subjects received zoledronate; and 8 subjects served as controls. BMD and structural analysis of the total body, A-P spine, dual femur, and dual knee were performed using dual energy x-ray absorptiometry (DEXA) at baseline, 1, 3, 6 and 12 months post injury. A repeated measures analysis of variance (ANOVA) was used to compare the within and between group (i.e., treatment or control) differences for BMD changes during the one year trial. We hypothesized that zoledronate will improve BMD retention at 12 months for all regions of interest compared to controls.

## **MOTOR IMAGERY OF RHYTHMIC ANKLE DORSIFLEXION IN INDIVIDUALS POST-STROKE**

P. Nair<sup>1</sup>, J. Shemmel<sup>2</sup>, J. Stinear<sup>3</sup>, D. Justus<sup>1</sup>, R. Avecillas<sup>1</sup>

<sup>1</sup> Department of Physical Therapy, School of Health and Medical Sciences, Seton Hall University

<sup>2</sup> School of Physical Education, University of Otago

<sup>3</sup> Department of Sport and Exercise Science, University of Auckland

**Background:** Neuroimaging studies have demonstrated that motor imagery and actual movements share at least in part common neural substrates. Motor imagery could therefore be a useful tool for promoting beneficial cortical plasticity post-stroke. Previous studies of upper extremity motor imagery have demonstrated temporal modulation of cortical excitability similar to the performance of the actual task in the contralateral primary motor cortex. However, it is unclear if lower extremity motor imagery produces a temporal pattern of activation resembling that observed in actual task performance. The present study therefore examined if motor imagery of rhythmic ankle dorsiflexion can produce dynamic changes in the excitability of motor cortex in individuals post-stroke. **Participants:** Nine individuals with post-stroke unilateral impairment were recruited for the study. Time Dependent Motor Imagery (TDMI), The Kinesthetic and Visual Imagery Questionnaire (KVIQ) and the Temporal Congruence Test (TCT) were administered to assess their motor imagery ability. A low frequency transcranial magnetic stimulation (TMS) coil was applied over the central fissure and magnetic stimulation was delivered at set time intervals. The amplitude of the imagined motor evoked potentials (MEPs) across the time points was compared to the amplitude of the actual task for the impaired limb. **Results:** The TDMI, KVIQ and the TCT scores in addition to the temporal modulation of corticospinal excitability observed in the actual and imagined tasks for the impaired limb are presented and discussed. **Conclusion:** The data support motor imagery as a candidate adjuvant therapy.

## **MECHANICAL COST ASSOCIATED WITH ASYMMETRICAL WALKING IN HEALTHY INDIVIDUALS**

P. Nair<sup>1</sup>, L. Cabell<sup>2</sup>, A. Dragonette<sup>1</sup>, K. Lesiczka<sup>1</sup>, K. Opoku-Nsiah<sup>1</sup>



<sup>1</sup>Department of Physical Therapy, School of Health and Medical Sciences, Seton Hall University

<sup>2</sup>Graduate Programs in Health Sciences, Seton Hall University

**Background:** Normal walking at self-selected speed is characterized by symmetry in step length and step time between limbs and is associated with minimal mechanical energy expenditure. Therefore, it is often assumed that asymmetrical step length (SL) and step time (ST) observed during impaired walking in neurological populations, might contribute to a change in mechanical cost. However, limited empirical evidence is available about the change in mechanical cost associated with altering SL and ST symmetry between limbs. The purpose of this study was to examine if altering SL and ST symmetry between the lower limbs results in a change in hip, knee and ankle joint powers, which are, established measures of mechanical cost. **Methods:** Participants included nine healthy individuals in the age range of 18-40 years. Participants completed three trials of three different overground walking conditions. The first condition involved symmetrical walking between limbs and the other two conditions involved walking asymmetrically with a 25% increase and decrease in both SL and ST values on the dominant limb. Peak hip, knee and ankle joint powers were calculated for both the dominant and non-dominant limb for all three conditions utilizing Qualisys Motion capture system and Bertec force plates. **Results:** Peak hip, knee and ankle joint powers observed between the three walking conditions are presented and discussed. **Conclusion:** Results of this study contribute to the body of evidence about the factors influencing the mechanical cost of walking

## TEMPORAL AND SPATIAL CHARACTERISTICS OF GAIT DURING PERFORMANCE OF THE 4-ITEM DYNAMIC GAIT INDEX

Kaitlin Sexton, SPT; Natalie Toczyłowski, SPT; Doreen Stiskal, PT, PhD

Department of Physical Therapy, School of Health and Medical Sciences, Seton Hall University

One of the most important clinical functional assessments is to determine how well a patient/client is walking. Clinical performance tools, such as the Dynamic Gait Index (DGI), describe global walking limitations when people walk in different ways. However, this tool has a ceiling effect with its scoring, thus limiting its application across populations. The GAITRite, a computerized gait mat, can capture more robust footfall information that may better guide evaluation and treatment of walking problems. Recently, researchers found the GAITRite to be a reliable means to assess the 4 continuous walking components of the DGI. The purpose of this study was to evaluate temporal and spatial parameters, including walking speed, step length and step frequency, of young adults performing the 4-item DGI on the GAITRite. Males and females, ages 18-30 years, volunteered to perform the test by walking 20 feet for 3 trials each: gait on level surface, gait with speed changes, gait with horizontal head turns, and gait with vertical head turns. The gait data were then averaged between the 3 trials of each tasks and statistically compared. As expected, walking footfall patterns while moving one's head and changing one's walking speed differed significantly from simple walking on a level surface. While the traditional scoring of the 4-item DGI was identical for all subjects, the GAITRite



helped identify variations in several key parameters between the 4 tasks. The results of this study suggest that use of a gait mat can help physical therapists to better evaluate walking function.

## **MEASLES: STAGING A COMEBACK**

Francesca DiPaola, Austin Michael, and Ellen D. Mandel

Physician Assistant Program, School of Health and Medical Sciences, Seton Hall University

**Introduction:** Since being declared eliminated in 2000 by the CDC, measles incidence has increased in the United States and worldwide due to a multitude of factors. These factors include decreased immunity via lack of vaccinations from an unjust fear, which poses a threat from the un-keen eye of clinicians who may be unfamiliar with its presentation, or who exclude measles from their top list of differential diagnoses, since it is considered a disease of the past.

**Presentation:** Measles presents in 4 separate stages, with the prodromal stage being the most recognizable with its classic triad of cough, coryza and conjunctivitis. The exanthematous stage follows with its distinct maculopapular rash, which spreads in a cephalad to caudal pattern.

**Diagnosis:** Measles diagnosis is either clinically based using specific CDC criteria, or through serologic IgM antibody detection. Measles affects multiple organ systems with complications such as otitis media (the most common), pneumonia (the leading cause of death) and can result in subacute sclerosing panencephalitis years after the initial infection. **Treatment:** While treatment is mainly supportive, supplemental vitamin A is recommended in select populations such as vitamin A deficient children. **Prevention:** Vaccination is central to measles prevention with efficacy rates of up to 99.7% with two separate MMR doses. A renewed sense of public education about the safety and efficacy of the vaccine is occurring which will hopefully promote eradication of this preventable disease.

## **PEDIATRIC ORAL HEALTH AND DENTAL DISEASE: A GROWING CONCERN AMONG PHYSICIAN ASSISTANTS**

Christopher Castellano, PA-S and Denise Rizzolo PA-C, PhD

School of Health and Medical Sciences-PA Program

The prevalence of early childhood caries (ECC) in children 2-5 years of age is on the rise from 24% in 1988–1994 to 28% in 1999–2004 and steadily increasing.<sup>1</sup> There is recent emphasis focusing on Physician Assistants to provide early and cost-effective interventional means to decrease the spread of dental disease in children. Socioeconomic outcomes of oral health disease can cause reduced quality of life in both child and caretaker, physical and developmental delays, missed school days, and increased healthcare costs. Early intervention and prompt pediatric referrals to a dentist in children at high-risk of poor oral health is more cost-effective and can provide improve a child's quality of life. Preventative hygiene strategies, including fluoride

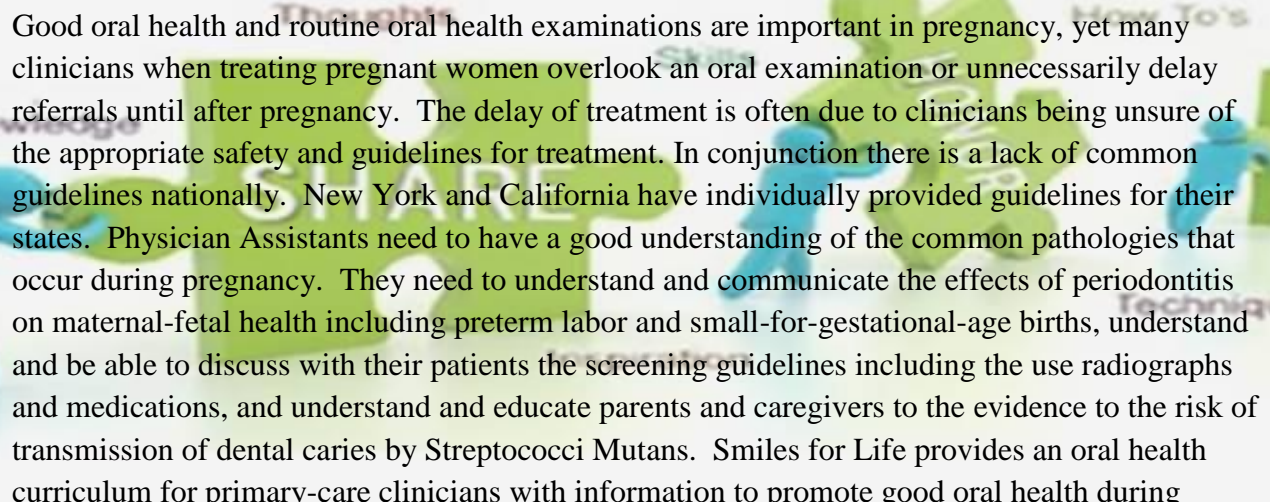


varnish treatment, emphasized to parents and caretakers by practicing clinicians can reduce the incidence of dental caries among children. The PA's role is not only in oral examination practices and referrals, but to be proactive in identifying risk factors, giving preventative care and education involving personal hygiene, proper brushing techniques, and ancillary guidance about flossing, fluoride treatments, and antibacterial mouth rinses to both children and their families. The Center of Disease Control (CDC), goal for 2012 is to prevent and control childhood dental caries, enhance oral health program effectiveness, and promote prevention of dental disease transmission.

## **PREGNANCY AND ORAL HEALTH: WHAT DOES A PRACTICING PHYSICIAN ASSISTANT NEED TO KNOW?**

Mark Boardman, Denise Rizzolo & Mona Sedrak

Department of Physician Assistant, Seton Hall University



Good oral health and routine oral health examinations are important in pregnancy, yet many clinicians when treating pregnant women overlook an oral examination or unnecessarily delay referrals until after pregnancy. The delay of treatment is often due to clinicians being unsure of the appropriate safety and guidelines for treatment. In conjunction there is a lack of common guidelines nationally. New York and California have individually provided guidelines for their states. Physician Assistants need to have a good understanding of the common pathologies that occur during pregnancy. They need to understand and communicate the effects of periodontitis on maternal-fetal health including preterm labor and small-for-gestational-age births, understand and be able to discuss with their patients the screening guidelines including the use radiographs and medications, and understand and educate parents and caregivers to the evidence to the risk of transmission of dental caries by Streptococci Mutans. Smiles for Life provides an oral health curriculum for primary-care clinicians with information to promote good oral health during pregnancy and throughout life. Providers should educate their patients about the importance of good oral health during and after pregnancy for themselves and their children. Patients should be reminded that the results of delaying treatment can be more detrimental than the treatment to the mother and child.

## **PREVALENCE AND KNOWLEDGE OF NONMEDICAL USE OF STIMULANTS AMONG UNDERGRADUATE AND GRADUATE STUDENT POPULATIONS**

Karen Salazar, PA-S, Shivani Patel, PA-S, Heather Reinhardt, PA-S, Vanessa Rodriguez, PA-S  
Mona Sedrak, PhD, PA-C

Physician Assistant Program, School of Health and Medical Sciences, Seton Hall University

Stimulant use has become increasingly common among college students. Several studies have reported on prevalence of use, however knowledge of side effects has not been investigated. The



purpose of this study is to assess the knowledge and nonmedical use of prescription stimulants (NMUPS) among college students and to compare healthcare and non-healthcare majors. An online student survey was distributed via email, and data was collected using the Academic Survey System Evaluation Tool (ASSET). Chi-square, Kruskal- Wallis, and Mann-Whitney U analyses evaluated responses using SPSS software. Among the 173 participants, 48.5% reported they knew students on campus who used stimulants. Findings revealed 22.8% of males and 13.2% of females indicated they used stimulants for nonmedical purposes. Seventeen percent of Caucasian, 17% of Hispanic and 14% of African-American students reported NMUPS. There were significant differences between undergraduate and graduate students in healthcare and non-healthcare studies regarding the extent of use and knowledge of stimulants and their side effects ( $p<0.05$ ). Approximately 17% of non-healthcare and 2.7% of healthcare majors reported taking stimulants while studying. Eighty-six percent of the graduate students in healthcare majors and 62.9% of non-healthcare majors reported they knew stimulants can cause some short-term side effects. Among the non-healthcare majors, 59% of undergraduate and 47.1% graduate students were unaware of the long-term side effects. The results of this study suggest that undergraduate students lack knowledge about stimulants, and are more likely to engage in its usage.

### **ASSESSMENT OF ADULT KNOWLEDGE REGARDING THE CURRENT TDAP VACCINATION RECOMMENDATIONS**

Jessica Wolkun, Nicole Bottino, Kristen Luzzi, Mariah Mullen, Whitney Wendt, Denise Rizzolo  
Department of Physician Assistant, Seton Hall University

The purpose of this study is to determine compliance, level of knowledge, and understanding of the current recommendations in individuals ages 19-64 years with regards to the Tdap vaccination. Members of a small private college ages 19-64 were asked to voluntarily complete a survey that collected demographic information and understanding of pertussis and the Tdap vaccination. Frequency counts, descriptive statistics and chi square analyses were used to analyze the data. Level of education demonstrated that 26.9% earned a bachelor's degree, 26.9% a master's degree, and 21.1% a doctoral degree. 70.8% of the participants had not received a pertussis booster in the past 10 years ( $p=0.00$ ). 81.9% of the participants responded that their healthcare provider had not recommended a booster within the past 10 years ( $p=0.00$ ). 63.7% were not aware that they may no longer be protected from pertussis if they had received the vaccine greater than 10 years ago ( $p=0.00$ ). There was no significant difference regarding knowledge of the guidelines among different education levels ( $p=0.868$ ). The results of this study suggest that the majority of the respondents were not aware that they need the vaccination nor had they been informed by their healthcare provider of the current guidelines. There was no significant difference in knowledge among higher education levels. Based on these results, there is a need for education regarding the updated pertussis vaccination guidelines and healthcare providers must become involved in educating this population.



## Chemistry and Biochemistry Poster Session

Tuesday, April 17 5:00 – 9:00 PM

McNulty Hall, Atrium

### SYNTHESIS AND PROPERTIES OF COMPLEX RNA

Mayurbhai Patel

Department of Chemistry and Biochemistry, Seton Hall University

A new approach to increase the selectivity of higher-order base-pairing interactions between lengthy synthetic oligonucleotides is currently desired for application in specific antisense agents, as well as probes for hybridization based detection assays of nucleic acids. In this study, we attempted to determine the structural and bio-physical requirements for high-order complex formation in nucleic acids. DNA and RNA template sequences with various lengths were synthesized along with two RNA segments complimentary to each template by automated solid-phase oligonucleotides synthesis. The three components were analyzed and purified by denaturing PAGE or RP-HPLC. Furthermore, single-stranded oligonucleotides were analyzed by native PAGE to determine the extent of self-folding. Interestingly, lengthy RNA and DNA 40-mer sequences were found to self-anneal in the absence of a complementary strand. These results were validated from the  $T_m$  data, which shows excellent base-pairing fidelity for the 3-component system as well as the lengthy single-stranded oligonucleotides. Structural studies from CD spectroscopy determine A-like helical character for the 3 component RNA system and AB-like trajectory for the mixed RNA:DNA complexes. In this presentation, we'll highlight the bio-physical and structural properties of high-ordered DNA and RNA complexes and discuss their relevance in biology.

### SELF-ASSEMBLY FOR DNA AND RNA

Mayurbhai Patel and David Sabatino\*

*Department of Chemistry and Biochemistry, Seton Hall, 400 South Orange Ave, South Orange, NJ, 07079*

A new approach to increase the selectivity of higher-order base-pairing interactions between lengthy synthetic oligonucleotides is sought after for applications in specific antisense agents, as



well as probes for hybridization based detection assays of nucleic acids. In this study, we attempted to determine the structural and bio-physical requirements for high-order complex formation in nucleic acids. DNA and RNA template sequences with various lengths were synthesized along with two RNA segments complimentary to each template by automated solid-phase oligonucleotide synthesis. The three components were analyzed and purified by denaturing PAGE or RP-HPLC. Furthermore, single-stranded oligonucleotides were analyzed by native PAGE to determine the extent of self-folding. Interestingly, under these conditions lengthy RNA and DNA 40-mer sequences were found to self-anneal in the absence of a complementary strand. These results were validated from the  $T_m$  data, which shows excellent base-pairing fidelity for the three component system as well as the lengthy single-stranded oligonucleotides. Structural studies from CD spectroscopy determine A-like helical character for the three component RNA system and AB-like trajectory for the mixed RNA:DNA complexes. In this presentation, we'll highlight the bio-physical and structural properties of high-ordered DNA and RNA complexes and discuss their relevance in biology.

\*Correspondences should be addressed to: [david.sabatino@shu.edu](mailto:david.sabatino@shu.edu)



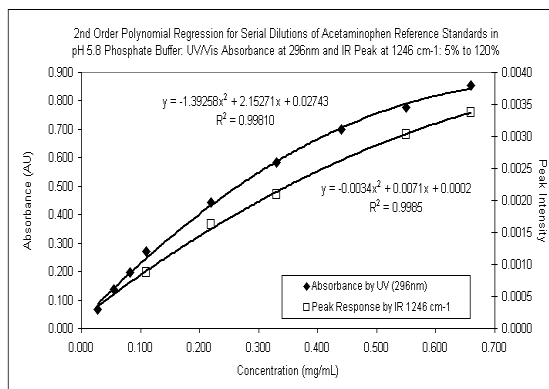
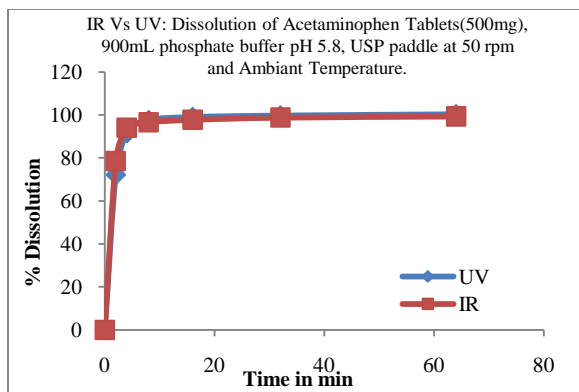
## UNDERSTANDING THE DYNAMIC PROCESS OF DISSOLUTION USING IR SPECTROSCOPY

Vrushali Bhawtankar

Department of Chemistry and Biochemistry, Seton Hall University

Dissolution studies are critical tests for measuring the performance of a drug product. In the past few years, the importance of the dissolution test has increased. Using in-situ ATR/FTIR spectroscopy we developed a methodology of analyzing and monitoring dissolutions of pharmaceutical APIs. The accuracy of this technique was found to be  $\pm 3\%$  relative to HPLC and UV using salicylic acid calibrator tablets and acetaminophen tablets. Additionally, research was conducted on multi-component drugs such as Excedrin and Extended Release Acetaminophen tablets. We are still working on multicomponent tablet. In fact, we also performed the Hydrolysis of Aspirin and will study the chemistry behind the dissolution by React IR. In the calibration study of acetaminophen we observed that at higher concentration its behavior is non-linear, and our hypothesis is due to dimerization of acetaminophen. With the study of hydrolysis of aspirin we are trying to study the non linear behavior of acetaminophen. With improved sensitivity, this is a promising method for monitoring dissolution of pharmaceutical tablets with an excellent automated capability for distinguishing individual components.



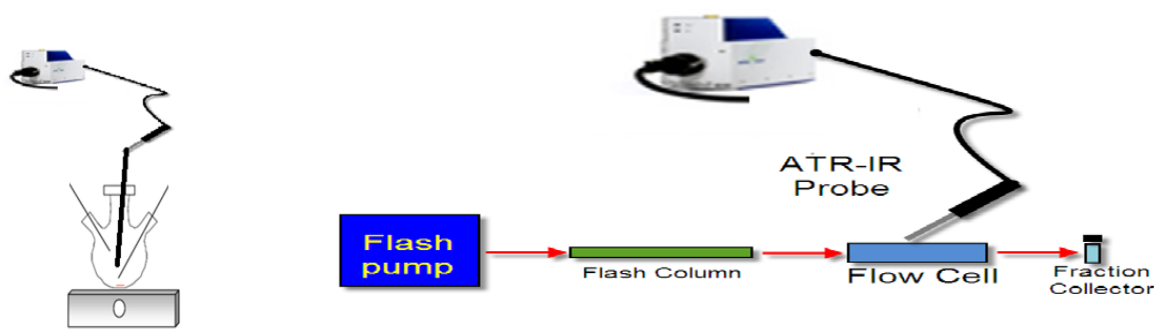


## REACT-IR A NOVEL PAT TOOL FOR REAL TIME REACTION MONITORING INTERFACED WITH FLASH SEPARATION

Gopalakrishnan Venkatasami, John R. Sowa Jr.

Department of Chemistry and Biochemistry, Seton Hall University, 400 South Orange Ave., South Orange, NJ 07079, USA

The use of mid-IR spectroscopy as a real-time monitoring tool for reaction and purification is illustrated. We have developed a novel technique using in situ ATR-IR spectroscopy to monitor real time reaction followed by purification of the product by flash chromatographic system. The etherification, acetylation and isomerization reactions were used to demonstrate the mid-IR spectroscopy as a valuable process analytical technology (PAT) tool. The results show that this technique can be successfully used as an alternative to traditional off-line methods since the results were well comparable to off line analysis.



## SYNTHESIS AND CHARACTERIZATION OF GRP78-siRNAs FOR POTENTIAL ANTI-CANCER APPLICATIONS

Anthony Maina, Eva Morozko, Maria E. Bender, Diana Gonzalez and David Sabatino\*



Department of Chemistry and Biochemistry, Seton Hall University, 400 South Orange Ave.  
South Orange NJ., 07079

Glucose Regulated Protein 78 (GRP78) is a protein responsible for regulating cellular proliferation and is expressed exclusively on the surface of cancer cells. The main function of GRP78 in cancer cells is to regulate cell homeostasis, maintaining rapid cancer cell metabolism and proliferation. In the absence of GRP78, cancer cells lack the ability to regulate protein misfolding events, ultimately leading to their cellular death. Thus, the down-regulation of GRP78 expression by inducing the RNA interference (RNAi) pathway can lead to cancer cell apoptosis. Therefore, RNAi has emerged as a potent therapeutic strategy in the treatment and control of various genetic diseases, including cancer. Key to its mechanism of action are short interfering RNA (siRNA) that function as small, non-coding sequences of RNA that trigger gene silencing events, the inhibition of protein synthesis and cellular apoptosis. The siRNAs corresponding to the inhibition of GRP78 expression have been previously shown to invoke the RNAi pathway. In this study, Solid Phase Synthesis (SPS) was used to generate siRNA sequences (GRP78-1, GRP78-2) which activate the RNAi pathway for potentially silencing GRP78 expression and inducing cancer-cell apoptosis. Through SPS, siRNA sequences were conjugated with a fluorescent tag (fluorescein) which can be used to track internalization into the cell. RNA sequences were isolated using ion-pairing RP-HPLC and denaturing PAGE techniques. Characterization by  $T_m$  studies indicated stable duplex structures owning melting temperatures of 65 °C and 70 °C, respectively. These fluorescently tagged siRNA sequences will allow for biological investigations, to determine its gene-silencing efficacy for future applications in cancer therapy.

\* Correspondences should be addressed to: david.sabatino@shu.edu

## **CANCER-TARGETING PEPTIDES AS CANCER SPECIFIC DRUG DELIVERY SYSTEMS**

Stesha C. Joseph, William Penny, Ivonne Martinez and David Sabatino\*

*Department of Chemistry and Biochemistry, Seton Hall University, 400 South Orange Ave. South Orange NJ., 07079*

The nonspecific binding of anticancer drugs towards cancerous and normal tissues often leads to levels of cellular toxicity which weakens the immune system thereby hindering its ability to destroy tumors. For this reason, we propose a combination approach, in which a chemotherapeutic agent is complexed with a ligand that functions to specifically target and internalize into cancer cells. In this case, rapidly proliferating cancer cells are known to exclusively contain cell-surface protein receptors – Glucose Regulated Protein (GRP78), which may act as molecular markers for cancer cell-targeted delivery and therapy. Cell-targeting peptides are attractive ligands that can act as drug delivery vehicles for a variety of chemotherapeutic agents. In our study, the Pep42 peptide, CTVALPGGYVRVC, was synthesized by Solid Phase Peptide Synthesis (SPPS) to validate its specific binding to the cell surface receptor GRP78. The target peptide was synthesized in yields of 91% and isolated in purities of



95% as detected by RP-HPLC. With this peptide in hand, it may serve as an attractive candidate for the delivery of cytotoxic drugs within GRP78 containing tumor cell lines. The highly specific GRP78-Pep42 interaction can be utilized for the assembly of potent Pep42-drug conjugates for specific drug delivery to cancer cells. These conjugates may offer significant improvements of the efficacy of drug delivery, thereby minimizing the adverse side effects associated with current chemotherapeutic treatments.

\* Correspondences should be addressed to: [david.sabatino@shu.edu](mailto:david.sabatino@shu.edu)

## **EXPRESSION OF TRANSIENT RECEPTOR POTENTIAL VANILLOID RECEPTOR 1 C-TERMINAL DOMAIN IN *E. COLI***

Edward C. Twomey<sup>1</sup> and Yufeng Wei<sup>1,2</sup>

<sup>1</sup>Department of Chemistry and Biochemistry, Seton Hall Univ

<sup>2</sup>Rockefeller University, New York, NY.

Transient receptor potential vanilloid receptor 1 (TRPV1) is a transmembrane ion channel which is implicated in pain sensory pathologies. Specifically, TRPV1 has been linked to hot thermosensation, migraine headaches, arthritis and hyperalgesia, and is also implicated in respiratory diseases due to its possible link to the coughing mechanism. The phosphoinositide, phosphatidylinositol(4,5)biphosphate (PIP<sub>2</sub>) has been found to propagate TRPV1 activation through the TRPV1 C-terminal domain (CTD). The TRPV1 protein has not been successfully expressed from bacterial cells. Current literature only reports expression of TRPV1 from yeast and baculovirus-infected insect cells. The low expression level and poor purity of these expression systems impedes high-resolution structural studies with nuclear magnetic resonance (NMR) or X-ray crystallography. We have produced the TRPV1 CTD in the laboratory to prepare for NMR spectroscopic studies in both free and PIP<sub>2</sub>-bound forms. Here we report our methodology for TRPV1 CTD expression in *E. coli* bacterial cells.

## **ANALYSIS OF RHENIUM AND RUTHENIUM COMPLEXES USING NMR SPECTROSCOPY**

Samona Hall & Wyatt Murphy

Department of Chemistry and Biochemistry, Seton Hall University

Ruthenium and rhenium complexes tris-(2-pyrazoyl)-methane (tpm) were synthesized from appropriate metal starting materials. In the former case, the Ru(tpm)Cl<sub>3</sub> precursor will be used to prepare bimetallic complexes with polypyridyl bridging ligands. In the latter case, NMR investigations will be made to observe the anticipated dangling pyrazoyl ligand. Electronic and infrared spectroscopy and cyclic voltammetry will be used to characterize the complexes. Results to date will be reported.



## SYNTHESIS OF CNS-ACTIVE D-GLUCAL-BASED BENZYLIDENE DERIVATIVES

Emi Hanawa, Jamie Talisman and Cecilia Marzabadi

Department of Chemistry and Biochemistry, Seton Hall University

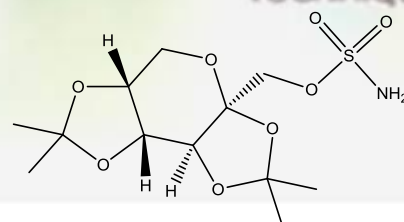
Central nervous system (CNS) disorders affect a large population throughout the world and thus are considered major public health concerns. Epilepsy is, among all CNS disorders, one of the most common medical and social disorders. The first generation of antiepileptic drugs (AEDs) control seizures by inducing prolonged inactivation of  $\text{Na}^+$  channel, by blocking  $\text{Ca}^{2+}$  channel currents or by enhancing inhibitory GABAergic neurotransmission [1]. Unfortunately, a proportion of patients have seizures that are resistant to those AEDs [2] and therefore a second generation of AEDs has been developed. The second generation of AEDs is designed to act by several different mechanisms instead of just targeting an ion channel or postsynaptic receptors. Topiramate (structure is given below) is one of the second generation AEDs and blocks the voltage-gated sodium channel, inhibits the kainate-type glutamate receptor, reduces L-type voltage-sensitive calcium currents, increases the frequency of GABA-mediated chloride channel opening, inhibits carbonic anhydrase isoenzymes and increases potassium conductance [3]. Despite their potency, both generations of AEDs have severe side effects and therefore the development of alternative AEDs with fewer side effects is highly needed. Previously, we prepared compound (1) with one functional group each for both X and Y as displayed below and observed that it had activity in epilepsy assays and nanomolar affinity for GABA A and mGluR2 receptors. We intend to prepare derivatives with modifications in three regions: the group at the *para* position of the benzylidene ring, the free hydroxyl group of the sugar and the glycal double bond.

### References

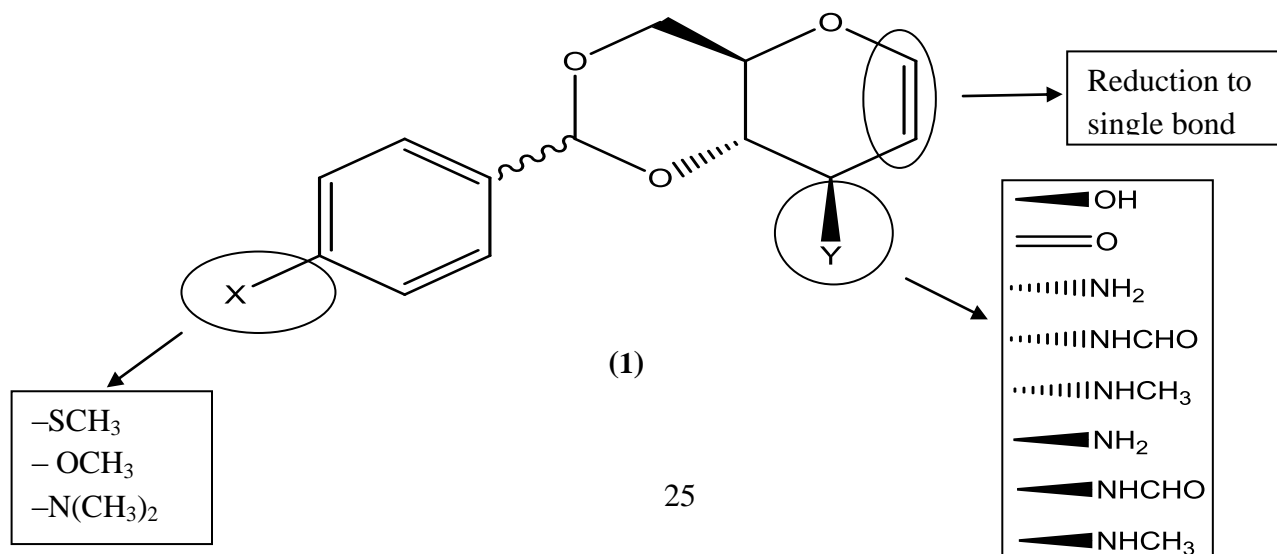
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[2] Hauser, W. A. *ibid.* 234-239.

[3] Faught, E. *Neuropsychiatric Disease and Treatment* **2007**, 3(6), 811–821.



Topiramate





## **MOLECULAR MODELING OF TRANSIENT RECEPTOR POTENTIAL VANILLOID TYPE1 ION CHANNEL (TRPV1) AND TRANSIENT RECEPTOR POTENTIAL MELASTATIN TYPE 8 (TRPM8)**

Kelly Raymond, Yufeng Wei, PhD and Stephen Kelty, PhD

Department of Chemistry and Biochemistry, Seton Hall University

The Transient Receptor Potential (TRP) family of ion channels encompasses more than 30 members, which are expressed in many different tissues and cell types.<sup>1</sup> Molecular modeling will be used in order obtain structural and functional data on Transient Receptor Potential Vanilloid Type 1 (TRPV1) and Transient Receptor Potential Melastatin Type 8 (TRPM8) ion channels in their membrane bound environment. In particular, the S1-S4 region and C-terminal domain of each protein will be used for this study. TRPV1 is part of the TRP family gated by vanilloids, heat and protons, while TRPM8 is activated by cold, methanol and icilin.<sup>2</sup> S1-S4 region of both channels are the putative ligand binding segment, while the C-terminal domain is suggested to respond to temperature and regulated by phosphatidylinositides. Currently, the only portion of either model that has been crystallized is the six ankyrin repeats that make up a small segment of the N terminal region. Therefore, a molecular model of the transmembrane S1-S4 domain segment of TRPV1 and TRPM8 was created using their respective homology models and inserted into their membranes. In addition, a molecular model using an alpha helix bound, mimicking helix S6 in TRPV1 or TRPM8, to the C-terminal domain of either protein was also created. Performing molecular dynamics simulations on the both regions could provide pivotal information about ligand binding, voltage sensing, interaction with heat/cold and proton binding for both TRPM8 and TRPV1. A greater understanding of the structure of TRPV1 and TRPM8 could provide important details on how to alleviate certain diseases such as pain, asthma and diabetes.

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2. Clapham, D. E. (2003). "TRP channels as cellular sensors." *Nature* **426**(6966): 517-524.

## **RESEARCH EXPERIENCE IN CHEM 1108: CONVERTING CARBOXYLIC ACIDS TO ESTERS**

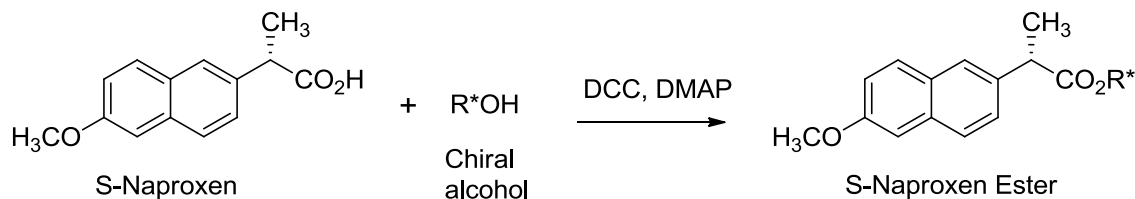
John Hobbs, Josh Hankins, Maxlande Anglade, John R. Sowa, Jr.

*Department of Chemistry and Biochemistry, Seton Hall University, South Orange, NJ 07079*

In our Chem 1108 class, we were interested in doing synthetic organic chemistry. In this research experience we practiced the techniques of performing a synthesis, isolation of the products and purification of the products. We developed a procedure for converting carboxylic acids to esters;



in particular, the procedure involves the reaction of a carboxylic acid (Naproxen) with an alcohol to obtain an ester.



After the initial synthesis, the product was contained within a mixture of excess reagents and by products. An insoluble urea byproduct was filtered out and acidic (e.g., excess Naproxen) and basic (DMAP) impurities were removed with acid and base washes. This experience also enabled us to explore the concept of stereochemistry as Naproxen is a pure chiral compound (S stereochemistry) and the alcohols we used were chiral mixtures (R and S stereochemistry). The coupling reaction results in a mixture of diastereomers as the Naproxen esters. We performed a thin layer chromatography in order to quickly test the initial progress of the reaction. We are currently analyzing the final products by high pressure liquid chromatography (HPLC) and nuclear magnetic resonance spectroscopy (NMR).

### **IDENTIFYING THE STRUCTURE AND FUNCTION OF THE TRANSMEMBRANE DOMAIN OF TRANSIENT RECEPTOR POTENTIAL (TRP) CHANNEL PROTEINS THROUGH NMR STUDIES**

Dana F. Cordasco and Dr. Yufeng Wei.

*Seton Hall University, College of Arts and Sciences, Department of Chemistry and Biochemistry, McNulty Hall room 419, South Orange, New Jersey 07079*

The transient receptor potential (TRP) channel proteins are a family of cation channels present in the cell membranes of many eukaryotic organisms. The TRP channels are involved in many different biological activities, including temperature sensing. It has been postulated that the transmembrane S1-S4 domain of the protein controls responses to agonist binding and voltage gating. Specifically, the TRPV1 and TRPM8 proteins will be studied. Both the TRPV1 and TRPM8 proteins are thermosensitive, and are representative of the TRP family. TRPV1 is heat-sensitive, while TRPM8 responds to cold. The TRPV1 and TRPM8 proteins will be produced via standard molecular biology methods. Once the protein samples have been produced, solution state NMR experiments, with the S1-S4 domain in phospholipid bicelles simulating cell membrane structure, will be conducted to determine the membrane-bound structure and function of this domain. Mutagenesis experiments will also be performed. The structure and dynamics of the mutants will also be studied via NMR to determine the key residues for agonist binding and voltage gating. The elucidated structure of both the TRPV1 and TRPM8 channel proteins will be deposited in the Protein Data Bank, to aid other scientists in future research into this important family of proteins.



## SEPARATION OF ACETONITRILE-WATER MIXTURE WITH MASS SEPARATING AGENTS

Mithilesh Deshpande

Department of Chemistry and Biochemistry, Seton Hall University

Worldwide shortage of acetonitrile (ACN), a commonly used HPLC solvent has forced us to implement a strategy for conserving the existing stocks. The most economical at laboratory level still remains the toll-recovery and resupply of ACN extracted from HPLC solvent wastes, and is already being considered by many as an exciting prospect. It is technically very challenging as ACN forms an azeotropic mixture with the water ( $H_2O$ ) as well as other organic solvents like methanol that is often also present in HPLC solvent wastes, making straightforward distillation unlikely to achieve the purity levels required (99.95%). Therefore a cost effective, nondestructive separation technique needs to be proposed. In present study we investigated 'Salting out' and novel 'Sugaring out' techniques as means of separating ACN- $H_2O$  mixture and consequently study phase separation in ACN- $H_2O$  mixture by employing ATR-FTIR spectroscopy.

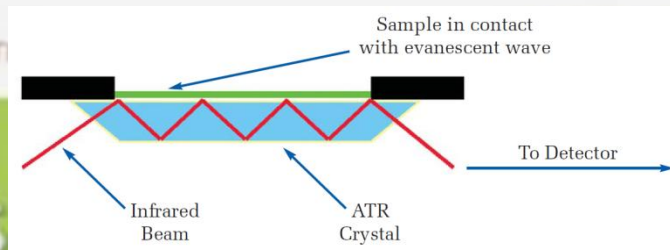


Figure: Schematic of ATR-FTIR spectroscopy.

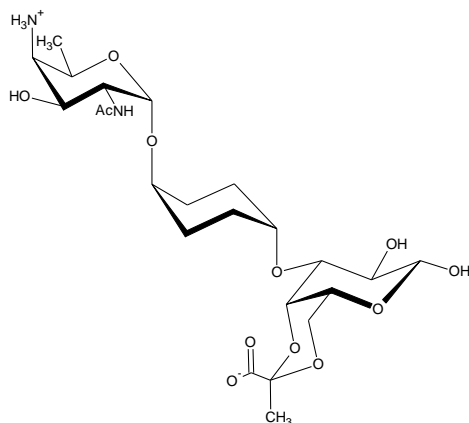
## SYNTHESIS OF AN IMMUNOMODULATORY ZWITTERIONIC POLYSACCHARIDE

Vikram Basava and Cecilia Marzabadi

Department of Chemistry and Biochemistry, Seton Hall University

Zwitterionic polysaccharide A1 (PSA1), isolated from the capsule of the anaerobic bacterium *Bacteroides fragilis*, has been shown to stimulate both innate and adaptive immune responses in mammals and is believed to be important in establishing a balanced immune system which is mediated by T-lymphocytes. The immunologic property is because of its zwitterionic character and any attempts in neutralizing either of the charges results in a strongly reduced biological activity of the polysaccharide. In order to better understand the mechanism of immunological activity, attempts are being made to synthesize the charged sugar moieties and attach them together by PEG resins or cycloalkane diol chains. Evaluation of the polysaccharide's ability to produce cytokines and chemokines in antigen presenting cells and T-cells using sandwich ELISA assay tests will be carried out on the molecules synthesized. The results obtained will aid in the development of agonists and antagonists for the treatment of asthma and allergies, as well as, other immunological disorders.





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#### **ANALYSIS OF STREET DRUGS USING COMPREHENSIVE TWO DIMENSIONAL GAS CHROMATOGRAPHY TIME-OF-FLIGHT MASS SPECTROMETRY(GCxGC-ToFMS)**

Brian Barnes

Department of Chemistry and Biochemistry, Seton Hall University

Drug abuse has become a more prevalent problem even as governments and law enforcement officials all over the world have enacted restrictions of the use, possession, distribution, and sale of these substances. Within the last 10 years, a new class of drugs known as designer drugs have appeared in various areas around the world. Designer drugs are usually conventional drugs that have been chemically modified to avoid the restrictions placed on them by law enforcement personal, as well as to increase the euphoric effect. During the course of this work two designer drugs, salvinorin A and Yaba, were studied. Prior to the invention of the gas chromatograph-mass spectrometer(GC-MS), detection and identification of these substances was a problem. This device has been used by forensic scientists with great success and is now one of the standard techniques for the analysis of drugs of abuse. The instrument is designed to separate a complex mixture and then identify the components of the mixture. Since its inception, improvements have been made to the GC-MS in order increase its detection capability, speed, sensitivity, accuracy, and precision. An especially powerful instrument that was able to increase all of the aforementioned parameters was designed about 10 years ago. This instrument is known as a Comprehensive Two Dimensional Gas Chromatograph coupled with a Time of Flight Mass Spectrometer(GCxGC-ToFMS). The technique uses two columns, each having different



dimensions and different stationary phases to perform orthogonal separations. The term 'comprehensive' means that the entire sample is separated on both columns. The term 'orthogonal' means that the sample is separated by two independent mechanisms without interfering with each other. This was primary instrument used for the analysis of drugs in this work.

When drug samples arrive in forensic laboratories they are usually contained in some type of aqueous matrix, usually urine or blood. In other cases, the drugs may be contained on the surface of an object such as a piece of clothing or even money. In order to perform instrumental analysis on them, the drugs must be extracted from the matrix. The two extraction techniques performed in this work were solid phase microextraction (SPME) and liquid-liquid extraction (LLE) in order to extract the drugs from various matrices including water, urine, and plants. SPME is a sensitive, simple, and efficient technique that uses a polymer coated fiber in order to extract analytes of interest from a complex or simple matrix. In this work, the technique was automated allowing improved repeatability for the extraction of trace levels of the drugs studied in comparison to LLE. Automated SPME and LLE were used in conjunction with GCxGC-ToFMS to extract salvinorin A from water and urine. Comparison of the analytical figures of merit obtained following each extraction technique showed that SPME produced better precision, higher recoveries, and detection limits at least two orders of magnitude lower than LLE. These results were further supported following the extraction of a more complex designer drug known as Yaba from water and urine. Further, the orthogonal separation and rapid, full-scan capability of the GCxGC-ToFMS revealed the presence of several impurities and degradation products following the analysis of both salvinorin A and Yaba. Therefore, this work not only demonstrates that SPME-GCxGC-ToFMS is an effective technique for the trace analysis of designer drugs. Further, the increased separation power of the technique can also be used as a powerful tool for impurity profiling of complex designer drugs. It is believed that this work can be very beneficial to law enforcement officials and forensic scientists for the identification of drug trafficking patterns and the development of effective regulations prohibiting the sale and use of these substances.

## **THE INVESTIGATION OF THE GROWTH OF SILICA PARTICLES WITH POROUS SHELLS**

Robert Spruce and Alexander Y. Fadeev

Department of Chemistry and Biochemistry, Seton Hall University

Silica particles are a big part of the pharmaceutical formulations, composite and hybrid materials, supported catalysts, and separation media. In this project we investigated the reaction of preparation of the pore-shell silicas, i.e. particles that consist of the solid silica core coated with thin porous silica shells. The main objective was to examine the effect of sizes of the non-porous "seed" silica particles on the growth of the porous shells. The porous shells were prepared via hydrolytic polycondensation of TEOS (Tetraethyl orthosilicate, 4.4 grams) in presence of polymeric template (Pluronic P123, 2.2 grams) and hydrochloric acid (62.1 grams)



and silica seeds (2.0 grams). The silica is prepared and put into an oven at 80°C for five days. Afterward, it is placed into a muffle furnace in order to calcinate it. The silica is then washed with hydrochloric acid, toluene and two rinses of acetone. Two samples of the poro-shell particles have been prepared; their surface area was determined and the thickness of the porous shells were calculated. The first experiment produced particles with shell thickness of 5.36e-10nm. At first, it was a solid, so the silica had to be mashed into a powder. For the second experiment, the amount of TEOS, deionized water, P123 and hydrochloric acid was increased to figure out the surface area and then compare to the other experiments. 4.9 grams of P123, 38.1 grams of water, 150.6 grams of hydrochloric acid and 10.8 grams of TEOS was added to increase the size. Future experiments will use smaller amount of TEOS, P123, deionized water and hydrochloric acid.

## CHIRAL MESOPOROUS SILICA USING PSEUDOMORPHIC SYNTHESIS

Gabriel C. Graffius and Alexander Y. Fadeev

Department of Chemistry and Biochemistry, Seton Hall University

Chiral mesoporous silicas (CMS), i.e. porous silicas with chirality present on the surface and/or in the pore morphology, form an interesting class of materials with prominent applications in enantioselective separations, catalysis, synthesis, etc. The focus of our research is to develop methods of preparation of the CMS using chiral templates and structure directing agents. Specifically, we are focused on the pseudomorphic transition method [1], a technique which involves modification of the pore morphology of the previously formed silica particles under the conditions facilitating solubility of silica (high pH and temperature) [2] and in the presence of structure directing agents. The preliminary research has involved the synthesizing and using the chiral anionic surfactant, N-myristoyl-L-alanine [3], for pseudomorphic synthesis with the main goal of the understanding the role of the reaction conditions, such as the pH and temperature range for optimization of the synthesis. Recent studies have focused on understanding the mechanism of this synthesis. The interaction of the surfactant with N-trimethoxysilylpropyl-N,N,N-trimethylammonium (TMAPS) seems to be the most important factor in a successful synthesis. Several studies were undertaken to characterize the ionic interactions and to understand the order of reaction with the silica surface have during the synthesis. Nitrogen adsorption is utilized as the primary tool to characterize the pore structure of the mesoporous silicas.

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## THE SYNTHESIS OF CARBOHYDRATE FUSED BENZOPYRANS

Sumiea Eltayeb and Cecilia H. Marzabadi

Department of Chemistry and Biochemistry, Seton Hall University

Carbohydrates comprise the most abundant natural product molecules. The general empirical formula for the carbohydrates is  $C_n(H_2O)_n$ . Carbohydrate chemistry has been a topic of interest and is attractive for drug design because of the molecules' unique structures and biological activities such as recognition, fertilization and signal transduction. Glycals are unsaturated sugars that contain a double bond between C1 and C2. Manipulations of this double bond have been the focal point of many syntheses that use glycals. The goal of this research is to synthesize carbohydrate-fused chromanes as potential anticancer drugs by using [4, 2] Diels-Alder reactions (Cycloaddition reactions). Much of this research will focus on reacting tri-O-substituted D-glucal with O-hydroxybenzaldehyde in the presence of an acid catalyst. Different catalysts will be tested to find the most efficient mechanism and good yields of product.

## ANALYSIS OF POLYCYCLIC AROMATIC HYDROCARBONS IN FISH OIL BY HEADSPACE SOLID PHASE MICRO EXTRACTION GAS CHROMATOGRAPHY-MASS SPECTROMETRY (HS-SPME-GC-MS) AND GCxGC-ToFMS

Shilpi Chopra, Lauren Ridley, Dr. Nicholas. H. Snow, Dr. John R. Sowa, Joseph Ravino

Department of Chemistry and Biochemistry, Center for Academic Industry Partnership, Seton Hall University, South Orange, NJ.

Quantitative analysis of polycyclic aromatic hydrocarbons (PAHs) was performed in fish oil capsules by headspace solid phase micro extraction coupled to gas chromatography mass spectrometry (HS-SPME-GC-MS). The extraction and instrumental methods were developed with using an over-the-counter fish oil capsule spiked with EPA Mixture 610. This mixture consisted of 15 PAHs that served as the model for this work. The PAHs showed a linear range from 50 to 1500 ppb; where the precision were lower than 10 % (25 to 500 ppb). The limit of detection and quantification varied from 0.1 to 2.5 ppb and 12.5-50 ppb respectively. Real samples of oil were extracted from menhaden fish; collected by two different ships located in the Atlantic Ocean off the NJ coast and in the DE Bay. Daybrook crude (oil processing plant in LA), DBP: Daybrook processed and GILA: Grand Isle, LA; collected October 2010 (post oil spill)(were all real samples post spill). Extraction of oil from these fish was prepared by dissection of the fish with removal of the internal organs and muscle from skin. Centrifugation was performed on both the muscle and the skin, followed by fish oil extraction. Naphthalene, fluorene, fluoranthene, pyrene, and anthracene were detected in the real samples and quantified to be at concentrations well below the limits given by the FDA. Preliminary analysis of PAHs was also performed using HS-SPME-GCxGC-ToFMS.



## **CHARACTERIZATION AND EXCESS ADSORPTION STUDY OF BINARY AQUEOUS ORGANIC MIXTURE ON NOVEL SILICA FUSE-CORE SBA-15 ADSORBENT MATERIAL**

*Margaret Figus, Yuri V Kazakevich and Alexander Y. Fadeev*

Department of Chemistry and Biochemistry

HPLC columns packed with fuse core particles are becoming the number one choice in most chromatographic applications especially in the pharmaceutical industry. This popularity is due to the significantly higher efficiency of fuse-core sub-2- $\mu\text{m}$  particles, which allows for the use of shorter columns and much faster separations at significantly lower backpressure. A new preparation method for particles that consist of a solid silica core and a mesoporous silica shell is presented. This new core-shell material was prepared using a polymer-templated sol-gel synthesis. A SBA-15-like material was prepared on the surface of 11  $\mu\text{m}$  nonporous spherical particles. This material was thoroughly characterized via low temperature nitrogen adsorption, and TGA. The adsorbent's surface was chemically modified using n-octyldimethyl(dimethylamino)silane and HPLC columns was prepared. Chromatographic properties of this new fused-core adsorbent with ordered porous structure was compared with commercially available fuse-core C-18 material. Column geometric parameters were determined via the minor disturbance method and retention of labeled analyte. New material demonstrates promising chromatographic behavior with comparable results to commercial columns.

## **EARLY DEVELOPMENT METHODS FOR PARTICLE SIZE RAW MATERIAL API**

*Maha Mobasher and Cecilia Marzabadi*

Department of Chemistry and Biochemistry, Seton Hall University

The purpose of this study is for the determination of particle size of active pharmaceutical ingredients (API) using laser diffraction method. Laser diffraction method is based on light scattering due to particles in the light beam. Particle size method development involves determining the characteristic of each material (such as structures, crystal shapes, solubility, wettability, and inter-particle attractions). The instrumentation commonly used in the pharmaceutical industry laser diffraction, microscopy and sieve analysis. The particle size affects disintegration, dissolution and absorption of the drug and thus affects the bioavailability of the drug in the blood. Levels of the drug in the blood are critical for toxicity studies, treatment and effectiveness. Formulation design of dosage forms requires evaluation of the particle size prior to the final formulation. Typically, a finer API has a higher solubility compared to a coarser material because of the higher surface area associated with the finer material. Based on the different characteristics, the critical components required for the methods are solubility of the material, selection of solvent system, prevention of agglomeration, suspending of particles and distribution of the particles to have a reproducible and reliable results. Solutions are typically observed and confirmed using microscopy to demonstrate when the solvent system is appropriate (no agglomeration).



## **PREPARATION OF SILICA CORE-SHELL PARTICLES WITH ORDERED MESOPOROUS THIN FILMS.**

Kyle W. Eckenroad and Alexander Y. Fadeev

Department of Chemistry and Biochemistry, Seton Hall University

In this work, we developed preparation methods for particles that consisted of a solid silica core and a mesoporous silica shell, core-shell particles. These particles are of interest for applications in adsorption, separations, and chromatography. We prepared core-shell particles using a polymer-templated sol-gel synthesis that closely mimicked the synthesis initially proposed by Stucky et al.<sup>1</sup> A series of SBA-15 thin films were prepared through the condensation of tetraethoxysilane (TEOS) in the presence of Pluronic 123 and nonporous silica seed of different sizes (10  $\mu\text{m}$  and 1.5  $\mu\text{m}$ ). The radius of curvature of the particles will create different pore structure which may be more energetically favorable with decreasing radius. The isolated materials have been characterized by nitrogen adsorption and electron microscopy. The preliminary data demonstrated the formation of core-shell particles based on the increased BET surface area and the presence of hysteresis loops in the adsorption/desorption isotherms. The effect of TEOS concentration, the initial age temperature, reaction age time, and seed concentration have been investigated. Reaction age time and seed concentration have both been observed to have an effect of the surface present on the particles. Seed concentration also has a significant effect possibly increasing film thickness with decreasing seed loading.

<sup>1</sup> Zhao, D.; Huo, Q.; Feng, J.; Chmelka, B.F.; Stucky, G.D. *JACS*, 120, 1998, 6025-6036.

## **CHARACTERIZATION OF DRUG POLYMORPHS BY ENCAPSULATION WITH MESOPOROUS SILICA**

Alvin K. Persad and Alexander Y. Fadeev

Department of Chemistry and Biochemistry, Seton Hall University, South Orange, NJ 07079

Polymorphism has always presented an interesting phenomenon to crystallographers. Studies have been completed in the macroscopic and nanoscale realm to observe the different chemical and physical properties. Researchers have published information about polymorphism existing in the nanoscale but not in the macroscopic scale. The nanoscale confinement provides stabilization for the growth of metastable polymorphs which would not be accomplished in the bulk. In the nanoscale environment thermodynamic properties can be determined for these metastable polymorphs. This can be applied to the pharmaceutical industry, producing drugs that would be more efficacious at reaching its target. In this research the pharmaceutical drug carbamazepine (CBZ) are being investigated. The confirmation of the drug CBZ polymorph has been studied using thermal analysis



and spectroscopic methods to show parallels with the existing literature data. In order to manipulate the drug CBZ to produce polymorphs, the environment is controlled to some extent by using nanoporous materials. The drug CBZ is dissolved in a solvent followed by saturating the inexpensive and biocompatible nanopores. Thermal analysis and spectroscopic methods provided data that would help elucidate the *new polymorph* of the drug CBZ thereby showing that the nanoscale and surface environment indeed effect the chemical and physical properties. This *new polymorph* will be investigated further to confirm its drug solubility and the physicochemical properties. If this is a viable method of growing new polymorphs with the favorably chemical and physical properties for the delivery of drugs to reach its targeted site then this should reduce cost for pharmaceuticals drug manufacturers.

### **FINITE DIFFERENCE STUDIES OF CAPACITY FACTOR VARIATION IN ADSORPTION CHROMATOGRAPHY AND RELATIONSHIP BETWEEN PEAK TAILING AND CAPACITY FACTOR IN PARTITION-ADSORPTION CHROMATOGRAPHY**

Nicole Charles

Department of Chemistry and Biochemistry, Seton Hall University

Computer software has been developed to model adsorption effects in partition chromatography using Windows Excel®. The new software allows the study of the variation of USP tailing factor with capacity factor when adsorption controls the chromatographic process. Written as a VBA running within an Excel® platform, this program uses finite difference methods to predict the chromatographic behavior when both partition and adsorption control the chromatographic distribution. This VBA software basically computes a variable, concentration-dependant mobile phase fraction for each and every theoretical transfer. Rather than treating the mobile phase fraction as a fixed quantity, the software computes a variable, concentration-dependant mobile phase fraction for each and every theoretical transfer. All calculations are performed using four dimensionless input parameters:  $X$ , the fixed partition mobile phase fraction;  $(K_{ad}Co)$ , the adsorption equilibrium constant;  $(\Gamma_{oA}/CoV_m)$ , the relative molar surface adsorption side density and  $N_o$ , the number of theoretical plates. Results have been obtained using this novel software that we have developed to model adsorption effects in partition chromatography. We have done some studies over a wide range of capacity factors and found out that peak tailing is highly dependent upon  $(\Gamma_{oA}/CoV_m)$ , which is the parameter that compares the number of adsorption sites with the number of species in solution. The resulting analysis also reveals an interesting relationship between the tailing factor and  $k'$  in adsorption chromatography.



## PREPARATION AND CHARACTERIZATION OF CURCUMIN LOADED MESOPOROUS SILICAS

Karthik Jayaraman and Alexander Y. Fadeev

Department of Chemistry and Biochemistry, Seton Hall University

Curcumin has been shown to possess strong antioxidative, anti-inflammatory and antiseptic properties<sup>1</sup> and also proven to be very effective against cancer cells such as breast cancer, prostate cancer, bone cancer, lung cancer and gastrointestinal cancer<sup>2</sup>. Despite these properties, it is not widely used for cancer treatment because of its poor aqueous solubility, low gastrointestinal absorption and poor bioavailability<sup>3</sup>. In this work, we focused on the preparation of Curcumin-loaded silicas (CLS) in order to facilitate Curcumin's solubility under physiological conditions. Samples of the CLSs were obtained by deposition of the Tetrahydrofuran (THF) solutions of Curcumin on ordered SBA-15 silicas ( $S_{\text{BET}}=600\text{m}^2/\text{g}$ ,  $V_{\text{Pore}}=1\text{cc/g}$ ,  $D_{\text{Pore}}\sim 5\text{-}8\text{ nm}$ ) followed by the vaporization of solvent. Typical loadings were  $\sim 15\text{-}20\%$  w/w. The CLSs prepared were characterized using a) Nitrogen adsorption/desorption method, b) Thermo Gravimetric Analysis and c) Differential Scanning Calorimetry. The release profile of the Curcumin from the porous silica into aqueous media was investigated and the improved solubility of the Curcumin has been demonstrated.

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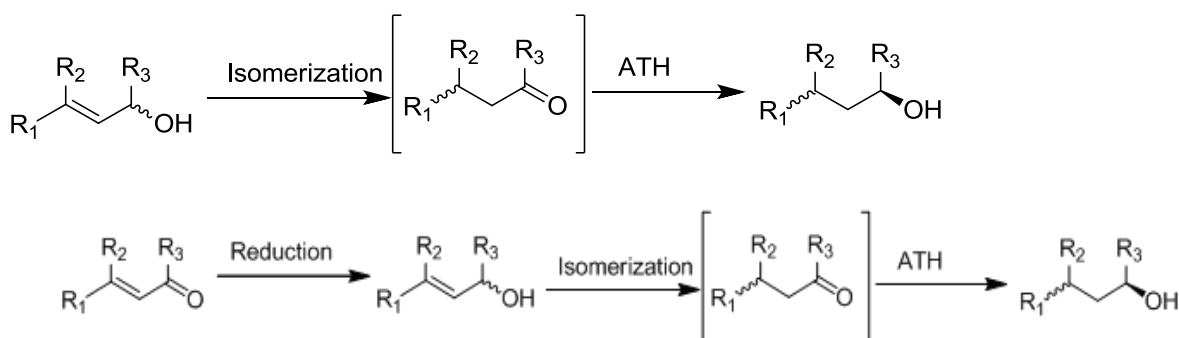
## RU-CATALYZED ISOMERIZATION/ASYMMETRIC TRANSFER HYDROGENATION OF SECONDARY ALLYLIC ALCOHOLS

Christopher O. Shoola

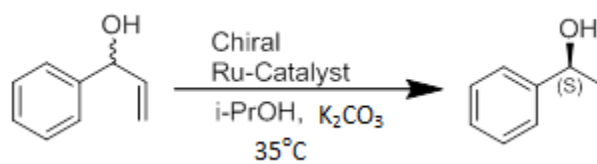
Department of Chemistry and Biochemistry, Seton Hall University

Chiral alcohols are important intermediates or precursors in the synthesis many biologically active compounds and therapeutic drugs. Among the methodologies that have been developed for the synthesis of chiral alcohols, the common method is the asymmetric reduction of prochiral ketones through asymmetric transfer hydrogenation reactions. Asymmetric Transfer Hydrogenation (ATH) has emerged as method of choice for the reduction of ketones and other unsaturated compounds such as imines, olefins and heterocyclic aromatics. Moreover, another class of unsaturated system is the allylic alcohols particularly secondary allylic alcohol, which can be converted to chiral alcohols via isomerization/asymmetric transfer hydrogenation mechanisms, knowing that transition-metal hydride such as ruthenium-hydride can be generated *in situ* to catalyze redox-isomerization of allylic alcohol to afford prochiral ketone which can be subsequently transformed to chiral alcohol. We have recorded impressive product yield and very encouraging product enantiomeric excess in this reaction.





**Figure 1: Representative Substrates for the Reaction**



**Scheme 1: Transformation of Secondary Allylic Alcohol to Chiral Alcohol**

## DEVELOPMENT OF A PROCEDURE TO EXTRACT OILS FROM *BREVOORTIA TYRANNUS* AND *BREVOORTIA PATRONUS*

Dustin Hanos

Department of Chemistry and Biochemistry, Seton Hall University, South Orange, NJ 07079

The recent Deepwater Horizon Oil spill that occurred in the Gulf of Mexico was an environmental disaster and its impact on the Gulf environment is massive, and difficult to comprehend. The basis of this research involves two species of fish *B. Patronus* and *B. Tyrannus*, also known as Menhaden, and their possible ability to consume and retain polycyclic aromatic hydrocarbons that are present in the water from the oil spill. These polycyclic aromatic hydrocarbons would most likely be present in the algae, which the Menhaden consume, or would be taken in through the gills of the fish, and would then be present within the fish's metabolites, or stored within the fishes' oil. The development of a proper procedure for oil extraction was crucial to the entire Menhaden Research Project, and this presentation aims at conveying the development of the oil extraction procedure and the difficulties faced while trying to find oil in the actual fish. The development began with simple homogenization and centrifugation, which yielded no oil in initial trials, and later advanced to dichloromethane extractions, oil to oil extractions, and hexane extractions to determine a relative amount of oil that are present within the fish. The experiments proved that the fish being used for the experiment were too young, and had yet to develop sufficient oil within their bodies to be extracted.



## **FINITE DIFFERENCE STUDIES OF THE RELATIONSHIP BETWEEN PEAK TAILING AND CAPACITY FACTOR IN PARTITION-ADSORPTION CHROMATOGRAPHY**

Raffi Manjikian

Mentor: Dr. Maloy

Department of Chemistry and Biochemistry, Seton Hall University

My group and I have recently described novel finite difference software to model adsorption effects in partition chromatography. Written as an Excel® VBA, this program predicts behavior when both partition between mobile and stationary phases and adsorption on the stationary surface control the chromatographic distribution. Using four dimensionless input parameters representing (1) the mobile phase partitioning fraction ( $X$ ); (2) the adsorption equilibrium constant ( $K_{ad}C_o$ ); (3) the relative molar surface adsorption site density  $(\Gamma_o A)/(C_o V_m)$ ; and (4) the number of theoretical plates ( $N_o$ ); the VBA generates a numerical representation of each peak and computes its characteristics such as  $t_R$ ,  $\sigma^2$ ,  $k'$ , and the USP peak tailing factor. The VBA then estimates  $N' = t_R(t_R - t_o)/\sigma^2$  and  $t_o$  by performing linear regression on a plot of  $t_R$  vs  $\sigma^2/t_R$  where the slope ( $m$ ) estimates  $N'$  and the intercept ( $b$ ) estimates  $t_o$ . The finite difference studies and simulation outputs that I participated in had the following parameters being used:  $[(\Gamma_o A)/(V_m C_o)]$  at 0.316 and 0.1 were used as different variations for absorption, mobile phase partitioning fractions at 0.9, 0.7, and 0.5 were used as different variations in partition, and theoretical plates set at  $N=1000, 2000$ , and  $3000$  were used as different variations in column length.

## **SYNTHESIS AND CHARACTERIZATION OF A MODIFIED 5'-CARBOXYLATE GUANOSINE**

Pradeepkumar Patel, Margaret Addo, Mariame Fofana, David Sabatino\*

Department of Chemistry and Biochemistry, Seton Hall University, 400 South Orange Avenue, South Orange, NJ 07079

RNA has been coined nature's intermediary molecule, for transferring the genetic information encoded within DNA to functional protein form. The evolution of chemical biology has elucidated novel structures and functions of RNA, including gene regulation (RNAi), catalytic activity (RNAzymes) and in protein translation, stimulating interest to explore the basis of its activity. The introduction of chemical RNA synthesis is central to the development of modern-day nucleic acid-based biotechnology, facilitating applications in molecular biology, genetics and in drug discovery and development. The fruitful application of RNA in medicinal chemistry programs have however been plagued by poor pharmacokinetic properties such that modified RNA become crucial for improving the 'drug-like' properties of RNA. To meet this objective, our research focuses on a multi-step synthesis procedure for the production of a modified guanosine nucleoside bearing a 5'-carboxylic acid in place of the native 5'-hydroxyl group. The



synthesis procedure begins with the installation of carboxybenzyloxy protecting groups at the 2' and 3'-alcohols of commercially available *N*-Isobutyryl-5'-*O*-(4-dimethoxytrityl) guanosine. Following carbomylation, detritylation using 3% trichloroacetic acid liberated the 5'-alcohol group. In the final reaction step, the primary alcohol was selectively oxidized to the corresponding carboxylic acid using BAIB-TEMPO oxidation conditions in yields of xy%. The efficient synthesis of 5'-carboxylate derived nucleosides may prove to be useful tools in the bio-conjugation of RNA with other bio-molecules. The synthesis and characterization of 5'-carboxylate guanosine will be discussed in this presentation for potential applications in bio-conjugation reactions.

\* Correspondence should be addressed to: [david.sabatino@shu.edu](mailto:david.sabatino@shu.edu)

## **ASSEMBLY OF AN SEM AND SUBSEQUENT ANALYSIS OF PHOTOVOLTAIC THIN FILMS**

Corey Kientz, Seth Stevens Mehmet A. Sahiner  
Department of Chemistry and Biochemistry, Seton Hall University

This research involves the setup and operation of a JEOL JSM-5300 Scanning Electron Microscope (SEM). The JEOL SEM's low-vacuum system allows for the scanning of a wider range of materials in comparison to other high-vacuum systems. After setting up the SEM instrument, the surface images of the CdTe/CdS based photovoltaic thin films and HfO<sub>2</sub> based high-k dielectric films will be acquired and surface roughness for these films will be determined. CdTe/CdS photovoltaic films are the next generation solar cells and the HfO<sub>2</sub> thin films were synthesized using Pulsed Laser Deposition (PLD) technique.

## **PREPARATION OF RUTHENIUM-NITROXIDE PRECURSORS FOR DNA CLEAVAGE**

Brianna Monti and Wyatt Murphy  
Department of Chemistry and Biochemistry, Seton Hall University

Research into potential anticancer treatments has identified a number of drug candidates, but current treatments have a number of side effects, and drug resistance is a problem with recurring cancers. Metal compounds have been developed into a wide variety of useful drug treatments, including anticancer pharmaceuticals. The exact way in which most molecules cause the pharmaceutically desired result is to bind to a biomolecule and cause some sort of structural change. One method for preparing new drug candidates is to combine known biomolecule binding features with unexploited chemical reactivity (ie. Intercalation with nitrosyl). The research into this idea is to prepare a ruthenium complex containing a planar organic structure feature (dppz) that yields enhanced DNA binding and the nitroxide functional group. The planar feature fits in between the bases in the DNA strand, causing the complex to bind tightly to DNA. The nitroxide group is a free radical. Such species are well-known to cause breaks in the DNA strand when created in close proximity. The high reactivity of free radical means that it is too



unstable to be created remotely from the DNA and transported to it. The nitro group can be converted by other molecules in biological fluids (acid and biological reducing agents) to the nitroxide radical. Such a species will result in efficient damage of the local DNA structure. This will be accomplished during future research with quantitative binding and cleavage.

## **THE INVESTIGATION OF THE GROWTH OF SILICA PARTICLES WITH POROUS SHELLS**

Robert Spruce and Alexander Y. Fadeev

Department of Chemistry and Biochemistry, Seton Hall University

Silica particles are a big part of the pharmaceutical formulations, composite and hybrid materials, supported catalysts, and separation media. In this project we investigated the reaction of preparation of the pore-shell silicas, i.e. particles that consist of the solid silica core coated with thin porous silica shells. The main objective was to examine the effect of sizes of the non-porous “seed” silica particles on the growth of the porous shells. The porous shells were prepared via hydrolytic polycondensation of TEOS (Tetraethyl orthosilicate, 4.4 grams) in presence of polymeric template (Pluronic P123, 2.2 grams) and hydrochloric acid (62.1 grams) and silica seeds (2.0 grams). The silica is prepared and put into an oven at 80°C for five days. Afterward, it is placed into a muffle furnace in order to calcinate it. The silica is then washed with hydrochloric acid, toluene and two rinses of acetone. Two samples of the pore-shell particles have been prepared; their surface area was determined and the thickness of the porous shells were calculated. The first experiment produced particles with shell thickness of 5.36-10nm. At first, it was a solid, so the silica had to be mashed into a powder. For the second experiment, the amount of TEOS, deionized water, P123 and hydrochloric acid was increased to figure out the surface area and then compare to the other experiments. 4.9 grams of P123, 38.1 grams of water, 150.6 grams of hydrochloric acid and 10.8 grams of TEOS was added to increase the size. Future experiments will use smaller amount of TEOS, P123, deionized water and hydrochloric acid.

## **EXPRESSION AND ANALYSIS OF PEA-15 AND VANISHIN LEADING TO INSIGHT TOWARD CANCER THERAPIES**

Ben Starke, Chris Cultrara, Dr. Yufeng Wei.

Department of Chemistry and Biochemistry, Seton Hall University

The ERK-2 (extracellular regulated kinase 2) is a member of the MAPK (Mitogen Activated Protein Kinase) cascade signaling family proteins inside cells. This family regulates cell proliferation, differentiation, transcription and survival of all types of cells. PEA-15 is a phosphoprotein that regulates ERK/MAPK activity, specifically causing cytosolic localization of ERK2. Vanishin (PEA-15B), which is 61% similar to PEA-15 by sequence, is another ERK regulating protein that causes ERK2 nuclear localization. This project will first aim at expressing PEA-15 from *E. coli* bacterial cells using an established methodology, which sets the foundation for the development of Vanishin expression. Vanishin and PEA-15 will then be characterized using NMR spectroscopy, providing more insight into regulation of ERK-2 signaling pathways, which is responsible for cancer cell proliferation and migration.



## **SETUP AND OPERATION OF THE NEWLY ACQUIRED JEOL JSM-5300 SCANNING ELECTRON MICROSCOPE**

Seth C. Stevens, Mehmet Alper Sahiner

Department of Chemistry, Seton Hall University, South Orange, NJ 07079

This research investigates the setup and operation of the JEOL JSM-5300 scanning electron microscope (SEM). The SEM is a low vacuum system which allows the examination of the surfaces of a wide range of materials that is otherwise not possible with current high vacuum systems. Using this device in conjunction with Pulse Laser Deposition Techniques allows the SHU Physics Research Lab to better conduct research into developing high-efficiency solar cells. In setting up and operating the SEM, the surface images of Cadmium Telluride (CdTe) and Cadmium Sulfide (CdS) based solar cell thin films and the  $\text{HfO}_2$  high-k dielectric thin films, which are used in complementary metal oxide semiconductor (CMOS) devices, will be acquired and surface roughness under various deposition conditions will be studied.



## **STUDY OF THE CAPILLARY DIELECTRIC BARRIER DISCHARGE**

Dan Vaverko, Nick Belluardo, and Jose Lopez

Department of Physics, Seton Hall University

Our research project for Spring semester 2012 is to create a capillary dielectric barrier discharge which will in return create microplasma, once an electric current is passed through it. This involves using tiny quartz tubes and tungsten rod inserts along with a specific electric current. We will be building a test chamber, using a vent hood, where we will house all the equipment. Our goal is to measure how much ozone is given off during the reaction, the optimum frequency needed in order to generate the optimal amount of microplasma as efficiently as possible, the composition of the plasma, as well as the temperature of the microplasma by using a handheld infrared camera. A digital oscilloscope will be used to record voltage and electric current that is running through the reactor. A voltage regulator will be used as a power supply and to control the amount of electricity running through the system, which will allow us to adjust the amount of



plasma that is being created, depending on the amount of electricity we pump through the regulator. An optical spectrometer will be used to determine the types of gases that are generated by the reaction inside the chamber. This will allow us to see any side reactions that may be taking place when generating ozone using capillary dielectric barrier discharge. All of these measurements will all be recorded at room temperature and at atmospheric pressure.

## C60 ISOMERS

Joe Zujkowski; John R. Sowa

Department of Chemistry and Biochemistry, Seton Hall University

C<sub>60</sub> is a molecule that is constructed of sixty carbon atoms in five- and six-membered rings that are then arranged into a sphere-like cage. This molecule is a member of the fullerene family, which is also known as buckyballs. C<sub>60</sub> was first discovered in 1985 by researchers at Rice University. The synthesis of a new isomer, C<sub>60</sub>[3,4,5], has been proposed in this research. This new molecule is made up of three-, four-, and five-membered rings, instead. This research focuses on the viability of this isomer, and the process of its potential creation. This will be done through the use of computational chemistry software: CambridgeSoft's Chem3D Pro, and Wavefunction's PC Spartan.

## BULK SIMULATIONS OF MODIFIED PHTHALOCYANINES

Erik Fernandez<sup>a,b</sup>, Rory Vander Valk<sup>a,b</sup>, Vito Cataldo<sup>b,c</sup> and Stephen Kelty<sup>a,b</sup>

a) Department of Chemistry and Biochemistry; b) Center for Computational Research; c) Lonza Personal Care, South Plainfield, NJ

Modified Phthalocyanine in which all hydrogen atoms are replaced with fluorine exhibit novel properties that make them technologically significant in a number of application areas. A key property of these materials involves the intermolecular interactions in bulk and thin films. We have developed computational methods aimed at predicting structural properties which complement experimental studies. In order to help validate and interpret experimental results of modified Zinc Phthalocyanines, computer simulations were conducted to determine the bulk properties of the target materials. Simulations were conducted using in-house developed force fields within the CHARMM (Chemistry at HARvard Molecular Mechanics) parameter set. The properties determined include bulk density and stacking order. Bulk density results are consistent with known experimental values. Stacking order was measured using simulated X-ray diffraction and pair correlation function analysis. The predicted stacking order is consistent with experimental X-ray diffraction data. The simulation and analysis methods will be discussed.



## **MEASURING VELOCITIES OF MICROTUBULES USING IMAGEJ AND KYMOGRAPHS**

Ashley Sydlo, Arya Nabizadeh, Jimmy Barrientos, & Mitra Shojania-Feizabadi  
Department of Chemistry and Biochemistry, Seton Hall University

Kymograph through ImageJ is composed of a collection of macros and plug-ins utilized for the measurement of the velocity of moving structures through a 2D image over time. A Kymograph is a compilation of the migrations of the designated region of interest, localizing its velocities and the various fluctuations. The Kymograph allows the calculations and analyses of the coordinate directions associated with these velocities. Our study through ImageJ has allowed us to calculate the velocity of microtubules.

## **SYNTHESIS OF POTENTIAL ANTI-CANCER/ ANTIBIOTIC DRUGS**

Brianna Bicho, Alexandra Kolodziejski, & Dr. Cecilia Marzabadi  
Department of Chemistry and Biochemistry, Seton Hall University

Cancer has become one of the most threatening diseases present in society today. Although drug solutions exist, they provide only temporary aid; the patient continues to face prolonged agony of the disease. Research utilizing new materials and methods is necessary to find a cure. Ortho-hydroxy-benzaniline and 3,4,6, tri-O-benzyl-D-glucal were reacted with various catalysts in an effort to produce a sugar-based benzopyran. Synthesized products were purified using extraction with ethyl acetate and by preparatory thin layer chromatography. They were analyzed using Nuclear Magnetic Resonance spectroscopy. Research has thus far yielded promising results in product formation: the appearance of a distinguished spot in the TLC suggested a complete reaction; NMR results illustrating new peaks, further supported this claim. TLC plates were prepared to purify the potential product. If experiments yield the expected products, we anticipate these compounds will act as intercalators, stopping the production of cancer cells in the body.

## **IDENTIFYING THE STRUCTURE OF BICELLES IN THE MIMICKING OF PROTEIN CELL-MEMBRANE COMPARING NMR AND DLS INSTRUMENT'S RESULTS**

Ana R. Perez and Dana Cordasco  
Department of Chemistry and Biochemistry, Seton Hall University

Research this semester has taken a toll in part of the pain signaling pathway and regulation of it may provide an alternative to current pain management therapeutics. Working along side Dana Cordasco the overall goal of this research is to elucidate the structures of the transmembrane S1-S4 domain of Transient Receptor Potential Vanilloid Type 1 (TRPV1) and Transient Receptor Potential Melastatin Type 8 (TRPM8) ion channel and determine the backbone dynamics of the protein in its membrane bound environment. The structure and dynamics information produced



by this study will lead to a better understanding of the molecular basis of the S1-S4 domain functional interactions and will provide a more detailed surface for the design and development of S1-S4 domain ligands to activate and/or inhibit TRP channels. Phospholipid bicelles were made in various different experiments and NMR results were taken. Additionally, data collected on the Nuclear Magnetic Resonance(NMR) will be compared to Dynamic Light Scattering(DLS) and a paper will be submitted as consequence of knowing that they should be producing the same data.

## **RETENTION BEHAVIOR OF ALKANES AND AROMATIC HYDROCARBONS ON IONIC LIQUID STATIONARY PHASES**

Ramkumar Dhandapani and Dr Nicolas H.Snow

Department of Chemistry and Biochemistry, Center for Academic Industry Partnership, Seton Hall University, South Orange NJ 07079

The interest of using ionic liquids as gas chromatographic stationary phase has increased in recent years. The low volatility, tunable physico chemical property and high thermal stability of ionic liquids make them an ideal choice for gas chromatographic stationary phase. The ionic liquid stationary phase separates nonpolar compounds like a nonpolar stationary phase and polar compounds like a polar stationary phase thereby offer unique selectivity. For the present research, commercially available ionic liquid capillary columns: SLB-IL 59, SLB-IL 69, SLB-IL 76, SLB-IL 82, SLB-IL 100, SLB-IL 111 were procured from Supelco to investigate the retention behavior of aliphatic and aromatic hydrocarbons on them. Attempts were made to know if the retention of analytes on these columns followed partition or adsorption mechanism. Based on the distribution coefficient and Van't Hoff plot, it was concluded that the retention of alkanes on these columns followed partition mechanism. Further, the claimed polarity for these columns was investigated. Change in the claimed polarity had no definite relationship with the change in the partition coefficient of analyte for these columns. This inferred that the claimed polarity for these columns were arbitrary. This also proved that Rohrschneider-McReynolds constants by itself does not predict the actual polarity of these columns and the five probe molecules used for ascertaining the Mc Reynolds constant does not account for all the possible interactions.

## **FT-IR ANALYSIS OF ATMOSPHERIC PLASMAS**

Kyle Honsinger & Jose L. Lopez

Department of Physics, Seton Hall University

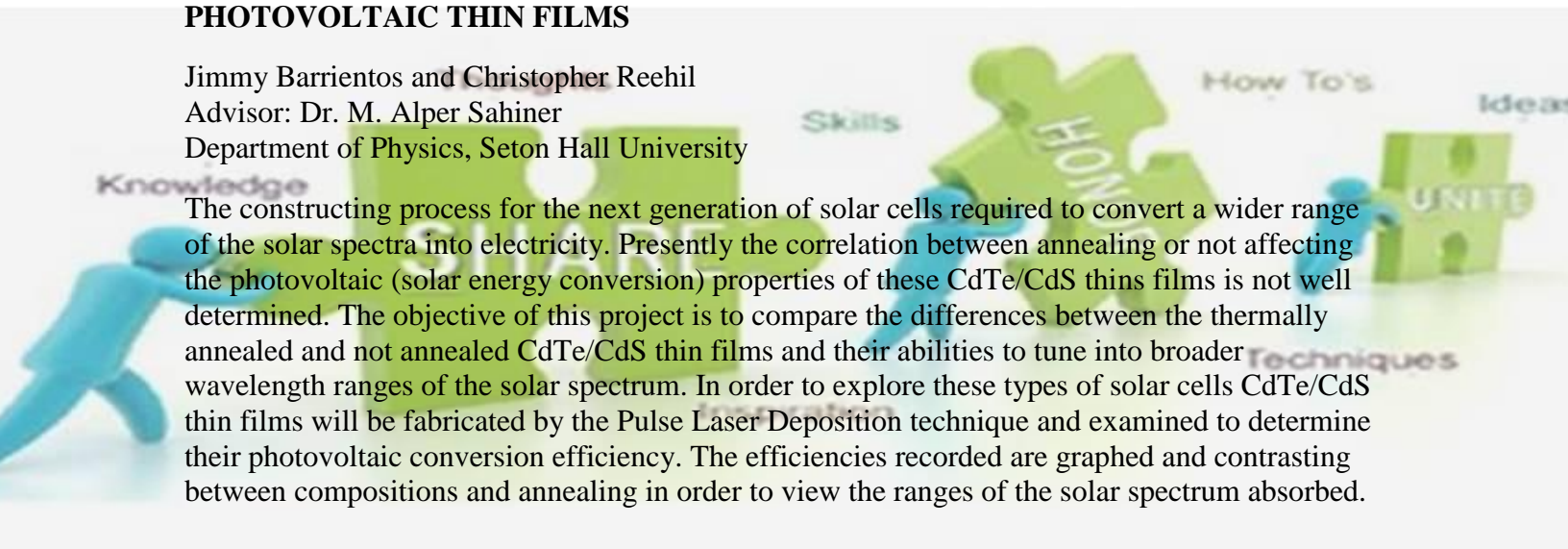
Fourier Transform Infrared Spectroscopy (FT-IR) utilizes an infrared (IR) laser beam that is sent through an unknown sample material with the purpose of reading the analyzing by determining absorption and transmittance through the material. There is a known FT-IR spectrum database for a large variety of samples, so the resultant amount of infrared radiation absorbed or passed through a specific unknown sample can be referenced and identification of the makeup of that sample can be done. The purpose of this experiment is to use an FT-IR to read which chemical compounds are being created by the atmospheric plasmas run in various gaseous backgrounds.



The setup of the experiment includes a discharge chamber in which the plasmas are created with air. Attached to this chamber through the use of inert tubing is an absorption spectrometer monitoring ozone levels. This work further uses methane ( $\text{CH}_4$ ) as a case study for hydrocarbon interaction with the created air atmospheric plasmas. The mixed air and methane gas is run through a glass gas cell which is placed in the FT-IR. The gas cell is a closed chamber that has optical windows on either end that allows the infrared beam of the FT-IR to pass through. Also attached to this gas cell is a vacuum that causes the gases created in the plasma chamber to flow into the gas cell. The infrared beam will then be able to pass through these mixed gas background and give a reading for what they may be. The purpose is to determine how the plasma the chemical species generated by the atmospheric plasmas using FT-IR as a diagnostic method.

## **SYNTHESIS AND ELECTRICAL CHARACTERIZATION OF CdTe/CdS ANNEALING PHOTOVOLTAIC THIN FILMS**

Jimmy Barrientos and Christopher Reehil  
Advisor: Dr. M. Alper Sahiner  
Department of Physics, Seton Hall University



The constructing process for the next generation of solar cells required to convert a wider range of the solar spectra into electricity. Presently the correlation between annealing or not affecting the photovoltaic (solar energy conversion) properties of these CdTe/CdS thin films is not well determined. The objective of this project is to compare the differences between the thermally annealed and not annealed CdTe/CdS thin films and their abilities to tune into broader wavelength ranges of the solar spectrum. In order to explore these types of solar cells CdTe/CdS thin films will be fabricated by the Pulse Laser Deposition technique and examined to determine their photovoltaic conversion efficiency. The efficiencies recorded are graphed and contrasting between compositions and annealing in order to view the ranges of the solar spectrum absorbed.

## **STUDY OF ORBITAL RESONANCE OF JUPITER'S GALILEAN MOONS**

William A. Manners Jr., & Alper Sahiner  
Department of Physics, Seton Hall University

I plan to investigate the periods of three of the four Galilean moons, which orbit around Jupiter, which should be related by the ratio 1:2:4. I hope to find the period of each moon for a length of time, possibly over a few months. I anticipate finding that the period of each moon is slightly different than the accepted values of the period. This assumption is based off Newton's Law of Universal Gravitation. Newton's Law of Universal Gravitation states that every mass in the universe attracts every other mass. As the moons revolve around Jupiter, they all exert a gravitational force on each other. Because the periods of the moons are different, they exert different combinations of attraction depending on their position around Jupiter in relation with the other moons. The changing attraction could possibly have an effect on the orbit of the moon,



which would then change the period, as long as the velocity of the planet also remained fairly constant.

### **EFFECTS OF DOPING IN THIN-FILM SUPERCONDUCTORS**

Tom Perry, Stacie Ballou, & Mehmet Alper Sahiner

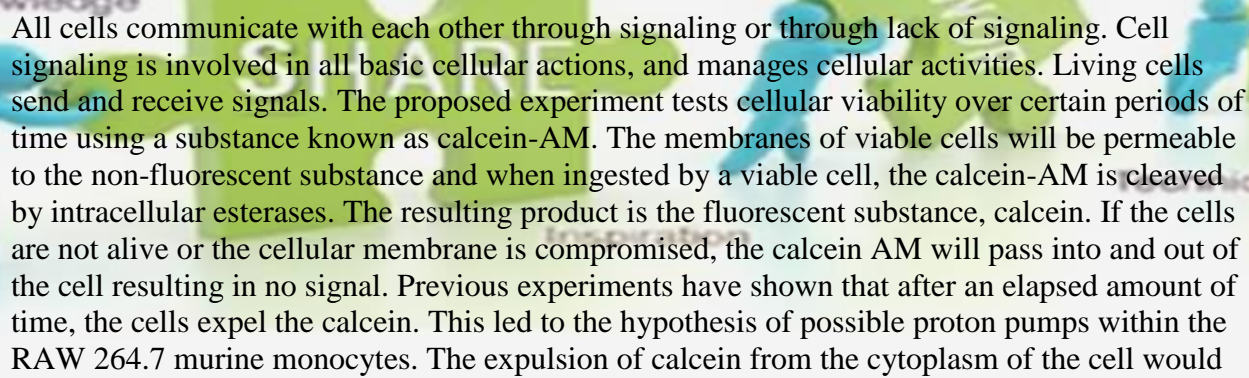
Department of Physics, Seton Hall University

This experiment examined the properties of superconductors, more specifically what effects doping and heating has on the performance of a superconductor. Boron doped, arsenic doped, and undoped superconductors were used in the experiment. Superconductors of each category were heated while some were left unheated. All superconductors were tested with a Hall Effect Measurement System and the data was analyzed by category, looking at consistency of data and overall performance of each semiconductor. Results will be discussed.

### **CALCEIN-AM AND CELLULAR VIABILITY**

Chris Parronchi & Allan Blake

Department of Biological Sciences, Seton Hall University



All cells communicate with each other through signaling or through lack of signaling. Cell signaling is involved in all basic cellular actions, and manages cellular activities. Living cells send and receive signals. The proposed experiment tests cellular viability over certain periods of time using a substance known as calcein-AM. The membranes of viable cells will be permeable to the non-fluorescent substance and when ingested by a viable cell, the calcein-AM is cleaved by intracellular esterases. The resulting product is the fluorescent substance, calcein. If the cells are not alive or the cellular membrane is compromised, the calcein AM will pass into and out of the cell resulting in no signal. Previous experiments have shown that after an elapsed amount of time, the cells expel the calcein. This led to the hypothesis of possible proton pumps within the RAW 264.7 murine monocytes. The expulsion of calcein from the cytoplasm of the cell would lead to an improper viability reading. This experiment will optimize the proper time for calcein-AM incubation for the RAW 264.7 cells.

### **DNA BARCODING OF MENHADEN**

Siddhi Patel & Carolyn S. Bentivegna

Department of Biological Sciences, Seton Hall University

The purpose of this research was to test whether various PCR primer sets could be combined in a single reaction and used to develop a DNA barcode for the marine fish, menhaden. A DNA barcode was used to distinguish between different DNA samples, in this case, different species and/or individual menhaden. Each PCR primer set amplified a unique area of the genome. If a primer set recognized an unique area of the genome, then a PCR band was generated. If it was



not a match, then no band was produced. Usually PCR has been done with one primer set resulting in one band. We wanted to make a “cocktail” of multiple primer sets; however, the primers might interfere with each other. To do this project, genomic DNA was isolated using Tri-Reagent from tail muscle tissue of menhaden. Once the DNA was determined to be of good quality, the resulting DNA was combined with individual or multiple primer sets. Some primers had non-coding extensions on them others did not. The samples were amplified using PCR, separated by gel electrophoresis and visualized using ethidium bromide. The sizes and presence or absence of bands were determined. Primers for ribosomal protein served as control. Primer sets for Cytochrome C Oxidase were evaluated with or without extensions. Results showed that adding the non-coding extension to primers did not affect the number of bands produced. DNA barcoding could help scientists determine how far adult menhaden travel from their place of birth and how genetically related they are.





## **Interdisciplinary Poster Session**

Wednesday, April 18, 10:00 AM - 12:00 PM

McNulty Hall, Atrium

### **IMPLEMENTING HEALTH AND WELLNESS PROGRAMS**

Ralph Chandler

College of Arts & Sciences, Seton Hall University

The United States economy has certainly taken a turn for the worst and many organizations have resorted to reductions in staff, and are somewhat hesitant to hire new employees, which leaves individuals who remain on the job overworked. Throughout various agencies workers are multi-tasking and unable to provide timely service or quality care for the population. The healthcare industry should consider the implementation of Health and Wellness programs into the workplace. Finally, by doing so creates an environment for staff to reduce stress and other anxieties, which are a hindrance to an employee's performance overall.

### **ORGANIC ALE, A HOPPY ENDING**

Robert Perniola, James Moorehead, and Matthew Curreri

Seton Hall University

Despite the economic recession and decline in many industries, the beer brewing industry in America is thriving. The craft brewing industry saw a 15% dollar growth in 2011 and a rapid growth in the number of breweries in planning. In conjunction with the growing interest in quality beer, many Americans have taken up the hobby of home brewing. Today there is estimated to be over 1 million home brewers in the United States. The goal of our project is to target this market. An essential component of beer is hops, which we plan on growing organically on Come Back Farm in Asbury, NJ. We believe home brewers will have a strong interest in using locally grown, organic hops in their beer. We plan on growing Cascade hops, a variety prized for its distinct citrus-like flavor and aroma. It is used in a variety of Pale Ales and India Pale Ales, including Sierra Nevada Pale Ale, a beer considered by many enthusiasts to be the benchmark of a classic American Pale Ale. With proper sunlight and irrigation, and plenty of space to grow, harvesting our organic hops should be a relatively simple yet lucrative endeavor.

### **COMPARING HEALTH SYSTEMS**

Cerstin Wolf

Healthcare Administration

When analyzing various healthcare systems across the globe, it is apparent that while our system is one of the most expensive, it lacks amalgamation. In 2008 alone, the U.S. spent over \$2.3 trillion on health care expenditures; this represents 16% of the country's gross domestic product (GDP). To break this number further down, each person theoretically spent \$7,681 on health care



services. To understand how extreme the increase in expenditures has been, we can analyze costs from 1970 when total health care expenditures totaled \$74.9 billion and this figure represented 7.2% of our country's GDP. Each individual in 1970 theoretically spent \$356 (Kovner, 2011). As one can see, the figures have drastically increased and it is anticipated that these numbers will continue to rise. According to Farinella, "By 2065, health expenditures will consume more than 25% of the GDP if current trends continue" (2011). In 2009, there were approximately 50.7 million or 16.7% uninsured US citizens; this number continues to increase as the unemployment rate rises. At least 61 million adult Americans are estimated to be underinsured (Kovner, 2011). This paper will examine the healthcare systems of four diverse countries: Great Britain, Germany, France and Japan. Through an economic analysis of these four systems, the reader will deem that the U.S. has no real healthcare system and we must follow the examples of the countries listed above to control costs and improve quality.

### LEADERSHIP DEVELOPMENT STUDY ABROAD- ROME, ITALY

Paulina Michalec

Center for Leadership Development, Stillman School of Business, Seton Hall University

The purpose of this study abroad trip was to engage students representing Seton Hall's Stillman School of Business in an interactive course of business in the foreign country of Italy. On this eight day trip, students traveled around to various businesses to become familiar global characteristic of today's business environment. The topics covered during this time include international trade, economics, finance, political and economic geography, risk management, marketing, ethics, and international law by visiting various organizations such as the US Embassy, Saatchi and Saatchi, Deloitte, Saipem, Hewlett-Packard, and UniCredit. Participants also took part in tours around Italy, providing them with a wide cultural understanding. With a better understanding of both the cultural and business aspect of Italy, students will be preparing a paper on a hypothetical business they would open in Italy.

### HEALTHCARE: U.S.A VS. WORLD

Harshal Shah

Department of Political Science & Public Affairs, Seton Hall University

The healthcare system of America is changing. The healthcare reform is one of the most divisive issues in the United States. The purpose of this paper is to compare and contrast the various health care systems around the world including the health system of the U.S. The comparison and contrast will help identify the differences, whether positive or negative amongst the different health systems of the U.S.A. Each health system has its strengths and weaknesses but are there any that have only strengths and no weaknesses? The information obtained through various sources including online media, journals, and research studies provides a very interesting picture when relating it to the U.S.A. The United States spends 18% of its GDP on healthcare but our nation's health status has not improved, while other countries spend less of their GDP's and has



a far better health status. Countries that will be focused on are Russia, China, Taiwan, Switzerland, Britain, and United States. There have been various researches providing an insight to the different health systems but I have taken the approach of using information from all forms of sources and incorporate them into this paper. The comparisons provided may assist in providing a clear picture to the public and to healthcare professionals of how the U.S. health system will change based on the health care reform and comparing its potential effects with other nation's health systems.

## **CAPTURING THE UNSEEN: SPIRITUAL PHOTOGRAPHY AND SURREALIST PHOTOGRAPHY**

Sarah Seymore

Art History

This poster presentation will explore the seemingly disparate styles and historical contexts of photography of the Spiritualism movement in 19<sup>th</sup> century America and the photography of 20<sup>th</sup> century Surrealism. The purpose of bringing together these photographic eras is to demonstrate that Spiritualism was a religious movement and Surrealism was an art movement, but both wanted to visually manifest hidden powers- occult powers and the powers of the unconscious. The photographs were both documentary and artistic in nature, and they used overt manipulation to reinforce the goals of the documenter/artist. Moreover, the movements were rebellious and innovative for their times. Occurring in post-war eras, Spiritualism advocated women's rights, and Surrealism rejected all tradition, as it was a part of the Modernism art movement. Overall, simultaneously examining these photographic eras allows an art historian to study the photographic manipulation and its artistic influence. For the Spiritualists, the camera was scientific and miraculous in nature as it visually manifested life-giving fluids and moments of communication with the dead. The Surrealists, however, used manipulation to capture the inner vision of the artist. The camera was a sense-making instrument for both movements, whether genuine in nature or not.

## **HOW GREEN IS CHS?**

Sharon Dauer, Rachel O'Keefe Sarah Brauner and Oluwajomiloju Olaode

Environmental Club/Columbia High School/Physics Department/ Environmental Geology Seton Hall University

The initial purpose of this poster is to evaluate the carbon foot print of Columbia High School located in Maplewood, New Jersey. The school has a population of 2,000 students and in 2009 the High School created more waste than any other building in town. There is a district wide five year goal to reduce energy use and to reduce the amount of waste created by the schools. The poster will present the findings of two School-wide Environmental surveys administered in 2009 and in 2012. This presentation will evaluate the Environmental Club's programs designed to raise student awareness of environmental issues and effective methods to reduce waste at the school. These Environmental Club students hope to foster a new generation of environmental stewards.



## **FILIPINO MYTHOLOGICAL CREATURES**

Kiyomi Juillerat

Department of Anthropology, Seton Hall University

The purpose of this study was to collect folktales of mythological creatures, the “*engkanto*”, in Filipino culture through interviews and then to examine the functionalism of maintaining an oral tradition of these creatures. Extensive interviews with Filipino natives recounted first-hand accounts and those that had been passed down, about encounters with the “*engkanto*”. The folktales gathered are discussed in length in this study and are furthermore supported through literary stories of these supernatural creatures. Through Radcliffe-Brown’s structural functionalism, the stories were noted for all maintaining a form of social control in Filipino society. The results of the study indicate that through an oral tradition, folktales of the “*engkanto*” transmit important morals of Filipino culture.

## **FORESTS LOCAL AND GLOBAL**

Matthew Curreri, James Moorehead, & Cristian Pons-Seres DeBrawer

Professor: Dr. Judith C. Stark

Environmental Studies Program

These students are presenting their research on forests from two perspectives –the local and the global. Two of the students, Matthew and James, are working on understanding the forest regeneration program that is currently underway in South Mountain Reservation situated about two miles west of Seton Hall campus. They have researched the history of the Reservation and have studied some of the current ecological problems found there. These include serious loss of understory due to deer predation, incursions of invasive species, and degradation of habitats. They are also studying the plans and activities of the South Mountain Conservancy that is successfully partnering with Essex County to revitalize the Reservation by creating forty-two exclosures within which almost 30,000 native plants have been put in place in the last three years. The global perspective on forests is being presented by Cristian who is currently working as an intern in New York City for an international NGO called Rainforest Alliance. Cristian is involved in two projects: first, developing a fundraising strategy aimed at the government of Spain and its agencies that would partner with Rainforest in its sustainable practices for forests in particular countries; second, creating a “donor yearbook” for the Gala celebration of the 25th anniversary of the Rainforest Alliance to be held in New York City in May 2012. These projects focus on the health and integrity of forests that are vital to the good functioning of ecosystems seen through global and local perspectives. The combination of these projects gives witness to the environmental maxim: to think globally and act locally.



## **DOES IMF TRANSPARENCY MATTER? EVIDENCE FROM EMERGING MARKETS, 1997-2008**

Dr. Martin Edwards, Yasmin Elkarrimy, and Cassie Denbow John C. Whitehead School of Diplomacy

A dramatic change has taken place in the manner in which the IMF conducts its annual surveillance of member state economies. These annual consultations (known as Article IV consultations) were originally viewed as private matters. Starting in 1997, the IMF released summary information about a country's consultation on a voluntary basis. Recently, countries could choose to release the consultation team's report itself, which is prepared for discussion by the Fund's Executive Board. This raises the question of how and to what extent international markets respond to this transparency. This paper builds on the work of Fratzscher and Reynaud (2011) and Glennerster and Shin (2008) to estimate the effects of Article IV data release on spreads on emerging market debt. This project is supported by a grant from the National Science Foundation (SES-0960422)

## **DOING BUSINESS IN INDIA 2012**

A D Amar

Stillman School of Business

The Stillman School of Business offers a number of Doing Business courses, graduate and undergraduate, that require students to travel abroad. For the course Doing Business in India, students spend 10 days in India, getting to know the business, society, culture and history of India with a view to understand its business environment by attending universities, business houses, and professional firms. In 2012, twelve students from the School of Business and the College of Arts & Sciences traveled to India during the Spring Break of 2012. The Petersheim exposition presentation is designed to share their experiences with Seton Hall community. Some students and the professor-in-charge of the course will be available to present their exhibit to the audience and answer their questions.

## **Health & Physical Education: Bits and Bites of Nutrition and Physical Fitness**

Wednesday, April 18, 11:15 AM - 12:15 PM

University Center, Galleon Room

## **NUTRITION AND PHYSICAL FITNESS (HPER 4402)**

Paula R. Zaccone



Health & Physical Education- Educational Studies

Members of course HPER 4402: Nutrition and Physical Fitness will display their findings of research on topics of fruits, vegetables, milk, "alco-hall" and fitness. Healthy edibles complement the presentations.

*Student Presenters:* Erica Bosompem Amlan Gangopadhyay Louis Salmon Justin Vega Angela Whiteneck Taylor Wilson Edward Zikoski



## **Department of Sociology, Anthropology, and Social Work Anthropology in the Real World Student Presentations**

Wednesday, April 18, 11:30 AM - 12:45 PM

Arts & Sciences Hall, Room 107

### **CLASSIC THEORIES IN THE MMORPG WORLD: EXPLORING COOPERATION AND COLLABORATION IN A VIRTUAL ENVIRONMENT WITH MARCEL MAUSS'S *THE GIFT* AND ÉMILE DURKHEIM'S *THE DIVISION OF LABOUR IN SOCIETY***

Edward Millar

Department of Sociology, Anthropology, and Social Work

The continuing development and expansion of the internet brings with it increasingly unique and diverse means through which its users share and interact with one another. One venue where this dynamic is particularly concentrated can be found in the Massively Multiplayer Online Role-playing Game (MMORPG) genre. In MMORPGs, players are frequently tasked with overcoming challenging encounters or utilizing the in-game market, in the pursuit of the strongest and most lucrative rewards. These two aspects of MMORPGs are only two of the many means through which players are encouraged to interact, cooperate, and organize themselves within the virtual world. This ethnography examines the cooperation and collaboration dynamic of MMORPGs



through my experiences as a member of ‘The Guild’ on the Riddermark server in The Lord of the Rings Online, and their relation to the classic, early 20<sup>th</sup> century concept of reciprocity and solidarity presented in Marcel Mauss’s The Gift and Émile Durkheim’s The Division of Labor in Society.



## College of Nursing Symposium

Wednesday, April 18, 12:00 – 2:30 PM  
Arts & Sciences Hall, Room 109

### A SYMPOSIUM ON GLOBAL HEALTH ISSUES IN THE PHILIPPINES AND DENMARK

Grace Modayil, Katherine Hooper, B & D Scholars, Michelle Calaguio, Eugene Glukhovskiy, Olga Linowski, William Moreo, Kristen Napolitano, Mohini Patel, Nancy Simoes, Kelly Thalacker, Undergraduate Students, Mary Ann Scharf, Ed.D, RN, Kathleen Sternas, Ph.D, RN, Faculty

College of Nursing, Seton Hall University

Nursing students and faculty participated in study abroad educational experiences. One study abroad experience was in the Philippines in January 2012, which was a collaborative endeavor between the College of Nursing, University of the Philippines and the College of Nursing at Seton Hall University. Nine undergraduate nursing students participated. Nursing faculty organized the study abroad program in collaboration with the Deans of the two Universities. The objectives for the study abroad experience were: to explore community health nursing in urban and rural settings; and explore cultural experiences in the Philippines. In a second experience, one student completed a community health nursing study abroad program at Metropool University in Copenhagen, Denmark during Fall semester 2011. These students learned about the health problems and the health care delivery system in the Philippines or Denmark.



This symposium focuses on students' research on health problems and clinical experiences in the Philippines and Copenhagen, Denmark. Through a B & D scholarship or independent study, students investigated selected health problems in the Philippines or Denmark from a global health perspective. Health problems addressed in this symposium are: dengue fever, malaria, hypertension, malnutrition, tuberculosis, and congenital heart disease. Prevalence of the health problem, signs and symptoms, prevention and treatment strategies were researched.

Students will present on their healthcare and cultural experiences in the Philippines and Copenhagen, Denmark. Presentations will focus on: Dengue Fever and Malaria as Global Health Issues in the Philippines, Africa, and South Pacific Islands, Grace Modayil; Dengue Fever and Malaria: Signs and Symptoms and Environmental Strategies to Prevent these Diseases, Mohini Patel; Malnutrition as a Global Health Issue in the Philippines and other Third World Countries: Herbal and Plant Solutions and Nutritional Diseases, Michelle Calaguio; Malnutrition in Urban Settings- Manila and New York City: Fast Food Consumption as a Contributing Factor, Kristen Napolitano; Cultural Factors Contributing to the Prevalence, Prevention and Treatment of Hypertension in the Philippines, Kelly Thalacker; Tuberculosis as a Global Health Issue in the Philippines, Pacific Region Countries and the United States, William Moreo; Congenital Heart Disease in Third World Countries, Olga Linowski; Historical Development, Proper Use, and Legislative Efforts to Mandate the Use of Pulse Oximetry as a Screening Method to Detect Congenital Heart Disease in Newborns, Eugene Glukhovskiy; Indications, Benefits and Risks of the Use of Pulse Oximetry in American Newborns, Nancy Simoes; Healthcare in Denmark and the United States- A Personal Reflection on a Study Abroad Experience in Denmark, Katherine Hooper.

Through students' study abroad experiences in the Philippines and Denmark, students gain a better understanding of health care problems and interventions utilized to solve these problems in different countries.

## **Whitehead School of Diplomacy and International Relations**

Wednesday, April 18, 1:00 PM

McQuaid Hall, Diplomacy Room

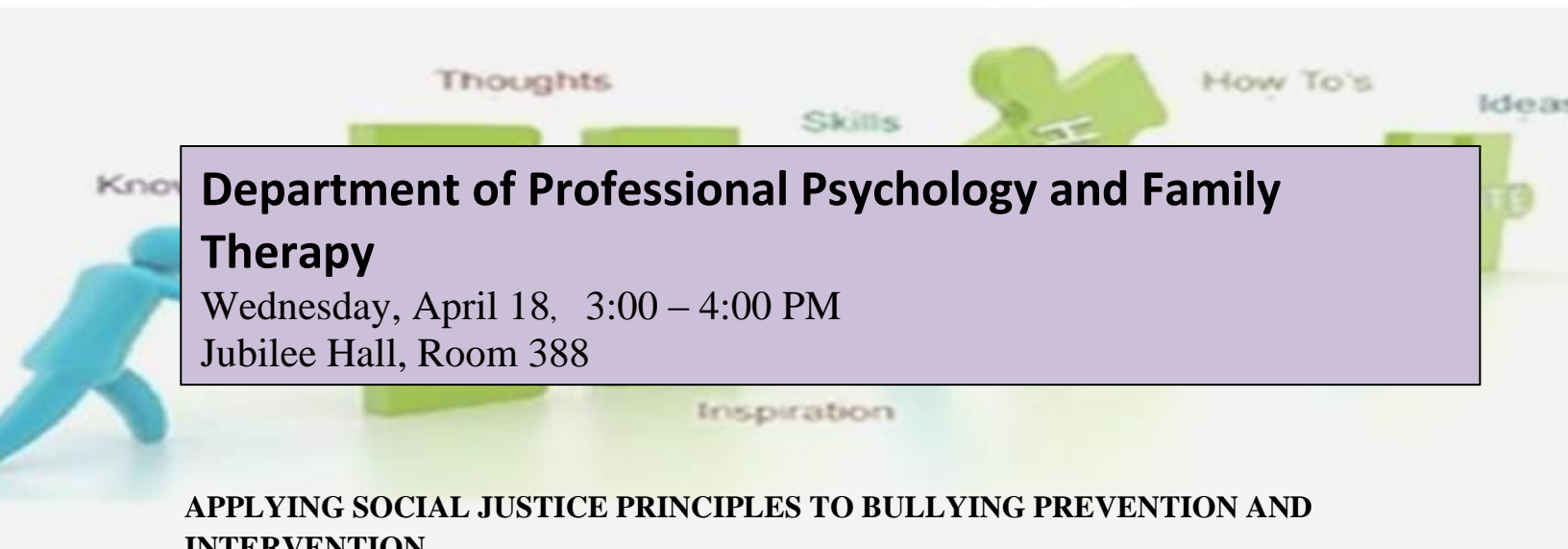
THE DEMOCRATIC REPUBLIC OF THE CONGO: RAPE IN THE WARSCAPE

Asaria Amador

Whitehead School of Diplomacy and International Relations, Seton Hall University



The construct of rape as a mechanism of waging war, has too often been dismissed as a ‘by-product’ of armed conflict. Otherwise, when acknowledged, sexual violence has been explained as the result of sexually frustrated soldiers or as the result of disrupted societal norms. In reality, rape has been used globally and historically as a weapon of warfare with the intent of terrorizing the local population. This presentation aims to prove through research and visual aids the validity of the arguments herein presented, specifically focusing on the case of the Democratic Republic of the Congo. The period of examination will primarily focus on the First and Second Congo Wars between the years of 1996 and 2003. By examining preexisting societal norms I will establish a *status quo*, with which the full intent and effect of sexual violence as a war mechanism will be highlighted. I will argue that sexual violence is used by militant groups as a method of terrorizing the population, controlling ‘conquered’ sectors and gathering supplies – proving the premeditation and tactical intentions of the attacks.



## **Department of Professional Psychology and Family Therapy**

Wednesday, April 18, 3:00 – 4:00 PM  
Jubilee Hall, Room 388

### **APPLYING SOCIAL JUSTICE PRINCIPLES TO BULLYING PREVENTION AND INTERVENTION**

Peggy Brady-Amoon, Margaret Jones Farrelly, & Erica N. Cannedy  
Department of Professional Psychology and Family Therapy, Seton Hall University

Bullying is perhaps on the “hottest” topics in education and public policy. Bullying has been implicated in suicides, homicides, and an array of less lethal yet still-serious mental and physical health concerns. New laws, including the NJ Anti-bullying law of 2011, and educational policy call upon school and other counselors to prevent bullying, as well as inform school-wide through individual intervention policies to create a climate of safety for all. This presentation will begin with a review of the effects of bullying, vulnerable populations, prevention, and intervention policies that are consistent with social justice principles in counseling. It will culminate in a facilitated discussion designed to increase participants’ awareness, knowledge, and skills in preventing and responding to bullying in a socially just manner.



## Department of Biological Sciences Poster Session

Wednesday, April 18, 4:00 PM

McNulty Hall, Atrium

### EXAMINATION OF MAP KINASES' ACTIVITIES IN RESPONSE TO HYPOXIC CHEMICAL MIMICS IN NEURONAL CELL MODEL SYSTEM

Lawrence Rasmussen, Adrienne Galang and Jane Ko

Department of Biological Sciences, Seton Hall University

Our lab previously used the hypoxic mimic compound, DFO, to simulate the hypoxic condition with a neuronal cell model system. Drug treatment decreased cell viability and increased cellular glutathione levels in a dose- and time- dependent manner. However, there were surviving cells. Confocal analysis using annexin-V-fluorescein and propidium iodide staining revealed that surviving/attached cells were morphologically similar to control cells. RT-PCR analysis demonstrated that the hypoxia inducible factor-1 $\alpha$  mRNA level was augmented in these surviving neurons. Although certain adaptive responses are identified in this cell model, how cells convey the message of drug treatment to the cells is still unknown. The signal transduction pathways, such as MAP kinases ERK1/2 and JNK, are known to initiate signaling cascades that mediate gene expressions for cell survival in low oxygen conditions and were thus chosen for examination. Western blot analysis revealed that DFO treatment decreased activity for ERK1/2 (Thr 160, Thr 177) and JNK. Additional Western blot analysis revealed that cobalt treatment increased activity for ERK1/2 (Thr 160, Thr 177) and decreased activity of JNK. Western blot analysis revealed that, ERK1/2 (Thr 202, Tyr 204) had no observable change in activity regardless of which chemical mimicker was used. These results demonstrated that MAP kinase family has a diverse response to chemical hypoxic mimic compounds.

### IDENTIFICATION AND CHARACTERIZATION OF POLY C BINDING PROTEIN 1(PCBP1) INTERACTING PROTEIN

Pranjal Nahar, Hamidah Sultan, Ysabella Esteban, Alyda Stabile and Jane Ko

Department of Biological Sciences, Seton Hall University

PCBP1 is a single stranded DNA binding protein and it contains three KH domains: two KH domains grouped at N terminal while the third domain is located at the C terminal. PCBP1 is involved in various biological processes including mRNA stabilization, translational regulation. Studies have shown that PCBP1 is involved in the regulation of  $\mu$ -opioid receptor and the eukaryotic initiation factor 4 (eIF4E) gene expressions. In order to understand the functional



roles of PCBP1, PCBP1 was used as a bait protein to identify PCBP1 interacting proteins via protein interactions, by screening human brain cDNA library using the two hybrid system. One of the clones was assigned as BL-10. The goal of this study is to examine the physical interaction between PCBP1 and interacting BL-10 protein. Deletion constructs of BL-10 protein were generated by polymerase chain reaction. The interaction between PCBP1 and BL-10 protein was studied by using bacteria two hybrid system. Individual BL-10 deletion construct was co-transformed with the Bait containing full length PCBP1; the cotransformants were subjected to media containing selective markers, chloramphenicol, tetracycline and 3-AT. Colonies that grew on media with these three markers were streaked onto higher stringent media containing four selective markers: 3-AT, chloramphenicol, tetracycline and streptomycin. The data from the bacteria two hybrid screening has validated the interaction between BL-10 and PCBP1.

#### **LIVER CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN TWO SPECIES OF FILTER-FEDDING FISH, MENHADEN**

Rebecca Hawke and Carolyn Bentivegna

Department of Biological Sciences, Seton Hall University

The April 2010 BP® oil spill has caused great concern for ecosystem health. Crude oil contains polycyclic aromatic hydrocarbons (PAH). PAHs are a class of over 100 chemicals that are produced due to the incomplete burning of organic materials. However, the overall health effects of PAHs depends on the extent of exposure, the concentration of PAH, and the toxicity of the PAH. Some PAHs are carcinogenic. In this study, liver PAH concentrations were determined in two species of the marine, filter-feeding fish called menhaden (*Brevoortia tyrannus* and *Brevoortia patronus*) using fixed wavelength fluorescence spectrophotometry. Menhaden account for over 40% of the commercial fisheries catch and are a major link in the food chain. Standardized curves were established for two common PAH metabolites, hydroxypyrene and naphthol. Liver PAH analysis was performed on 382 fish samples. The NJ fish samples, VA samples, and FL samples were provided by government agencies in the months following the oil spill and were collected off the Atlantic coast. LA fish samples were collected off the southern coast of Louisiana in both 2010 and 2011. Naphthol-like and hydroxypyrene-like PAHs were found in all fish species. Major findings included a significant increase in PAH concentrations for Naphthol-like PAHs in Louisiana fish from 2010 to 2011 compared to NJ fish. Naphthol-like PAHs have been considered indicative of petroleum exposure. This finding indicated that menhaden have potential as a biomonitoring organism for oil spills.

#### **INVESTIGATION OF THE INTERACTION AND CELLULAR DISTRIBUTION BETWEEN PCBP AND ITS INTERACTING PROTEIN**

Faith Ikalina, Amanda J. Hunkele, Haminda N. Sultan, and Jane L. Ko

Department of Biological Sciences, Seton Hall University



Poly C Binding Protein 1 (PCBP) is a RNA and single-stranded DNA binding protein and it has multiple functional roles. It has been demonstrated that PCBP is distributed in both the nucleus and cytoplasm, with greater emphasis in the nucleus, in neuronal cells. To further understand PCBP functional roles, a human brain cDNA library was screened for the PCBP-interacting proteins using the two-hybrid system. One of the candidate clones was found to encode  $\gamma$ -synuclein with the first six amino acids missing at the N-terminus. The full length was generated by PCR and confirmed by DNA sequencing. GST-pull down assay demonstrated a direct physical interaction between these two proteins and co-immunoprecipitation using a human neuronal cell model confirmed the interaction *in vivo*. These results demonstrated that PCBP can interact with  $\gamma$ -synuclein in human neuronal cells. DNA sequencing analysis showed a missense mutation in the C-terminus as compared to the NCBI database. Sequence analysis further demonstrated that  $\gamma$ -synuclein with the same missense mutation was also found in several colorectal, breast, and lung cancer cell lines. This study is therefore to determine the cellular distribution of  $\gamma$ -synuclein containing this missense in neuronal cells. Confocal microscopy analysis was utilized with immunofluorescence labeling via  $\gamma$ -synuclein antibody and Cy3 labeled secondary antibody. Results showed that  $\gamma$ -synuclein is present in the entire cell. Taken together, these results demonstrated that both PCBP and  $\gamma$ -synuclein have a similar cellular distribution, and they can physically interact with each other in the neuronal cells.

#### STUDY OF CELLULAR RESPONSES UNDER CHEMICAL INDUCED HYPOXIC CONDITION

George Coricor and Jane Ko

Department of Biological Sciences, Seton Hall University

Hypoxia is a condition with inadequate oxygen supply. The adaptive responses in cells occurred under hypoxia. To understand human hypoxic responses, a human neuronal cell model system is generated, which used hypoxic mimic compound to simulate hypoxic condition. Previously, our laboratory used DFO a hypoxic mimic compound to generate hypoxic condition in neuronal cells. We found that the treatment decreased cell viability. However, some cells still survived. Using confocal image analysis the surviving cells were morphologically similar to control (vehicle-treated) cells. To confirm the cells developing the hypoxic response, the hypoxia inducible factor 1 (HIF-1) was examined, which plays an important role in regulating hypoxia. HIF-1 is a heterodimer composed of HIF-1 $\alpha$  and HIF-1 $\beta$ . Under normoxic condition, HIF-1 $\alpha$  is degraded, but under hypoxic condition, its message level is increased, indicating the cellular hypoxic response. RT-PCR analysis demonstrated that HIF-1 $\alpha$  mRNA level was intensified in these surviving cells. In addition, the other adaptive response was also found, as the hMOR message level was down regulated, but hDOR message was not changed. To further investigate if HIF-1 is involved in receptor gene regulation, HIF-1 response element was cloned into the luciferase reporter gene and transfected into NMB cells. The transfected cells were then treated with DFO. Our preliminary results showed that the potential involvement of HIF in the regulation of receptor expression.



## **MOLECULAR CHARACTERIZATION OF HEMOGLOBIN PROTEIN IN LARVAE OF 4<sup>th</sup> INSTAR *CHIRONOMUS RIPARIUS* (DIPTERA: CHIRONOMIDAE): A PROMISING BIOMARKER FOR EVALUATING ENVIRONMENTAL QUALITY**

Jun Oh

Department of Biological Sciences, Seton Hall University

Larvae of 4<sup>th</sup> instar Chironomidae or chironomids are a convenient animal model for studying environmental quality. In order to generate a useful biomarker, we have been attempting to characterize various molecular responses exhibited by chironomid upon a change in their environment – especially upon exposure to heavy metals, which are frequent toxic pollutants found in urban environments. Previous results indicated that hemoglobin (Hb) proteins of chironomid – major proteins found in their hemolymph – are an appropriate biomarker for evaluating environmental quality because they are modulated by heavy metals like cadmium (Cd). Our data suggested that low molecular weight proteins (4-6 KDa), observed on SDS PAGE in the control group, were potentially representing normal degradation processes by indigenous proteases. However, upon exposure to low concentrations of Cd, varying Hb protein profiles were observed – either disappearance or decreased intensity of the low molecular weight proteins – suggesting that the normal degradation process might have been inhibited by the presence of Cd. In addition, it was evidenced by LCMS that the low molecular weight proteins were identified as possible fragmented products of Hb genes IV and VII. In this study, we used two proteases – cathepsin D (aspartic) and trypsin (serine) – to further investigate the degradation process of Hb proteins in larvae of *Chironomus riparius*.

## **PROTAMINE-LIKE PROTEINS IN *DROSOPHILA PERSIMILIS* AS COMPARED TO *D. PSEUDOOBSCURA*: AN OBSCURA SPECIES GROUP ANALYSIS**

Matthew Chapman, Zain A. Alvi, and Angela V. Klaus

Department of Biological Sciences, Seton Hall University

The obscura species group within the genus *Drosophila* is characterized by unusual morphological features including deep red pigmentation of their ellipsoid testes, and dimorphic sperm (eusperm and parasperm). The vast majority of *Drosophila* species testes have yellow, greenish, or light orange pigmentation and a tubular, coiled morphology. Additionally, most species have monomorphic sperm. Previous work in our lab indicates that the putative sperm DNA binding proteins termed protamine-like proteins in *D. pseudoobscura* are unusually large (over 500 amino acids) as compared to protamine-like proteins found in other *Drosophila* species. However, the putative protamine-like proteins in the close relative of *D. pseudoobscura*, *D. persimilis*, appear to be more closely related to proteins found in the melanogaster species group. The goal of the current study is to confirm the presence of the two putative protamine-like proteins (GL14516 and GL25738) in *D. persimilis* genomic DNA by PCR and analyze them as compared to *D. pseudoobscura*. This work supports a larger project aimed at understanding the



evolution of protamine-like proteins in the genus *Drosophila*, and elucidating their possible role in chromatin patterning and nuclear shaping.

### **TROPHIC TRANSFER STUDY OF PAHs IN MENHADEN FISH OIL USING SILVER PERCH FISH**

Edwin Pena, Melissa Bell, & Carolyn Bentivegna  
Department of Biological Sciences, Seton Hall University

The BP oil spill contaminated a large area in the Gulf of Mexico in summer 2010. It is likely that many aquatic species in the Gulf were affected by the spill. Crude oil contains polycyclic aromatic hydrocarbon (PAHs). Some PAHs are carcinogenic to fish and humans. The purpose of this project was to determine whether PAHs from contaminated fish can trophically transfer into their predators. To study this, fish oil was prepared from menhaden (*Brevoortia sp.*). Menhaden are a filtering-feeding marine fish that may have been exposed to floating crude oil during the BP oil spill. The menhaden oil was fed to silver perch (*Bidyanus bidyanus*) collected from Tuckerton, NJ. The treatments were fish oil prepared from menhaden collected from the Gulf of Mexico (Daybrook) in 2008 and from Delaware Bay, NJ (EPNJ) in 2010. The crude oil was collected from the DeepWater Horizon pipeline (source oil) in 2010. Perch were gavaged with oil twice over an 8 hr period and then sacrificed 16 hrs after the last dose. The control was Phosphate Buffer Solution (PBS). The EPNJ fish oil was given alone or spiked with deuterated naphthalene and deuterated phenanthrene (25ug/mL). PAHs in perch gill, liver, bile, and GI tract were detected using fixed wavelength fluorescence spectroscopy. It was found that PAHs have the potential to transfer from the GI tract to other tissues. This showed that the BP oil spill in the Gulf of Mexico may affect aquatic species by contaminating the food web.

### **CYTOTOXICITY OF HOECHST 33342 AND ULTRAVIOLET ILLUMINATION DURING LIVE-CELL IMAGING OF DROSOPHILA PSEUDOOBSCURA CULTURED SPERMATOGENIC CYSTS**

Crystal Pristell and Angela V. Klaus  
Department of Biological Sciences, Seton Hall University

Recent work indicates that Hoechst 33342 is non-toxic in time-lapse live-cell imaging when dye concentration and light exposure is limited (Purschke et al., 2010, Phototoxicity of Hoechst 33342 in time-lapse fluorescence microscopy, Photochem Photobiol Sci 9:1634-9). Previous work in our lab indicated that Hoechst 33342 and low levels of UV illumination at low magnification (4x and 10x objectives) is non-toxic to cultured spermatogenic cysts obtained from *Drosophila pseudoobscura* testes. In the current work, cysts were cultured in glass-bottomed culture plates and exposed to UV illumination without and with the inclusion of a very low concentration of Hoechst 33342 (0.02 ug/ml) in the culture medium. Cysts were exposed to one



minute of UV light at 30 minute intervals over two 4-hour periods using the 20x objective lens on a wide-field fluorescence microscope. Illumination continued over two days in culture. After 72 hours, cysts were analyzed for viability using calcein-AM staining. Three conditions were tested: (1) no dye, no UV (control), (2) no dye, UV, and (3) dye, UV. Our initial results indicate that the higher light dose at higher magnifications in the presence of Hoechst 33342 is non-toxic to living spermatogenic cysts. The goal of this work is to develop a system for high-resolution live-cell imaging of nuclear migration and nuclear transformation in living spermatogenic cells

### **PROTAMINE-LIKE PROTEINS IN *DROSOPHILA YAKUBA* AND *D. ERECTA***

Matthew Emery and Angela V. Klaus

Department of Biological Sciences, Seton Hall University

Previous work in our lab identified the putative nucleic acid and protein sequences of the protamine-like proteins in 12 species of *Drosophila* flies whose genomes have been sequenced. Protamine-like proteins bind DNA in the sperm nucleus and facilitate chromatin compaction during spermatogenesis. In the current work, we are aiming to confirm the presence of two of these genes (GE24787 and GG24235) in two species from the melanogaster species group: *Drosophila yakuba* and *Drosophila erecta*. Additionally, we propose to analyze the chromatin condensation patterns in the sperm nuclei from these two species using transmission electron microscopy. Primers have been generated against the DNA sequences for GE24787 and GG24235 for PCR amplification of these genes from genomic DNA. This work supports a larger project aimed at a large-scale analysis of the role of protamine-like proteins in chromatin patterning and nuclear shaping the genus *Drosophila*.

### **NUCLEAR MIGRATION AND SPERMATID ELONGATION DURING SPERMIOGENESIS IN *DROSOPHILA PSEUDOOBSCURA***

Benjamin Reimer, Crystal Pristell, and Angela V. Klaus

Department of Biological Sciences, Seton Hall University

*Drosophila* is a model genus that can be used to improve our understanding of mammalian spermatogenesis as the cellular and molecular processes in mammalian and fruit fly spermatogenesis are very similar. In *Drosophila pseudoobscura* spermatogenesis, 128 round spermatids arise via five mitotic and two meiotic divisions within an encapsulating cyst and then transform into mature, elongate sperm during a post-meiotic stage termed spermiogenesis. Prior to spermiogenesis, the 128 spermatid nuclei relocate to one side of the cyst, however the mechanism by which this relocation occurs is unknown. Because actin structures are involved in later stages of sperm maturation, we hypothesize that an actin-based structure may be responsible for the nuclear migration event. Our preliminary results indicate that a distinct actin-based structure is associated with the sperm nuclei in pre-migration 128-cell cysts. Actin is detected as a diffuse cytoplasmic signal prior to this stage. Interestingly, we also detected multiple cytoplasmic 'elongation bulges' in early post-migration cysts using calcein-AM staining.



Cytoplasmic ‘voids’ were detected within these bulges that may represent the microtubule assembly machinery involved in tail elongation.

## **HUMAN IMMUNODEFICIENCY VIRUS TYPE (HIV-1) EVOLUTION IN HIV-ASSOCIATED NEUROCOGNITIVE DISORDERS**

Charles Farmer and Marcus Gerald

Department of Biological Sciences, Seton Hall University

Human immunodeficiency virus type-1 (HIV-1) infection of the central nervous system (CNS) can induce varying degrees of HIV-associated neurocognitive disorders (HAND). Compartmentalization of the virus within the cerebrospinal fluid (CSF) has also been observed which has led to recent studies of neuroadaptation during disease progression. The goal of this study is to perform a longitudinal analysis of patients with varying degrees of HAND by sequencing paired plasma and CSF samples in order to understand the evolutionary pathway of the virus. Full length HIV-1 envelope subtype B variants will be generated using single genome amplification. Phylogenetic analysis will be used to assess the genetic differences within and between the viral quasispecies. Co-receptor usage may also play a role in differentiating between plasma and CSF compartments and there may be a relationship between disease progression and co-receptor usage. Co-receptor usage is evaluated by extracting V3 loop sequences from the full length HIV-1 envelope. Our hypothesis is that there will be evidence of clustering found in the CSF viral quasispecies and that clustering may become more evident as the disease progresses. We also hypothesize that there will be a significant change in co-receptor usage throughout disease progression. These studies are expected to provide further insight into neuroadaptation that will aid in combating HAND and HIV-1 infection. This project is proposed as part of our Senior Biology Seminar capstone course.

## **ALTERNATIVE THERAPIES TO INDUCE HYPOLOCOMOTOR EFFECT IN P35 KNOCKOUT MICE**

Kim Pereira

Department of Biological Sciences, Seton Hall University

p35 knockout mice display hyperactivity resembling the symptoms of attention deficit hyperactivity disorder (ADHD). The purpose of this study is to evaluate p35 knockout mice for increased tolerance to stimulant drugs over extended periods of time, and to test alternative therapies. Mice will be placed on a regimen of stimulant drugs, and will be monitored using an animal activity cage over 30 days in order to determine if they develop a tolerance to the stimulants. The mice will then be treated with combinations of ginkgo biloba, gotu kola, and very low doses of stimulants to determine if those therapies will induce a hypolocomotor effect. It is anticipated that the p35 knockout mice will develop a tolerance to the stimulant drugs and require higher doses to achieve the initial hypolocomotor effect. Ginkgo biloba and gotu kola should cause a hypolocomotor effect in the mice, but may not be as effective as the stimulants. Any combination of ginkgo biloba, gotu kola, and/or stimulants may create a balance which will



reduce the need for increased doses of stimulants due to tolerance. Using p35 knockout mice, combination therapies can be tested in order to find the best combination of natural therapies, or the combination of low doses of stimulants with natural therapies to treat ADHD symptoms. This project is proposed as part of our Senior Biology Seminar capstone

## **THE EFFECTS OF VITAMIN C ON INFLAMMATORY CYTOKINE LEVELS IN AIRWAY DRAINING LYMPH NODES AND BLOOD SERUM IN A MURINE MODEL**

Meagan Bennett and Crystal Pristell

Department of Biological Sciences, Seton Hall University

According to a 2005 Centers for Disease Control survey, asthma prevalence doubled from 1980 to 1996. Asthma is predominantly characterized as an inflammatory disease. Inflammation is caused in part by inflammatory cytokines produced by T-cells. We propose to investigate whether the antioxidant Vitamin C has protective effects on inflammation in respiratory lymph nodes. Using BALB/c mice we propose to use ovalbumin (OVA) to induce an allergic asthmatic response. Two of three groups of male mice (8 in each group) will be treated for three consecutive weeks with 100 µg of OVA via peritoneal injection and respiratory nebulization. On day 22, one of the two variable groups will receive Vitamin C by injection. This will be continued for seven days. All 24 mice will be sacrificed on day 30. T-cells levels from blood serum will be analyzed using flow cytometry and cytokine levels will be analyzed using an ELISA assay. T-cell and cytokine levels will also be analyzed in airway draining lymph nodes. We expect that the cytokine levels will increase with exposure to OVA but decrease with Vitamin C. This research aims to improve our understanding of the role of inflammation in asthma. This project is proposed as part of our Senior Biology Seminar capstone course.

## **PALEOLITHIC DIETING: IS THE EFFECT OF THE AGRICULTURAL REVOLUTION AND MODERN DIET DANGEROUS TO PRIMATE HEALTH?**

Richard Kerr and Daniel Barnes

Department of Biological Science, Seton Hall University

Wheat, starch, and grains are foods that are implemented in nearly every American's diet. Since the agricultural revolution the diet consumed by human beings has shifted drastically from a diet that was based on meat and some fruits and berries, to a modern diet based on high carbohydrate intake and a variety of highly processed foods. This experiment, using primates as a model organism, will examine the health effects on the cardiovascular system by comparing a Paleolithic to a modern Western diet. The experiment will involve three groups of primates, feeding one group a western diet, one a Paleolithic diet, and a control fed normal primate food. All groups will be fed for 30 days while monitoring sleep patterns, activity levels and weight. We will also assay general cardiovascular health using blood tests to compare triglycerides, cholesterol, blood glucose and hormone levels in experimental and control groups. It is expected that the primates fed a Paleolithic diet will show better overall health, exhibit higher energy levels, and show more consistent sleep patterns. The epidemic of obesity and poor cardiovascular



health as a result of a poor modern diet has become an epidemic; research into alternate diet options may offer promising alternatives to the Western diet. This project is proposed as part of our Senior Biology Seminar capstone course.





## **PERFORMING FLUORESCENT SPECTROMETRIC ANALYSES TO DISTINGUISH THE EXCITATION WAVELENGTHS OF COMMON POLYCYCLIC AROMATIC HYDROCARBONS FROM VITAMINS E AND A IN FISH OIL.**

Megan Dunham, Carolyn Bentivegna, Angelo Montero, & Edwin Pena  
Department of Biological Sciences, Seton Hall University

After the BP oil spill, concern rose in regards to the toxicological effects on the many species of fish that inhabit the region of the Gulf of Mexico. One of these effects is the possibility that PAH's dissolved into the oil of these fish. In order to prove this hypothesis, a particularly oily fish, the Menhaden, was chosen as a sample organism from which to analyze fish oil. Before investigating the oil from these fish, however, a method of analysis was first developed using commercially available fish oil. The oil was tested for PAH's, mostly naphthol and hydroxyperene, by dissolving it in 75 % ethanol and by analyzing the solution using a fluorescent spectrometer. The spectrometric protocol called for holding the emission wavelength constant and scanning for excitation. Through this method, it was possible to detect the aforementioned PAH's through the appearance of peaks at the wavelength values they normally excite in. It was also discovered that vitamins A and E, which are found in fish oil, appeared to fluoresce at values similar to those of naphthol and hydroxypyrene. Nevertheless, a method for distinguishing the PAH's from the vitamins was developed by using various emission wavelengths and identifying where these compounds excite at those emission values. As an example, it was possible to distinguish naphthol from vitamin A by observing that at an emission of 450 nm, naphthol excites at 360 nm and vitamin A at 340 nm. This work was supported by the New Jersey Department of Environmental Protection and the Louisiana Fish and Wildlife Service.

## **COMPLETE HYALINE CARTILAGE REGENERATION DUE TO LOCALIZED IMMUNOTOLERANCE IN RHEUMATOID ARTHRITIS**

Maria Bender  
Department of Biological Sciences, Seton Hall University

In the US, over 2 million people are diagnosed with the autoimmune disease Rheumatoid Arthritis (RA). Currently there is no cure for this disease which, if left untreated, can lead to death. We propose to use a form of allergen immunotherapy to permanently suppress the RA immune response in order to regenerate damaged synovial joint hyaline cartilage. Allergen immunotherapy involves repeated administration of antigen to the body, eventually building immune system tolerance. To incorporate this therapy, implanted capsules will continuously release localized dosage of intravitreal cyclosporine to prevent the immune system from attacking the joint until subsequently ignoring that structure. In this study, the joints of canine models naturally exhibiting RA were used in this study to mimic human synovial joint RA.



Damaged hyaline cartilage will be removed entirely and new cartilage will be generated with microfracture techniques in combination with a Bioactive Nano Gel (BNG). The regeneration is from mesenchymal stem cells which seep out of the bone marrow from microfracture techniques and proliferate with TGF- $\beta$ 1, retained locally by the BNG. We hypothesize that the cartilage will be protected by the implanted slow-release capsule filled with intravitreal cyclosporine to provide localized immunosuppression. The Nano Gel/microfracture technique has been tested on osteoarthritis, however when combined with localized immunosuppression it can also maintain RA joint repair. This project is proposed as part of our Senior Biology Seminar capstone course.

### **CHARACTERIZATION OF THE APICAL TESTIS IN DROSOPHILA PSEUDOOBSCURA**

Michael Beaury and Angela V. Klaus

Department of Biological Sciences, Seton Hall University

Fruit flies (genus *Drosophila*) are common models used in biological studies. Our lab uses several species of this model to study the cellular and molecular details of spermatogenesis. The goal of the current work was to characterize the stem cell niche in *Drosophila pseudoobscura* that resides in the apical testes. The testis stem cell niche is the site of stem cell maintenance and renewal that gives rise to a continuous supply of spermatogenic cells for the life of the adult male. The niche is composed of a cluster of somatic cells known as the hub. The proliferation of germ-line stem cells and somatic cyst cells is maintained by these hub cells. This region of the testis has not been fully characterized in the obscura species group, which includes *Drosophila pseudoobscura*. Using immunofluorescence labeling of known hub cell antigens and confocal microscopy visualization, we demonstrate for the first time the structure of the hub region in *Drosophila pseudoobscura*.

### **IDENTIFICATION OF COMMON BLOOM FORMING CYANOBACTERIA AND OTHER PHYTOPLANKTON IN NEW JERSEY FRESHWATER ECOSYSTEMS**

Matthew J. Rienzo & Tin-Chun Chu

Department of Biological Sciences, Seton Hall University

Freshwater ecosystems in urbanized areas receive an excess of nutrients including nitrogen and phosphorous due to pollution and manmade chemicals such as fertilizers and pesticides. These nutrients increase eutrophication within the ecosystem, characterized by overgrowth of cyanobacterial and other phytoplankton. Harmful algal bloom is a major disruption to aquatic life and vegetation in several ways including hypoxia, depletion of sunlight below the surface, and the possible release of toxins as a byproduct of cyanobacterial growth. Thus, it is important to identify the common bloom forming cyanobacteria and other phytoplankton in order to predict and prevent algal blooms. Water samples were collected from five freshwater bodies in the summer and fall. The samples were filtered through a coarse filter with a pore size of 2.7  $\mu\text{m}$  and then through a fine filter with a pore size of 0.45  $\mu\text{m}$ . Microorganisms were identified via



polymerase chain reaction as well as phase-contrast microscopy as a secondary confirmation. DNA extractions and PCR-based assays were carried out with designed primers to identify bacteria, cyanobacteria, and other phytoplankton. Once cyanobacteria were detected, sites with cyanobacterial presence were subsequently tested for identification of specific cyanobacteria and other phytoplankton, including cyanobacteria *Anabaena circinalis* and different species of diatoms such as *Amphicampa eruca* and *Fragilaria capucina*. Samples also underwent microscopic observation for identification. It was found that in this study, diatoms and anabaena appeared to be among the most common organisms identified among all sites tested.

## **RECOMBINANT MG53 IN TREATMENT OF CARDIAC ISCHEMIA TO PREVENT CARDIOMYOCYTE DEATH**

Jenna Alloush and Steve Guerrero

Department of Biological Sciences, Seton Hall University

Ischemic heart disease is the greatest cause of death in Western countries and is predicted to be the leading source of mortality worldwide by 2020. MG53, a novel protein that nucleates cell membrane repair machinery in skeletal muscle, has been observed to have highest expression in myocardium. MG53 has been shown to be a crucial component of ischemic preconditioning machinery. Following ischemia, reperfusion is closely accompanied by the down regulation of MG53 which has been associated with additional cell death. Overexpression of MG53 protects cardiomyocytes against hypoxia and oxidative stress-induced death. Our hypothesis is that by treating ischemia/reperfusion mice with recombinant MG53 in the perfusion system, there will be a limited amount of cardiomyocyte death. To test this hypothesis, experiments will begin with a Langendorff heart perfusion model. Ischemia will be induced and reperfusion will occur with or without rhMG53. From the Langendorff apparatus, the perfusate will be collected at specific time points and both LDH and CK assays will be run to monitor tissue damage. To test for global response, hemorrhagic shock will be mimicked and the amount of damage done to the body will be visible as downstream effects occur. These results show that MG53 can have a significant impact in the battle against ischemic heart disease particularly by reducing infarct size. This project is proposed as part of our Senior Biology Seminar capstone course.

## **THE EFFECTS OF HIGH-FAT DIET INDUCED OBESITY ON THE T-CELL RESPONSE IN ADIPOSE TISSUE**

Tessy La Torre and Idia Mema

Department of Biological Sciences, Seton Hall University

The inflammatory events that occur during the onset of high-fat diet induced obesity are a result of the coordinated response of the adaptive immune system with the innate immune system. Obesity is characterized by a high percentage of adipose tissue in the body and previous studies have shown that adipose harbors T-lymphocytes as well as macrophages during adipose-derived inflammation. Chemokines are involved in the accumulation of T-lymphocytes in adipose tissue, but it is unclear to what extent these chemokines contribute to the recruitment of T-cells. To address this question, we propose to study T-cell recruitment and the inflammatory response that T-cells cause in adipose tissue. In this study, 6 week old C57BL/6J mice will be fed a high-fat



diet; controls will be fed regular chow diet. Data will be measured in intervals of 7 weeks up to 21 weeks. We will assess the number of T-cells in experimental and control groups using flow cytometry; ELISA will be used for the analysis of T-lymphocytes chemokine markers. We anticipate an increase in the number of lymphocytes in the adipose tissue and an increase in pro-inflammatory cytokines secreted during the time of the inflammation. This study may provide insight into our understanding of high fat-diet induced obesity and the inflammatory response. This project is proposed as part of our Senior Biology Seminar capstone course.

### INHIBITING PRION PROPAGATION

Loreen Mogere & Diego Salazar

Department of Biological Sciences, Seton Hall University

Prion diseases, or transmissible spongiform encephalopathies (TSEs), are a family of rare progressive fatal neurodegenerative disorders, including mad cow disease in animals and Creutzfeldt-Jakob disease in humans. Prions are atypical infectious agents that do not contain nucleic acids and are able to induce abnormal folding of specific normal cellular proteins in the brain. Prions occur in two forms, the normal conformation  $\text{PrP}^c$  and the abnormal conformations  $\text{PrP}^{\text{sc}}$ . Our main objective was to inhibit the formation of the abnormal form and to prevent the infectivity of  $\text{PrP}^{\text{sc}}$  from spreading to other cells. In vitro and in vivo models were used to study the effects of prion propagation. In this study, we used the neuroblastoma cell line ScN2a permanently infected with prions. The administration of copper caused an inhibition of  $\text{PrP}^{\text{sc}}$  and an increase of  $\text{PrP}^c$  in ScN2a cells. For in vivo models, normal hamsters were administered 24 ppm of copper daily for one month, and the copper induced  $\text{PrP}^c$  internalization into Purkinje cells. In  $\text{PrP}^{\text{sc}}$  scrapie-infected hamsters, the administration of copper delayed the onset of the prion disease. Administration of 300 ppm and 750 ppm of copper was added to the drinking water of the scrapie infected hamsters, and this caused a delay of 3 and 4 days of the disease onset respectively compared to the control in most of the hamsters' brain cells. In conclusion, copper binds to  $\text{PrP}^{\text{sc}}$  and inhibits its propagation in both in vitro and in vivo models.

*This project is proposed as part of our Senior Biology Seminar capstone course.*

### THE SYNERGISTIC EFFECTS OF POLYMETHOXYLATED FLAVONES (PMFS) WITH ANTIBIOTICS AND ANTISEPTICS

Evan Venino, Franzie Edquilag & Tin-Chun Chu

Department of Biological Sciences, Seton Hall University

Extracted from citrus fruits, polymethoxylated flavones (PMFs) have demonstrated anticancer, antioxidant, and cholesterol lowering effects. This study focuses on the possibility of PMFs having synergistic effects with antibiotics and antiseptics. Tangeretin and nobiletin, two most



abundant PMFs found within citrus fruits, were tested on four gram negative bacteria, *Escherichia coli*, *Enterobacter aerogenes*, *Proteus vulgaris*, and *Pseudomonas fluorescens* and four gram positive bacteria, *Bacillus megaterium*, *Staphylococcus epidermidis*, *Streptomyces griseus*, and *Sporosarcina ureae*. The Kirby-Bauer method was used to measure the synergistic effects of the PMFs with antibiotics, and it was found that *S. griseus*, *S. urea*, *P. vulgaris*, and *E. aerogenes* showed increases in the zones of inhibition upon the addition of the PMFs on specific antibiotics. Synergistic effect with the PMFs was observed specifically with Penicillin, Neomycin, and Novobiocin with *S. griseus*, Penicillin with *S. urea*, Kanamycin with *P. vulgaris*, and Kanamycin, Streptomycin, Chloramphenicol with *E. aerogenes*. The effectiveness of the PMF and antibiotic combination was quantified by finding the approximate concentrations of the PMFs and antibiotics at which a positive result occurred. Furthermore, the disc diffusion method was used to measure the synergistic effects of PMFs with antiseptics. Two hand sanitizers and two mouthwashes were studied. Both tangeretin and nobiletin have synergistic effect on all the antiseptics tested. The result suggested that nobiletin process more synergistic effect with antiseptics than tangeretin.

## **FRUCTOSE METABOLISM AND THE GLUT5 TRANSPORTER IN GALLUS DOMESTICUS**

Theodore DaCosta and Angela V. Klaus  
Department of Biological Sciences, Seton Hall University

Fructose is a monosaccharide that can be used by the body for energy and is passively transported across membranes via its primary transporter, GLUT5. Using embryonic chick (*Gallus domesticus*) cardiomyocytes, we have begun studies testing the effects of high fructose medium on viability. Recent work in our lab has indicated that high fructose medium does not affect the viability of chick cardiomyocytes after 24 hours in culture. The current work is aimed at analyzing the effects of high fructose medium over longer term exposure. Additionally, we have designed primers specifically for the GLUT5 transporter using the nucleic acid sequence found in the *Gallus domesticus* genome. We expect to demonstrate, for the first time, the expression of the GLUT5 transporter in chick ventricular cardiac tissue using RT-PCR.

## **ANTIBACTERIAL ACTIVITY OF BLACK AND GREEN TEA POLYPHENOLS**

Elaine Sanjuan, Maggie La Forte, & Tin-Chun Chu  
Department of Biological Sciences, Seton Hall University

The potential health benefits of black and green teas have been linked to their polyphenolic compound, flavanoids (catechin subgroup). Epigallocatechin 3-gallate (EGCg) is a catechin found in green tea and has been associated with improvements in health. Theaflavins (TF1, TF2 & TF3) are the major components of black tea polyphenols. This study shows the effects of black and green tea extracts on antibiotic sensitivity and antiseptic efficiency on two gram positive bacteria (*Sporosarcina ureae* and *Streptomyces griseus*) and two gram negative bacteria



(*Escherichia coli* and *Pseudomonas fluorescens*). The Kirby-Bauer Susceptibility Test was performed; with and without green tea extract (GTE) or black tea extract (BTE). After comparing the zones of inhibition (ZOI), *P. fluorescens* showed the highest antibiotic susceptibility percentile with 33% for BTE and 33% GTE. *E. coli* had the second highest increase with 25% for BTE and 9% for GTE. The results suggested that GTE and BTE have higher synergistic effects on gram negative bacteria. GTE and BTE increased antibacterial efficiency by more than 50% in the bacteria tested.

## **SYNERGISTIC ANTIBACTERIAL ACTIVITIES OF HERB, SPICE & FRUIT PEELS WITH ANTIBIOTICS AND ANTISEPTICS**

Rohail Malik, Daniel Barnes & Tin-Chun Chu

Department of Biological Sciences, Seton Hall University

Herbs, spices, and fruits have been suggested to aid in fighting off illnesses and infections due to qualities that include but are not limited to antimicrobial properties. A selection of bacteria consisting of gram negative *Escherichia coli*, *Enterobacter aerogenes*, *Proteus vulgaris* and gram positive *Bacillus megaterium*, *Sporosarcina ureae* and *Staphylococcus epidermidis* were used to test antimicrobial properties and effects of combinatorial applications of antibiotics/antiseptics with herb, spice and fruit extracts. The herbal/spice extracts include 20% sage, 10% oregano along with 100% *Nigella sativa* solutions (black seed oil). The fruit peels used in this study include grape, mango and orange. The Kirby-Bauer disk diffusion method was carried out to assess the susceptibility of the selected bacteria. Both the sage and oregano solutions showed increased zone of inhibition for Chloramphenicol (C30) against *Sporosarcina ureae* and *Enterobacter aerogenes* and for Ampicillin (AM10) on *Bacillus megaterium*. The grape and mango peel solutions were found to have synergistic effects with Novobiocin (NB30), Ampicillin (AM10) and Cephalothin (CF30) antibiotics against *Staphylococcus epidermidis* and *Escherichia coli*. In addition, the orange peel, oregano, sage and *Nigella sativa* solutions showed synergistic effects with several selected antiseptics. This study may provide insights into antibiotic treatment for multiple drug resistant bacteria.

## **SYNERGISTIC ANTIBACTERIAL ACTIVITY OF *FALLOPIA MULTIFLORA* AND ANTISEPTICS**

Kerly Guerrero, Yansel Nunez, & Tin-Chun Chu

Department of Biological Sciences, Seton Hall University

Previous reports indicated *Fallopia multiflora* (also known as Chinese Knotweed) possess anti-inflammatory and antiviral properties. To study the antibacterial activity of *F. multiflora*, four gram positive bacteria, *Bacillus megaterium*, *Sporosarcina ureae*, *Staphylococcus epidermidis*, *Streptomyces griseus* and four gram negative bacteria, *Enterobacter aerogenes*, *Escherichia coli*, *Proteus vulgaris* and *Pseudomonas fluorescens* were selected. Disk diffusion methods were carried out to evaluate the antibacterial activity of different antiseptics with and without *F. multiflora*. Both alcohol and non-alcohol based antiseptics were included in this experiment. Zone of inhibition (ZOI) was measured to evaluate the synergistic effect of *F. multiflora* with various antiseptics. The results indicated that *F. multiflora* was able to increase the ZOI for many



selected bacteria, especially *S. ureae* and *P. fluorescens*. In addition, *F. multiflora* showed better synergistic effect with non-alcohol based antiseptics tested.

## **REDUCTION OF ANXIETY-LIKE BEHAVIOR IN MALE RATS VIA PROGESTIN RECEPTOR**

Chineze Obi

Department of Biological Sciences, Seton Hall University

Progesterone (P) affects physiology and behavior by binding to progestin receptors, which act on the genome to regulate gene expression. P affects a range of psychological states such as aggression, stress, and mood. Despite numerous studies, controversy exists regarding a P-signaling pathway that reduces anxiety. A study utilizing female progestin receptor knockout (PRKO) mice reported anxiolytic-like effects of P; another study reported male PRKO mice displayed greater anxiety-like behavior in response to P. In this study; I will test the hypothesis that P can modulate anxiety-like behavior partly by acting upon PR in the male rats. I examined the anxiolytic-like effect of P in the presence and absence of the PR antagonist RU-486, which is known to block the effects of P in male rats. An elevated plus maze and light/dark chamber were used to test this hypothesis. A physiological dosage of P was introduced into the male rats. They avoided the open areas in the maze by confining their movements to enclosed spaces because of anxiety. While both P-treated groups had physiological levels of P, the group given RU-486, which inhibited signaling of P, showed reduced anxiety. Therefore, anxiety reduction was indicated by an increase in the time spent in the open arms: thus inhibiting PR was shown to be effective in anxiety reduction in this experiment. This project is proposed as part of our Senior Biology Seminar capstone course.

## **EFFECTS OF NICKEL STRESS ON FRESHWATER CYANOBACTERIA**

Brian Nohomovich, Matthew Rienzo, Aline de Oliveira, & Tin-Chun Chu

Department of Biological Sciences, Seton Hall University

Nickel is an EPA target heavy metal that is naturally found in the earth's crust, the bottom of ocean floors, and in freshwater. Nickel is a trace mineral that is necessary for the maintenance of health in both eukaryotes and prokaryotes. However, if exposed in high concentration, nickel is known to cause toxic, harmful effects including DNA damage and cancer in humans. Cyanobacteria serve as an ideal model to test the effects of heavy metal stress because they have some mechanisms of natural resistance to a certain heavy metals. Metallothionein, a cysteine rich protein, plays a key role in resistance to many heavy metals. In this study, potential resistance to heavy metal nickel was observed using a freshwater cyanobacterium *Synechococcus* IU 625 (*S. IU625*). Pigmentation and cellular morphology provide an easy way to identify heavy metal stress. We have monitored the cell growth in various concentrations (0, 10, 25, and 50 mg/L) of nickel chloride using a direct count and turbidity study. It has been found that the highest concentration of nickel chloride of 50 mg/L had the highest effect on *S. IU 625*, resulting in a significant decrease in optical density and cell number. The concentration of 25 mg/L of nickel



chloride resulted in a prolonged lag phase when compared to the control (0 mg/L). The lowest concentration of nickel chloride (10 mg/L) had a similar growth as control. By day 22, these cells reached an optical density similar to the control, but with much lower cell counts. Samples were also collected for qPCR-based assays to evaluate the expression of the metallothionein gene through a time course under nickel stress conditions.

## **EFFECTS OF COPPER STRESS ON FRESHWATER CYANOBACTERIA**

Ahasis Ahmed, Kristin Althausen, Andrew Gewain, Ria John, & Tin-Chun Chu

Department of Biological Sciences, Seton Hall University

Copper is a widely distributed naturally occurring element, which at high concentrations can become toxic to plants, animals, and humans. Long term high concentration copper exposure has been implicated in humans to cause renal disease, cirrhosis, brain damage, demyelination, Wilson's disease, death, and many other serious adverse events. Since copper does not break down in the environment it accumulates allowing only few microorganisms to survive. Metallothionein sequesters metals (most notably Zn and Cu) in bacteria and may play a role in copper tolerance. In this study we used the cyanobacterium *Synechococcus* IU 625 (*S. IU 625*) as a model organism to investigate its physiological effect under copper stress. *S. IU 625* cells were grown in 3M media while being exposed to CuCl<sub>2</sub> at concentrations of 10, 25, and 50 mg/L for 22 days. A control group was grown in the absence of CuCl<sub>2</sub>. Cell growth was monitored twice weekly by direct count using a hemocytometer and turbidity study with spectrophotometer at 750 nm. Gene expression will be determined by qPCR. The morphological analyses of CuCl<sub>2</sub> on cell structure were examined by fluorescent microscopy. The results showed that cell growths were similar to control in the presence of 10 and 25 mg/L CuCl<sub>2</sub>. Cell growth was inhibited completely at a concentration of 50 mg/L CuCl<sub>2</sub>. The results suggested that the critical concentration of CuCl<sub>2</sub> for *S. IU 625* should be between 25 and 50 mg/L. This may also indicate that metallothionein was active at low concentrations until the high concentration of CuCl<sub>2</sub> disrupted its ability to sequester Cu.

## **RECOMBINANT MG53 IN TREATMENT OF CARDIAC ISCHEMIA TO PREVENT CARDIOMYOCYTE DEATH**

Jenna Alloush and Steve Guerrero

Department of Biological Sciences, Seton Hall University

Ischemic heart disease is the greatest cause of death in Western countries and is predicted to be the leading source of mortality worldwide by 2020. MG53, a novel protein that nucleates cell membrane repair machinery in skeletal muscle, has been observed to have highest expression in myocardium. Following ischemia, reperfusion is closely accompanied by down regulation of MG53 which has been associated with additional cell death. Overexpression of MG53 protects cardiomyocytes against hypoxia and oxidative stress-induced death. Our hypothesis is that by treating ischemia/reperfusion mice with recombinant MG53 (rhMG53) in the perfusion system, there will be a limited amount of cardiomyocyte death. This recombinant form should function



extracellularly by binding to exposed phosphatidylserine on injured cells and stimulating the healing process. To test this hypothesis, experiments will begin with the Langendorff heart perfusion. Ischemia will be induced and reperfusion will occur with or without rhMG53. Tissue damage will be detected by CK and LDH assays. To test for global response, hemorrhagic shock will be mimicked and the amount of damage to the body will be visible leading to further knowledge of ischemia and rhMG53's effect. These results reveal that MG53 can have a significant impact in battling ischemic heart disease particularly by reducing infarct size. This project is proposed as part of our Senior Biology Seminar capstone course

### **SPERM NUCLEAR BASIC PROTEINS IN *DROSOPHILA*: EVIDENCE FOR CONSERVED DNA-BINDING DOMAINS AND PROTEIN-PROTEIN INTERACTION REGIONS**

Zain A. Alvi, Tin-Chun Chu, and Angela V. Klaus  
Department of Biological Science, Seton Hall University

The current study is aimed at analyzing the conserved domains of protamine-like proteins and histone H1 linker-like proteins in 12 sequenced species of *Drosophila*. These proteins belong to a group of sperm specific proteins termed sperm nuclear basic proteins, or SNBPs. SNBPs are involved in chromatin remodeling during spermatogenesis and may also be involved in generating the species-specific shape of the sperm nucleus. Using the reference sequences for *Drosophila melanogaster* SNBPs (Mst35Ba, Mst35Bb, and Mst77F), we previously identified the putative sequences for the SNBP proteins in *D. simulans*, *D. sechellia*, *D. yakuba*, *D. erecta*, *D. ananassae*, *D. mojavensis*, *D. virilis*, *D. willistoni*, *D. grimshawi*, *D. pseudoobscura*, and *D. persimilis*. Our current work suggests that Mst77F is conserved in the melanogaster species subgroup, but not conserved in the rest of the subgenus Sophophora or in subgenus Drosophila, whereas Mst35Ba and Mst35Bb are conserved among the original 12 sequenced species of *Drosophila* flies. Mst35Ba, Mst35Bb, and Mst77F all have a putative conserved DNA binding domain. Additionally, Mst77F appears to have a conserved protein-protein interaction domain. We are also analyzing chromatin condensation patterns during nuclear transformation in *Drosophila* sperm nuclei. Our hypothesis is that the type of SNBPs present in the sperm nucleus will affect the pattern of chromatin condensation, which in turn will affect the species-specific shape of the sperm nucleus.

### **EFFECT OF CADMIUM ON FRESHWATER CYANOBACTERIA**

Ryan Gelsinger, Matthew Emery, Mutaz Fakhry & Tin-Chun Chu  
Department of Biological Sciences, Seton Hall University

Metallothioneins (MTs) are proteins with protective properties against stress, in particular to heavy metal contamination. *Synechococcus* sp. IU 625 is a freshwater cyanobacterium used as an indicator for heavy metal pollution. It is a good model because of the toxicity that heavy metals cause to the organism. Cadmium Chloride (CdCl<sub>2</sub>) is the heavy metal contaminant used in this study. Cadmium is a typical heavy metal contaminant due to the burning of fossil fuels



and their presence in batteries and manufacturing. It has been suggested that MT is utilized in order to detoxify and protect the cell against heavy metals. In this study, the cyanobacteria where exposed to the following concentrations of CdCl<sub>2</sub>: 0, 10, 25, and 50 mg/L. All three concentrations had a toxic effect on the cells compared to the control (0 mg/L). The aim of this study is to test the cells viability at different concentrations of CdCl<sub>2</sub> and correlate it to the metallothionein gene expression. We tested our cells growth and viability through direct cell count using hemocytometer and through turbidity study using spectrophotometer at wavelength 750 nm. The metallothionein expression levels in different conditions will be analyzed through qPCR. The cell growth in 10 and 25 mg/L of CdCl<sub>2</sub> were similar to the control whereas the growth of cells under 50 mg/L CdCl<sub>2</sub> was inhibited completely.

### **LOCATING THE EQUATORIAL SEGMENT AND SUBSEGMENT IN SPERMATOOZOA OF WHITE TAILED DEER**

Emily Borland, Nicole Horvath, Dr. Angela Klaus  
Department of Biological Sciences, Seton Hall University

A recently discovered region of the head of the spermatozoa is called the equatorial segment. There is reason to believe that inside the segment is another region called the equatorial subsegment and it is believed to help with the attachment of the sperm to the egg. So far, it has been found in mice, rats, boar, ram, bull, and in some ungulates. The white tailed deer is an ungulate so we hypothesized that it will also contain at least an equatorial segment and possibly a subsegment. For the purpose of this research project, the use of spermatozoa from white tailed deer will be used to find where the equatorial segment is located and to find out the purpose and its importance. Through the use of atomic force microscopy, scanning electron microscope, and immunofluorescence the equatorial subsegment should appear in pictures and become visible to the naked eye. The AFM and SEM will show an outline of the segment and possibly subsegment, but the immunofluorescence will confirm our hypothesis in the end we hope that there will be an equatorial segment and subsegment in the spermatozoa and hopefully find out more about it.

### **MISFORMATION OF UBIQUILIN 2 PROTEIN CAN CAUSE AMYOTROPHIC LATERAL SCLEROSIS**

Mary Diltz and Allison LaMotte  
College of Arts and Sciences, Seton Hall University

Amyotrophic lateral sclerosis (ALS) is a neurodegenerative disease in which specific nerve cells degenerate and become unable to send signals. There are sporadic (sALS) and familial (fALS) forms of ALS; fALS is marked by a miscoiled ubiquilin 2 protein. We sought to determine how the misformations of ubiquilin 2 can mark ALS and what factors are responsible for the misformation of ubiquilin 2. We found that free proline amino acids can affect the ubiquilin 2 conformation. If we are able to prevent free proline from adhering to ubiquilin it will not



misfold. Proline adherence occurs when the amino acid loses a water molecule when binding to another amino acid via hydrophobic bonds. We used an in vitro system of recombinant ubiquilin (regular and misfolded) and cellular lysate to test whether imino acid (4R)-fluoroproline could competitively inhibit proline adherence to ubiquilin and thus prevent misfolding. The ubiquilin proteins will then be purified and studied by x-ray crystallography to determine conformation. These data may enhance understanding of the disease process and lead to possible treatments. This project is proposed as part of our Senior Biology Seminar capstone course.

### **EFFECTS OF REDUCED HORMONE LEVELS ON REGURGITATION FOLLOWING TOTAL REPAIR OF TETRALOGY OF FALLOT**

Adrienne Galang and Antonio Halas

Department of Biological Sciences, Seton Hall University

Tetralogy of Fallot (TOF) is the most common form of congenital heart disease. Although a simple repair procedure exists, there can be remaining abnormalities. One abnormality is regurgitation where a heart valve does not close properly during pumping, allowing backflow of blood in the heart. Previous experiments established a statistical correlation between hormonal levels and regurgitation. We sought to determine if decreasing levels of aldosterone and antidiuretic hormone will decrease regurgitation after total repair of TOF, as these hormones were correlated with regurgitation in previous studies. We obtained 20 rats with pulmonary valve stenosis. Repair of this valve was performed on each rat. Ten served as a control and 10 were given conivaptan and spironolactone immediately following the procedure. Regurgitation and hormone levels were measured 24 hours after repair via echocardiogram and immunoassay, respectively, and results were compared. The group that received drugs continued to receive a daily dose for one week, then taken off the drugs for another week; control group received no drug administrations. During the total two weeks, all 20 rats' hormone and regurgitation levels were recorded daily. Our findings showed the rats treated with conivaptan and spironolactone exhibited lower levels of regurgitation and aldosterone/ADH levels while the drugs were administered but regurgitation levels increased somewhat during the week of no drug administration. Overall levels of this group, however, were lower than the control demonstrating that decreasing these hormones can lower regurgitation levels. This project is proposed as part of our Senior Biology Seminar capstone course.

### **THE EQUATORIAL SEGMENT AND EQUATORIAL SUBSEGMENT IN THE WHITE-TAILED DEER VISUALIZED BY SCANNING ELECTRON MICROSCOPY**

Deborah Hyland<sup>1</sup>, Emily Borland<sup>2</sup>, Nicole Horvath<sup>2</sup>, and Angela V. Klaus<sup>1</sup>

<sup>1</sup>Department of Biological Sciences and <sup>2</sup>Department of Chemistry and Biochemistry, Seton Hall University



Several species of mammalian sperm are characterized by the presence of a sperm head structure termed the equatorial segment. This region of the sperm head is important because it appears to be the site of plasma membrane fusion between the sperm and egg. The presence of the equatorial segment has been reported in at least 10 mammalian species. An additional structure called the equatorial subsegment has been reported to be present within the equatorial segment. The function of the equatorial subsegment is unknown. In the current work, using scanning electron microscopy, we confirmed the presence of the equatorial segment in white-tailed deer (*Odocoileus virginianus*) sperm obtained from the cauda epididymis and have preliminary data that suggests the equatorial subsegment is also present. Our continuing work will involve further confirmation of these structures using atomic force microscopy and immunofluorescence labeling.

### **ALTERATIONS IN GLUT4 TRAFFICKING UNDER INSULIN-RESISTANT CONDITIONS**

Faith Ikalina & Katrina Bisda

Department of Biological Sciences, Seton Hall University

Upon intake of dietary glucose, insulin stimulates the translocation and fusion of GLUT4 storage vesicles (GSVs) to the plasma membrane (PM) of muscle and adipose cells. GLUT4 insertion in the PM promotes uptake of dietary glucose into the cell, however GLUT4 is usually sequestered in GSVs until an insulin signal is received. GLUT4 is also found constantly recycling to and from the PM through endosomes and the trans-Golgi network (TGN). Under insulin-resistant conditions, GSV translocation to the PM is inhibited and insulin-resistant individuals can develop health problems, such as Type 2 diabetes. This experiment investigates if insulin resistance redirects GLUT4 trafficking in adipocytes to favor recycling endosomes in absence of insulin-stimulated GSV translocation. Induced insulin-resistant adipocytes expressing GLUT4 linked to green fluorescent protein (GFP) were imaged using total internal fluorescent microscopy to observe changes in distribution of GLUT4-GFP in GSVs versus recycling endosomes and the TGN. VAMP2, a protein component of GSVs, was labeled with Cy3 while the endosomal transferrin receptor was detected by transferrin conjugated to Alexa546. A change in GLUT4's colocalization with VAMP2 to colocalization with the transferrin receptor suggests that under insulin-resistant conditions, GLUT4 trafficking in adipocytes is redirected towards the recycling pathway, away from the insulin-stimulated pathway. Knowing this, methods to accelerate GLUT4 exocytosis from the recycling pathway could be investigated for treating insulin resistance. This project is proposed as part of our Senior Biology Seminar capstone course.

### **BACTERIAL TRANSMISSION AND PROLIFERATION IN FIBROUS ENCAPSULATED CENTRAL VENOUS ACCESS PORTS**

Maggie LaForte & Jillian Straub

Department of Biological Sciences, Seton Hall University



Central venous access ports are devices surgically implanted at the subcutaneous level of the skin. The port contains a self-sealing septum with a metal or titanium base attaching to a silicone catheter. The catheter is inserted into a major vein, enabling long-term drug delivery. Drug is infused externally via access needle driven through the skin into the port. This study investigates whether infection arises from access or the surgical procedure itself. We believe that since tissue is damaged during implantation, it becomes more vulnerable to bacterial transmission and proliferation due to frequent prep and access to device. Twenty-one rabbits were divided into 3 groups of 7. Groups 1 and 2 were implanted with ports; access protocol was performed on Group 1, while observation of wound healing without access was performed on Group 2. Group 3 did not receive ports, but received access protocol. Access protocol involved prepping skin with Chloraprep® followed by needle stick into the port every 24 hours for 90 days. After 90 days, punch biopsies from access sites on all 3 rabbit groups were viewed by microscopy to visualize breakdown of tissue by comparing to normal fibrotic tissue. Cultures were performed to correlate bacterial growth. Our results suggest investigation into alternate drug administration techniques/needle composition to prevent bacterial infiltration into port wound. This project is proposed as part of our Senior Biology Seminar capstone course.



### **COMBINATIONAL THERAPY INHIBITS CELL PROLIFERATION IN HUMAN PANCREATIC CANCER CELL LINES AsPC-1 and PANC-1**

Mark Ramdial & Matthew T DeFilippis

Department of Biological Sciences, Seton Hall University

The present study utilized the combined effects of gemcitabine, survivin DNA vaccine, and EGCG on human pancreatic cancer in hopes of discovering a more successful treatment for pancreatic cancer. The survivin DNA vaccine decreases tumor growth in vitro by inhibiting the survivin protein activity. Gemcitabine, used for chemotherapy in human patients with pancreatic cancer, acts by halting DNA synthesis. EGCG, a potent antioxidant, inhibits the STAT3 pathway responsible for proliferation of cancer cells. We sought to test for potential synergistic effects by administering a combination of the DNA vaccine, gemcitabine, and EGCG in comparison to each treatment alone and to an untreated control. By treating human pancreatic cancer cell lines AsPC-1 and PANC-1 with the combination therapy we show 40% cell viability compared to 100% in untreated control. Intermediate viabilities were found with the individual treatments. In addition, XTT and TUNEL assays confirmed respectively a 50% reduction in cell proliferation and 40% increase in apoptosis compared to untreated controls (100%). Transwell migration and Matrigel invasion assays determined a significantly reduced cell migration (50%) and cell invasion (60%) with the combination treatment. The combined therapy exceeded the effectiveness of either treatment alone. Future plans for this treatment involve testing its effectiveness in an in vivo model, such as the KrasG12D transgenic mouse that closely reproduces the malignant progression seen in human pancreatic ductal adenocarcinoma.

*This project is proposed as part of our Senior Biology Seminar capstone course.*



## **PALEOLITHIC DIETING INDUCES KETOGENIC METABOLISM OPTIMAL FOR FAT LOSS, MUSCLE GAIN, AND ADRENERGIC STIMULATION**

Richard Kerr

Department of Biological Sciences, Seton Hall University

Wheat, starch, grains, and legumes are foods that are implemented into nearly every human's diet for the past 5,000 years. Since the agricultural revolution, the diet consumed by humans has shifted drastically from a diet that was based on meat, greens, some fruits and berries, to a modern diet based on high carbohydrate and high fat content, consisting of a variety of highly processed foods. As part of this experiment, the subject (myself) underwent a change in diet and exercise in order to test the hypothesis that 'modern' diets are not optimal for human health and lifestyle. The subject ate a high fat, moderate protein, and very low carbohydrate diet (fruit post-workout to replenish depleted glycogen levels) in order to be induced into a metabolic state called ketosis. Although glycolysis is the common method for attaining ATP, ketosis will be a sufficient replacement due to higher energy content in fat. A high weight, low rep exercise routine with high intensity interval training was added in order to complement the Paleolithic lifestyle and ketogenic metabolism. Diabetes, cardiovascular diseases and the "obesity epidemic" is believed to be due to modern dieting. The results of this study support Paleolithic dieting leads to decreased body fat, increased muscle mass, and higher energy levels due to adrenergic stimulation along with a more physical lifestyle, and possibly preventing diabetes and cardiovascular diseases..

## **LNA-SILENCED MICRORNA-21 PREVENTS THE PROGRESSION OF TUMORIGENESIS IN CULTURED LUNG CANCER CELLS**

Cameron Rhein & Thabelo Lekoetje

Department of Biological Sciences, Seton Hall University

Recent studies suggest that microRNAs are involved in the progression of cancer. In particular, microRNA-21 (miR-21) has been shown to be increased in lung cancer. The present study set out to determine whether silencing microRNA-21 (miR-21) can prevent the development of tumorigenesis in lung cancer. Lung tumors were induced in rats via inhalation of carcinogens found in cigarette smoke (benzene, nickel, and vinyl chloride) over four weeks. The resulting tumor cells were then isolated from the lung four weeks after inhalation, cultured and transfected with seed-targeting 8-mer locked nucleic acid (LNA) oligonucleotides, to silence the expression of miR-21. qRT-PCR and western blots confirmed silencing of miR-21 and resulting increased levels of its target genes mRNAs: *Spry1*, and *Spry2* showed a 53% increase, *Btg2* showed a 61% increase, and *Pdcd4* showed a 73.2% increase. Importantly, after miR-21 silencing cells showed a 64% reduction in the cell proliferation rate when compared to cells transfected with a control LNA. These data suggest that silencing miR-21 may be a valid method to prevent the progression of tumorigenesis in lung cancer. Follow-up studies may determine the efficacy of silencing miR-21 in vivo, by injecting the LNA directly into the lung tumors of living rats.



*This project is proposed as part of our Senior Biology Seminar capstone course.*

## **EFFECTS OF GLS, SNTB2 & STX4 ON TYPE 1 DIABETES**

K. Rapajon & C. Mercado

Department of Biological Sciences, Seton Hall University

Type 1 diabetes (T1D) is an autoimmune disease characterized by the destruction of pancreatic  $\beta$ -cells, which secrete insulin, hormone playing a major role in carbohydrate and lipid metabolism. From previous studies, 11 genes have been predicted to be disease-causing genes in T1D. In this study we analyzed 3 of those genes (GLS, SNTB2, & STX4) in non-obese mice and tested their potential involvement in the development of diabetes. Using immunohistochemical analysis, we determined protein distribution in the pancreas and verified expression of GLS and STX4 in  $\beta$ -cells. Next, to quantify protein expression, western blots were performed that showed strong bands for both STX4 & GLS in the pancreas. We also developed knockout mice for STX4 and GLS where we found a high number of apoptotic  $\beta$ -cells, accompanied by 60% decrease in plasma insulin levels compared to wild type mice. These findings confirm the predicted role of these genes in insulin secretion. We then used transgenic mouse lines overexpressing STX4 and GLS, and found increased plasma insulin levels. This study shows that STX4 & GLS may represent potential therapeutical targets that may be useful to develop better therapies for type 1 diabetes.

*This project is proposed as part of our Senior Biology Seminar capstone course.*

## **REVERSAL OF OSTEOPOROSIS IN OVARIETOMIZED MICE BY COMBINATION OF PHARMACEUTICAL AND NON-PHARMACEUTICAL TREATMENTS**

Ashley Pollard & Erica Wald

Department of Biological Sciences, Seton Hall University

The purpose of this study was to determine if the effects of osteoporosis on bone mineral density could be reversed. Forty-two ovariectomized Sprague Dawley female mice, 9-10 months of age were put on a phytoestrogen and calcium reduced diet to induce osteoporosis. The mice were divided into six equal groups and each received the following treatments: Control (Group C), Non-pharmaceutical (Group NP) consisting of Calcium (1000 mg/day), Vitamin-D (1200 mg/day) and weight bearing exercise, Pharmaceutical (Group P) consisting of Alendronate (35 mg/day), combination of Non-pharmaceutical and Pharmaceutical (Group NPP), Nitrate medication (Group N) of 55 mg/day, and combination of Non-pharmaceutical, Pharmaceutical, and Nitrates (Group NPPN). Baseline bone mass density was measured two weeks after the mice were ovariectomized and at one-month intervals for four months using the XR-36 bone densitometer. After this period a urine NTx Osteomark test was performed to test bone resorption and a Vitamin D 25(OH)D blood test was also performed to assess vitamin D adequacy. Test results showed that 85% of all mice tested were able to regain normal bone



density with the combination Group NPPN (100% reversal rate) being the most successful in the reversal of osteoporosis.

*This project is proposed as part of our Senior Biology Seminar capstone course.*

## **ORAL PRESENTATION**

### **Department of Communication & The Arts**

Thursday, April 19, 10:00 AM– 12:00 PM

Walsh Library, ITV Room

#### **HYPERLOCAL JOURNALISM: A PARTNERSHIP BETWEEN SETON HALL UNIVERSITY AND THE ALTERNATIVE PRESS**

Dr. Amy Kiste Nyberg, Kimberly Bolognini, Caitlin Carroll, Patrice Kubik, Timothy LeCras, Alexandra Lubischer, Morgan Tornetta, and Stephen Valenti  
Department of Communication & The Arts

The Department of Communication & The Arts has a partnership with The Alternative Press, a hyperlocal online daily newspaper serving South Orange and 12 other New Jersey communities. Each semester, a team of top journalism majors, known as the “TAP Team,” covers South Orange. Their news stories are posted online at [www.thealternativepress.com](http://www.thealternativepress.com). This partnership is unique; other schools with similar arrangements only allow graduate students to participate. This presentation will begin with a brief explanation of hyperlocal journalism and its importance in a changing media world. Student TAP Team members will show and discuss examples of their work, including coverage of municipal government, the board of education, sports, business, the arts and the lives of everyday South Orange citizens. The presentation will conclude with a discussion of how working as journalists in South Orange has developed students’ reporting skills, as well as their understanding of the community that is the home of Seton Hall University.

## **ORAL PRESENTATIONS**

### **Department of English**

Thursday, April 19, 10:00 AM– 11:15 AM

Jubilee Hall, Room 132



## **ESSAYS IN CREATIVE NONFICTION**

Students from Creative Nonfiction, Spring 2012 Department of English

Students from the Spring 2012 Creative Nonfiction class will read individually from their personal essays, memoirs, and cultural critiques. These pieces were created and developed during the current semester.

## **ORAL PRESENTATIONS**

### **Permaculture Design Project**

Friday, April 20, 10:00 AM– 12:30 PM

McNulty Hall, Room 107

#### **THE POND**

Alexandria Garcia, Yansel Nunez, Pui Wing Sher, Jameson Cullen, Marian Glenn, & Wanda Knapik.

Permaculture Design Class, Seton Hall University 400 South Orange New Jersey 07079

This permaculture project will focus on creating a pond on Comeback Farm in Asbury NJ located at Musconetcong River Valley. This will restore the stream that runs through the farm to its natural course and promote wildlife and animal activity on the farm. The pond will be used as an irrigation system, and provide water to the field as opposed to flooding it. We will dig a hole in the lowest point of the farm to build the pond. The pond will supply an irrigation system with drip lines and a pump. The hydraulic ram is a pump that enables water flow from an area of low elevation to higher elevation, and uses a minimal amount of water. It is anticipated that the pond will be a foundation for livestock to drink from and a place where fish can live. The irrigation system will contribute to the growth of vegetable crops, such as certain vegetables and herbs. The animals that inhabit the pond, such as frogs and fish can consume the insects that can potentially harm the crops grown around the pond. This pond will alleviate the hardships that the stream brings, serve an irrigation system and ultimately allow the stream to run its natural course.

#### **AQUINAS COURTYARD REVIVAL**

Romina Martinez and Idia Mema

Department Environmental Studies Seton Hall University

It is important to use land wisely. Seton Hall has plenty of open space that can be used to grow food or perennials. There are certain areas on campus which have a lot of potential to be transformed into something beautiful. The intended area is located behind Aquinas Hall which is a residence hall on campus. This area gets a lot of shade so shade loving plants will be planted.



The type of plants that would be planted would be perennials that grow in the early spring. The challenges of planting in this area are that the air circulation is not good since the courtyard is surrounded by high walls. Due to the poor air circulation there might be a problem with pests. Perennial plants such as forget-me-nots or bleeding hearts might be ideal plants that will grow in Aquinas Courtyard. In addition to plant we will be investigating how to capture rain water to use for irrigation.

### **FOGHORN'S HENHOUSE**

A. Wicki, C. Denbow, C. Mercado & C. Nascone  
Permaculture Design Class, Seton Hall University

A chicken tractor is essentially a movable chicken coop and enclosure. The object of having an enclosure that can move around the farm is to keep the soil and plant life healthy by not subjecting them to overgrazing, a common problem with traditional chicken runs. The hens can be used for the obvious food production, but also for fertilization and to “mow” the fields. A farm has different areas or zones and these tractors can be placed anywhere throughout these zones in order to preserve and invigorate the ground. However, it is important to find a place that is easily accessible to care for the chickens. Using light materials that may be found on the farm such as bamboo, as well as other supplies from outside the farm, we are able to design and build a modular type tractor and pen. The chickens used will be a heritage breed with a goal of producing 30 or more eggs per week, which will help the family on the farm as well as the surrounding community. Our research into chicken breeds will be aided by the published work of Harvey Ussery, a noted expert on small-scale chicken production. With this experiment, we are hoping to help control growth as well as productivity at the farm.

### **GOURMET CAMPUS DESIGN ENHANCEMENT**

Evan Venino, Tekla Pontius-Courtney, Chineze Obi, & Bridget Sloan  
Permaculture Design Class, Seton Hall University

The Seton Hall garden is a beautiful, organic vegetable and herb garden. Our design project will encourage the Seton Hall campus community to get involved and utilize the space. A student friendly environment will be created to attract students into the garden space. As both an educational tool as well as a recreational environment, the garden can serve students in various ways. By introducing picnic tables, benches, and reading areas students will be more apt to get involved in the garden. In addition, a pergola and trellis system will act to create a visually appealing setting and block out unsightly electrical machinery adjacent to the garden. Currently, the water runoff in the garden has caused unwanted erosion and water pooling. In response to this problem, a rain garden will be planted in connection with the student area. Water loving plants will be placed in strategic locations to reduce water pooling. Additionally, grass will be replaced with ground covers and shrubs to reduce compaction and water runoff.



**Seton Hall University presents...**

**A production of the Environmental Science Department...**

**Brought to you by Wanda Knapik's Permaculture Design class...**

**Structural Re-establishment, Honey Bee Implementation and Renewable Energy Development**

**Starring – Gregory Maaks ... Maria Bender ... and introducing Sermin Jakupi!**

For many years Comeback farm has been a state certified organic farm producing numerous varieties of organic fruits and vegetables in Asbury New Jersey. Due to the historic nature of the farm many renovations are required to rehabilitate the existing structures as well as implement new organic products. The implementation process will be carried out in three stages. The first stage consists of renovating pre-existing historic structures to conform to modern-day code. The second stage will include design of honey bee habitat and new perennial fruit and nut trees. Finally, stage three will consist of renewable energy design by utilizing the extreme solar and wind conditions present on the farm. With this accessible planning, increased crop production and structural re-establishment will bring nothing but benefits to this historic farm.

## **ORAL PRESENTATIONS**

### **College of Nursing and College Seminary: The Ripple Effect**

**Friday, April 20, 2:30 – 12:30 PM**

**Arts & Sciences Hall, Room 107**

#### **THE RIPPLE EFFECT**

Debby Garriques, Lisa Donofri, Hyun-ah Melanie Kim, Aida Palomino, Namrata Patel, Sho Yeon Park, Joshua Nevitt, & Mark Patrick

College of Nursing and College Seminary, Seton Hall University

The purpose of this presentation is to aid the Seton Hall community by providing insight to the rewards of Servant Leadership. Robert K. Greenleaf established the definition of “Servant Leadership” as an individual who serves first and leads from behind. One of the principles is to meet the community where they are at and to dedicate our services towards the growth of that community. Through our work at Raphael’s Life House we encountered spiritual moments that had a profound impact on our team and the underserved. We hope to bring forth a positive



change and shift the attitudes of our community by promoting the spirit of stewardship. As it only takes one pebble to create a ripple effect, it only takes one person to stimulate a change.

## ORAL PRESENTATIONS

### Psychology Department Research Symposium

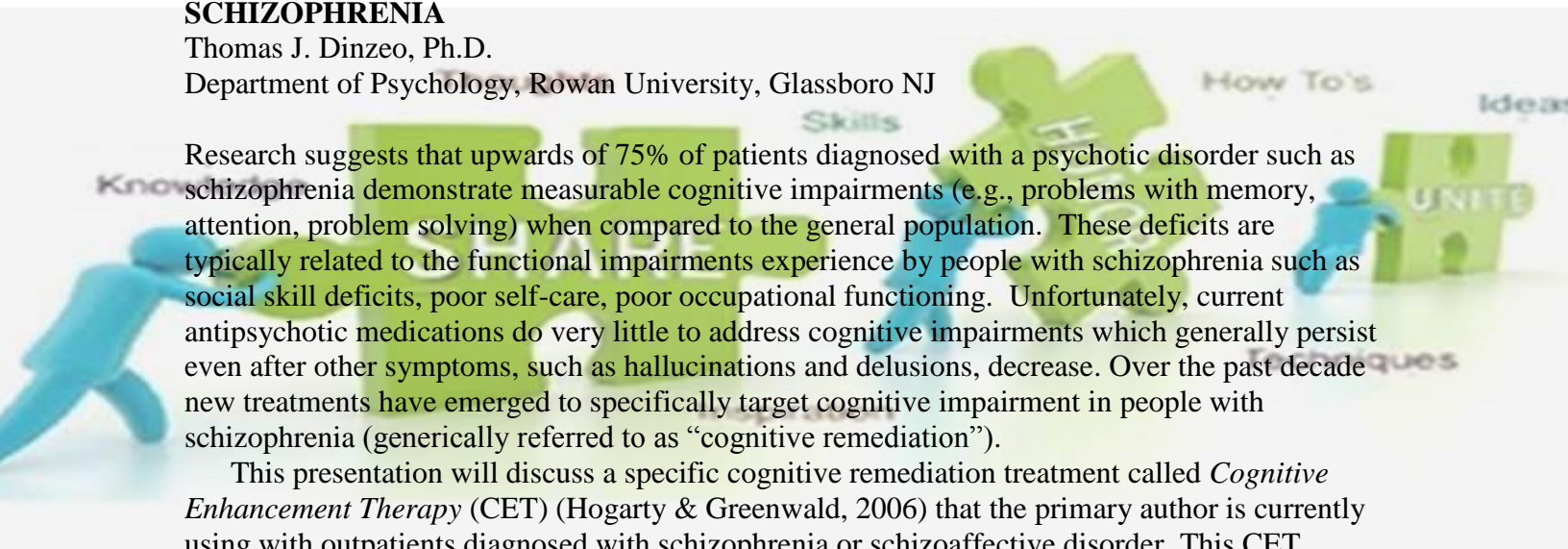
Saturday, April 21, 1:00 – 3:30 PM

Jubilee Hall, Room 383

#### COGNITIVE ENHANCEMENT THERAPY IN OUTPATIENTS WITH SCHIZOPHRENIA

Thomas J. Dinzeo, Ph.D.

Department of Psychology, Rowan University, Glassboro NJ



Research suggests that upwards of 75% of patients diagnosed with a psychotic disorder such as schizophrenia demonstrate measurable cognitive impairments (e.g., problems with memory, attention, problem solving) when compared to the general population. These deficits are typically related to the functional impairments experience by people with schizophrenia such as social skill deficits, poor self-care, poor occupational functioning. Unfortunately, current antipsychotic medications do very little to address cognitive impairments which generally persist even after other symptoms, such as hallucinations and delusions, decrease. Over the past decade new treatments have emerged to specifically target cognitive impairment in people with schizophrenia (generically referred to as “cognitive remediation”).

This presentation will discuss a specific cognitive remediation treatment called *Cognitive Enhancement Therapy* (CET) (Hogarty & Greenwald, 2006) that the primary author is currently using with outpatients diagnosed with schizophrenia or schizoaffective disorder. This CET intervention involves weekly 2-hour group sessions that occur over a 5-month period. These sessions focus on building skills to bolster basic cognitive functioning and social competence (i.e., the ability to attend to, process, and respond to information in the environment). Participants receive handouts, conduct homework assignments, participate in group tasks, and utilize computer-based tasks designed to train/strengthen cognitive processes.

As a part of this clinical study (which is still on-going) baseline and follow data is collected on symptom severity, level of functioning (social, vocational, cognitive, living skills) and quality of life. We will briefly discuss some preliminary findings related to our initial study participants.



## **MENTAL ILLNESS STIGMA: AN EXPERIMENTAL EXAMINATION OF THE EFFECTS OF LABEL AND GENDER ON COLLEGE STUDENTS' PERCEPTIONS OF DEPRESSION AND ALCOHOL ABUSE**

Chelsea P. Reichert & Susan Nolan, PhD

Department of Psychology, Seton Hall University

Mental illness stigma is a serious social issue that leads to lasting social consequences. Negative reactions and societal rejection associated with mental illness are part of the reason that a majority of mental illness sufferers choose not to seek help. The public's reaction to those with mental illness is the result of preconceived notions that society holds about sufferers of mental illness. There are many factors that influence mental illness stigma, including some that were examined in the current experiment: 1) presence of a mental illness label (whether or not described as having a "mental illness"), 2) type of mental illness (depression versus alcohol abuse), and 3) gender of the person with the diagnosis. The current study sought to address the effect of these three variables on college students' impressions of a student described in a vignette. The results suggest that only type of mental illness has a statistically significant effect on perceptions of mental illness, such that participants were more sympathetic, on average, toward the characters suffering from depression than alcohol abuse, and believed they had a more genuine mental illness. On the other hand, participants were more socially tolerant, on average, of the character with alcohol abuse than depression, and believed they had a higher ability to function socially. Additionally, there was an interaction between gender and mental illness type, such that the male character with depression was seen as more maladjusted, on average, than the male character with alcohol abuse, a pattern not true for female characters.

## **THE IMPACT OF EDUCATION AND GENDER ON PERCEPTIONS OF BORDERLINE PERSONALITY DISORDER**

Jennifer Noonan & Susan Nolan, Ph.D.

Department of Psychology, Seton Hall University

Borderline personality disorder (BPD) is a pervasive disorder which impacts an individual through stormy or unstable interpersonal relationships, marked impulsivity, and instability in self-image and affect. Although BPD seems to carry a heavy stigma among mental health professionals, there has been a lack of research examining this stigma among the general population. Therefore, the present study sought to examine the amount of stigma surrounding BPD among college students. It was hypothesized that students who read about BPD before reading a vignette of a college student with BPD would report less mean rejection than would students in a control group. It was also hypothesized that, on average, students would reject a male character in the vignette more than a female character. Students were randomly assigned to an awareness tool about BPD (a flyer, fact sheet, or a control group with no awareness tool). Students then read a vignette of a college student with BPD that varied by gender, and rated the character on several different measures, including a rejection questionnaire. There was no support for the hypothesis that, on average, reading an awareness tool would result in less rejection of the character. Furthermore, there was no support for the hypothesis that level of



rejection did not differ, on average, between a male character and a female character. It is possible that the awareness tools may not be having the desired impact.

## **ANATOMICAL CORRELATES OF IPSILESIONAL NEGLECT**

Daniela Sacchetti & Kelly Goedert, Ph. D.

Department of Psychology, Seton Hall University

Spatial neglect is a disorder commonly occurring after right hemisphere stroke. Typically neglect results in an attentional impairment to contralesional space: a person with a right lesion fails to respond or orient towards stimuli on the left. In some cases however, patients display ipsilesional (or right-sided) neglect. Contralesional neglect is often associated with lesions to right parietal cortex, specifically the right temporal-parietal junction (Karnath, Berger, Kuker & Rorden, 2011) and it is classically considered a disorder of perceptual-attention. In contrast, the much sparser existing research on ipsilesional neglect supports an association of this disorder with damage to the right frontal lobe (Kim et al, 1999). Because frontal systems are involved in planning and initiation of actions, ipsilesional neglect may result in more motor-intentional errors. In this study, I performed lesion mapping and overlap analysis of 12 participants with ipsilesional neglect. I also assessed participants' perceptual-attentional and motor-intentional biases. I hypothesized that participants would have lesions localized to the right frontal lobe and basal ganglia, because these areas are associated with the motor-intentional system. I also predict that participants would display greater motor-intentional than perceptual-attentional bias. Consistent with my hypothesis, a greater proportion of participants with ipsilesional neglect had frontal/basal ganglia damage compared to expected proportions observed in contralesional samples. However, inconsistent with my hypothesis, participants with ipsilesional neglect had greater magnitude of perceptual-attentional than motor-intentional bias.

## **INTERACTING IDENTITIES: AN EXPLORATION OF THE MODERATING EFFECTS OF PERCEIVED SIMILARITY ON THE STING OF OSTRACISM**

Amanda Majewski & Janine Buckner, Ph.D.

Department of Psychology, Seton Hall University

Human nature is rooted fundamentally in social interaction. When social stability is threatened by being ignored or ostracized negative effects on self-esteem, self-meaning, and feelings of belonging and control are reported (Sommer, Williams, Ciarocco, Baumeister, 2001). In this study we examined whether identity factors of "victims" or sources of exclusion moderate this negative impact. Gonsalkorale and Williams (2007) reported no significant effects of political identity, but we sought to expand the parameters to include a broader notion of the sense of self. Participants in the study were 26 undergraduate psychology students, whose gender and identities were measured via a personality questionnaire; narrative reflections on self image were also collected. Ostracism was controlled through participant involvement in Cyberball, an online



ball tossing game simulator, and perceived similarity of an opponent to participants was manipulated randomly. Preliminary results indicate no differences in aversive effects due to target gender or identity style but some evidence of source identity impact.

## **MINDSET MEMORY: THEORIES OF INTELLIGENCE'S EFFECT ON CONTENT OF AUTOBIOGRAPHICAL MEMORY**

Sejal Brahmhatt & Janine Buckner, Ph.D.

Department of Psychology, Seton Hall University

Theories of intelligence (TOI) are constructed by individuals based upon their beliefs about the sources of their intelligence (Nussbaum & Dweck, 2008). "Entity" theorists believe that intelligence is an unchangeable internal characteristic. "Incremental" theorists believe that intelligence is malleable and can be increased through effort and training (Nussbaum & Dweck, 2008). According to Dweck's social-cognitive approach to motivation, entity and incremental theorists interpret and react to academic successes similarly but interpret and react to academic failures differently (Nussbaum & Dweck, 2008). In the current study, autobiographical memory (AM) was utilized as a method to measure differences in the cognitions, emotions, and behaviors that individuals remember about their own personal academic successes and failures.

Participants were 181 undergraduate students who recalled an AM of either a success (getting a good grade) or a failure (a bad grade). Each participant was categorized an entity or incremental theorist based on responses to the TOI scale (Dweck & Henderson, 1988) and AMs were coded for content related to positive emotion, negative emotion, mastery-oriented cognitions, helplessness-oriented cognitions, mastery-oriented behaviors, and helplessness-oriented behavior. For the failure condition, it was hypothesized that 1) holding an entity TOI would predict negative emotion, and helplessness-oriented cognitions and behaviors in the AMs; 2) incremental TOI would predict mastery-oriented cognitions and behaviors in the AMs. For the success condition, it was hypothesized that there would not be any significant differences in any of the dependent variables. Discussion of preliminary results will focus upon partial support of these hypotheses and on the generalizability of Dweck's work to multiple populations.

## **THE EFFECTS OF CAFFEINE ON SPATIAL LEARNING AND MEMORY**

Romina Cupo & Amy Hunter, Ph.D.

Department of Psychology, Seton Hall University

Caffeine, a widely used psychostimulant, is an adenosine antagonist, a neurotransmitter whose receptors are present in all areas of the brain. The effects of caffeine differ based on variables such as dose, prior exposure, and timing of administration. For example, acute caffeine given post-learning facilitates retention of spatial information (Angelucci et al., 2002). Chronic caffeine administration, however, impairs spatial learning (Han et al., 2009). A radial arm water maze task was used to assess the behavioral effects of caffeine on caffeine-acclimated and caffeine-naïve rats. The rats were housed in enriched housing (n=9) or standard housing (n=7).



Caffeine was administered to half of the rats for 9 days to acclimate them to the drug. After a three-week delay, all rats were exposed to the radial arm water maze, a spatial learning task, for 6 days of training and 3 days of testing. Half of the rats were given caffeine during the training task. Caffeine administered during training improved latency to escape of rats who were previously housed in an enriched environment. However, caffeine-treated rats made more errors as days progressed. The results indicate that although caffeine may improve latency, possibly by increasing swimming speed, accuracy is impaired.

## **A COMPARISON OF DIFFERENT FORMS OF METHAMPHETAMINE ON LOCOMOTOR ACTIVITY AND SIGN TRACKING PERFORMANCE IN RATS**

Christine Michaels & Michael Vigorito, Ph.D.

Department of Psychology, Seton Hall University

Methamphetamine (METH) abuse is a major public health concern. The effect of impurities resulting from clandestine METH production on drug use is poorly understood. Using rats as subjects, we examined the effects of d-METH (the psychoactive form of the drug) and d-METH adulterated with the non-psychoactive form of the drug (l-METH) on two behaviors theorized to be associated with drug addiction; locomotor activation and sign tracking. The effect of l-Meth when combined with the psychoactive form (i.e., dl-Meth) (as is the case in clandestine-produced METH) is unknown and was evaluated. Measurement of locomotor activity across 5 days of injections confirmed that d-METH has stimulant properties but not l-METH. Sign tracking, which reflects the impact of incentive salience on behavior, was also investigated. Incentives are previously neutral stimuli associated with rewards (such as food or psychoactive drugs) that attain the same rewarding properties as the rewards themselves. As a reward-paired object gains incentive salience it gains the power to elicit compulsive approach behavior called sign tracking (Robinson & Berridge, 1993). Incentives are believed to activate the same dopaminergic neural pathway involved in METH-induced locomotor activation. Thus, we hypothesized that sign-tracking should emerge more robustly in groups pre-treated with d-METH compared with groups pre-treated with l-METH or saline. Results showed that rats treated with d-METH (either d- or dl-METH) demonstrated significantly more sign tracking behavior than rats treated with l-METH or saline across the 10 days of training post-treatment. Moreover, the effect of d-METH on sign tracking was attenuated when given in combination with l-METH.



## **FOSSIL FINDERS**

Martha Schoene,, Kristen Gavinelli and Laura Degnan  
Department of Physics  
Dutch Neck Elementary School- off campus

Students from the Introduction to geology class will share their knowledge of fossils and their relationship to interpreting Earth's History with students at the Dutch Elementary School in West Windsor, New Jersey. Five classes of Second Grade students will become Paleontologists modeling the process of finding and identifying fossils in layers of sediments using mini containers, multi colored paper shards, tweezers, and plastic knives, magnifying glasses, Fossil identification chart, a data record and fossil samples. Students will remove each layer of sediment and place them in piles according to color. Students will discover paper fossils and place them in in sequential order according to their relative age. Then the students will identify each fossil species and match the paper fossil to a real fossil of the same species. After identifying each fossil, the students will place the fossils on a geologic time line and construct a story of what might have happened during Earth's History to create each fossil using the criteria provided on their data records. Lesson plans, handouts and follow up activities will be provided to the Teachers and students after each 45 minute hands- on activity.

## **QUALITY OF CARE IN AMBULATORY SURGICAL CENTERS**

Gina L. Campanella, JD, MHA  
Healthcare Administration  
Tuesday, April 17, 2012

Ambulatory Surgical Centers have been growing exponentially in the last thirty years. Hospitals have suffered because they are unable to provide the same quality of care with the same speed, efficiency and level of patient satisfaction as an Ambulatory Surgical Center. This article traces the growth of Ambulatory Surgical Centers and the corresponding legislative attempts to curb their growth and, perhaps, eliminate them completely. Reasons why regulatory attempts to eliminate Ambulatory Surgical Centers have not been successful are discussed and a shift in focus from Ambulatory Surgical Center regulation to regulation of insurance reimbursement rates is recommended.

## **CONFLICT RESOLUTION FOR NURSING: PROMOTING JOB SATISFACTION AND RESPECT FOR ORGANIZATIONAL JUSTICE**

Anthony Meo  
Arts and Sciences /Healthcare Administration

Tuesday, April 17, 2012



Unresolved conflict is a primary reason why nursing turnover rates are exceptionally high and job satisfaction is lacking within the profession. One of the driving factors in leading a decision to leave employment is a nurse's relationship with peers and with the organization. Whether or not an infrastructure exists to resolve conflict is irrelevant if a nurse's perception of organizational support is a barrier to utilization. As the population continues to age, hospitals and long term care facilities will see a surge in patients and an increased level of stress on an already strained system. Though conflict is unavoidable and can be productive in certain instances, the ability to successfully manage the process within the health care setting is a significant catalyst to a nurse's decision to remain or leave employment. Departure typically results in higher costs for an organization in terms of recruitment, and jeopardizes patient outcomes via a break in the chain of care. Research has found a positive correlation between nursing job satisfaction and organizational commitment to conflict resolution. This paper analyzes issues that jeopardize job satisfaction, the responses that occur as a result of poor conflict management practices and concludes with a recommendation that outlines changes to leadership, structure and process that can be utilized to successfully manage conflict, improve employee confidence, increase job satisfaction and promote a healthier work environment leading to a restoration of confidence in organizational justice.

