The 2nd Annual Graduate Student Research Symposium

Power Center Ballroom, Duquesne University
November 7, 2014

Sponsored by:
Academic Affairs
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Photo by Jake Kurtz.
The second annual Graduate Student Research Symposium

November 7, 2014
Power Center Ballroom
Duquesne University
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ACKNOWLEDGEMENTS

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Bayer School of Natural & Environmental Sciences
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Center for Spiritan Studies
DU Undergraduate Jake Kurtz for the cover photograph
Enrollment Management Group
McAnulty College and Graduate School of Liberal Arts
School of Nursing
Office of the Provost
Office of Research, Christine Pollock, & Mary McConnell
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## Presentation Session 1

**Power Center Ballroom-Section A and Section B**

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<td><strong>1:00</strong></td>
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| Gina Johnson *Campus Buildings as Living Laboratories: Overcoming Challenges to Zero-Energy Retrofitting — A Case Study*  
A.J. Palumbo School of Business Administration  
Abstract Number: 59 | Stephen Hallenbeck *Benjamin and Contemporary Art: Communicating Truth in Experience*  
Philosophy | McAnulty College and Graduate School of Liberal Arts  
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| Zhe Ji *Shallow talk of Chinese higher education: Inequity within Chinese Higher Education Admission*  
Theology | McAnulty College and Graduate School of Liberal Arts  
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| Chris Rawls *Spinoza’s Ethology*  
Philosophy | Bryon Williams *Censorship and the Archive: A Case Study in Power, Intent, and Editorial Theory*  
English | McAnulty College and Graduate School of Liberal Arts  
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| **1:45** | **1:45** |
| Christine Skrzat *Revisiting Advance Directive Planning from a Holistic Perspective*  
Center for Healthcare Ethics  
McAnulty College and Graduate School of Liberal Arts  
Abstract Number: 46 | Jayna Bonfini *Towards a model of trauma-informed correctional care*  
Counseling | School of Education  
Abstract Number: 57 |
### Presentation Session 2

**Power Center Ballroom-Section A and Section B**

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| **3:00** | **3:00** | **Elif Gokbel**  
*Does Teacher Questioning Matter in Student Engagement?*  
DILE | School of Education  
Abstract Number: 50 |
| **3:15** | **3:15** | **Benjamin Andrick**  
*Predicting viral cross-reactive epitopes in adalimumab, infliximab and etanercept: implication of therapy failure due to anti-drug antibodies*  
Pharmaceutics | Mylan School of Pharmacy  
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| **3:30** | **3:30** | **Cebrail Karayigit**  
*Counseling implications for Muslim graduate international students: A Practical Approach*  
Counselor Education & Supervision | School of Education  
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| **3:45** | **3:45** | **Shelley Kobuck**  
*Global Health Disparities from a Catholic Social Teaching Perspective*  
Healthcare Ethics | McAnulty College and Graduate School of Liberal Arts  
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**Session 2 Section A**

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| **3:00** | Eric Perry | “The Interactive Primer Model: Where High Tech and Old World Collide” | Counselor Education and Supervision | School of Education  
Abstract Number: 62 |
| **3:15** | Ian Butcher | *Limits of Political Correctness in Perfect Agreement, Blue Angel, and Japanese by Spring English* | McAnulty College and Graduate School of Liberal Arts  
Abstract Number: 52 |
| **3:30** | Joseph Smith | *Ressourcement Theology and the Supernatural Debate: Toward a Christological Ontology* | McAnulty College and Graduate School of Liberal Arts  
Abstract Number: 54 |
| **3:45** | Stephanie Mullen | *To Pay or Not to Pay? Variables Influencing Hostage Outcomes in Terrorist* | Social and Public Policy  
McAnulty College and Graduate School of Liberal Arts  
Abstract Number: 63 |
Bayer School for Natural and Environmental Sciences
Award for Graduate Research-Excellence in Graduate Research: 
2 awards, $300 each

Center for Catholic Intellectual Tradition & Spiritan Studies Award 
for Graduate Student Research: $300

McAnulty College and Graduate School of Liberal Arts: 
Outstanding Poster or Presentation: $250

School of Nursing Award for Graduate Research: $250

Provost's Award for Outstanding Scholarship: $250
Honorable Mention: 2 awards, $125 each
1 "The First Christian of Her Nation": Baptism of Pocahontas (1840), the U.S. Capitol, and Teaching National Identity
Carrie Hadley
History | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor: Dr. Alima Bucciantini, PhD.

“The First Christian Ever of Her Nation:” Baptism of Pocahontas, the U.S. Capitol, and Teaching National Identity  
John Gadsby Chapman’s painting Baptism of Pocahontas (1840) hangs in the Rotunda of the United States Capitol building. It is surrounded by paintings of significant themes and moments in American history, such as the signing of the Declaration of Independence; the messages that these paintings produce were meant to shape our identity as a new nation. Products of their time, these messages often included patriotism, history, honoring the Founding Fathers, or, in Baptism’s case, between white settlers and Powhatan Indians, enforcing racial hierarchies. Chapman’s portrayal of Pocahontas at the moment of her conversion to Christianity, and by extension, English way of life, shows the priorities of 19th Century Americans regarding Native Americans. Significantly, the Indian Removal Act had been in effect for almost 10 years at the time the painting was completed, and the country had not yet fulfilled its “manifest destiny.” Arguably, Chapman also portrayed the Virginia colony’s origin in a religious light, perhaps in hopes of defending Virginia against it’s ominous legacy of accepting the first African slaves—an issue starting to tear the country apart. This poster will delve into the politics behind the painting and will pose questions and issues that we as public historians must confront when presenting pieces or artifacts with divisive perspectives. The painting still hangs in the Rotunda of the U.S. Capitol and millions of visitors see and provide their own interpretation of it every year. Understanding its politics serves as an opportunity to learn about the country in the mid-19th Century and, by extension, the country’s priorities as it attempted to create an identity, and interpretation by public historians to visitors should reflect this.

2 Activity and Gene Expression of Steroid Sulfatase During Differentiation of the Human MG-63 Preosteoblastic Cell Line
Natasha Dias
Co-Authors: Kyle W. Selcer, Ph.D.
Biological Sciences | Bayer School of Natural and Environmental Sciences
Faculty Advisor: Kyle W. Selcer, PhD

Estrogen is important in maintaining bone density. Postmenopausal women have low circulating levels of estrogen but high levels of estrone sulfate and dehydroepiandrosterone sulfate. Conversion of these precursors to estrogen may help maintain postmenopausal bone density. Steroid sulfatase (STS) converts sulfated steroids into their active forms. STS occurs in bone, but little is known about its
regulation. We are investigating the activity and expression of STS in the human preosteoblastic cell line MG-63. MG-63 cells differentiate under the influence of osteogenic supplement, leading to extracellular mineralization. We studied STS in cells grown in medium alone (OS-) or grown with osteogenic supplement (OS+) over 21d. Cell proliferation was nearly exponential in OS- cells, but slowed in OS+ cells. STS activity and STS gene expression increased substantially over time in OS- cells, but showed only a small increase in OS+ cells. Bone cell differentiation was assessed by alkaline phosphatase activity and osteocalcin gene expression. Alkaline phosphatase activity increased substantially in the OS+ cells and only slightly in the OS- cells. Osteocalcin gene expression was high in OS- cells throughout the time course, but was high only during d2-d11 in OS+ cells. STS inhibitor EMATE virtually eliminated steroid sulfatase activity throughout differentiation in OS- and OS+ cells. The estrogen receptor blocker ICI 182,780 had little effect on steroid sulfatase activity during differentiation in either OS- or OS+ cells despite the observation that mRNAs for both estrogen receptor alpha and beta are more highly expressed in OS- cells. The effect of individual components of osteogenic supplement on cell proliferation revealed that the glucocorticoid dexamethasone plays a crucial role in cell differentiation. Our data indicate that activity and expression of STS is higher during the early stages of bone differentiation. These results suggest that STS may play a role in bone development.

3 A Neuroethical Justification of Psychoactive Enhancements
Michael Olusegun Afolabi
Center for Healthcare Ethics | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor: Henk ten Have, MD, PhD

Depressant and stimulant drugs influence the human brain/mind nexus by facilitating introspection, metacognition and decision making. As such, they offer an attractive means through which creative people may accomplish tasks faster. In spite of this capacity to improve “creative turnaround time”, the addictive and illicit nature of some of these drugs however raise ethical, social and legal concerns. Yet, the use of drugs in this context may be shown to largely cohere with the nature-nurture interaction which predominates the human experience. To be sure, such a description fits into a neurogenetic framework. On this note, this paper explores a neuroethical justification for the use of psychoactive drugs as biomedical enhancements. It shows that such a claim is reflected and founded in their capacity to foster extant skills including creativity-related behavior. Appraising the benefits and harms, the paper argues that the justification equally lies in a socially embedded framework. This is because society often values and overvalues certain skills over others based on the perceived relevance or contribution such skills may have on collective welfare. The derivation of socially useful values from psychoactive enhancements thus validates their use for creativity-related tasks. Since accessibility to controlled psychoactive drugs often constitutes a legal matter, the paper addresses the moral tensions raised by a neuroethical justification in relation to legal statutes. In this vein, it extricates and explicates the diverse hermeneutics underlying the harms of psychoactive enhancements. In the final analysis, the paper underscores the need for legal change vis-à-vis approving the selective use of psychoactive substances on utilitarian grounds. The legal change will however rest on the structure, tenor and tone of prevailing societal norms and values.
4 Allocortex is more vulnerable to loss of heat shock protein activity than neocortex
Jessica Posimo
Co-Authors: Amanda M. Gleixner, Jeffrey L. Brodsky, Peter Wipf, and Rehana K. Leak, Ph.D.
Pharmacology | Mylan School of Pharmacy
Faculty Advisor: Rehana Leak, Ph.D.

The neocortex is less vulnerable to tau and alpha-synuclein inclusions in Alzheimer’s and Parkinson’s disease than the allocortex. One hypothesis to explain these regional differences is that protein-misfolding stress (proteotoxicity) travels through neuroanatomical circuits in a staggered fashion and that pathology is transmitted to allocortex first. An alternative hypothesis is that some regions are inherently more vulnerable than others. In order to establish whether cortical subregions differ in their vulnerability to proteotoxicity, we applied proteasome inhibitors to primary neuronal cultures from neocortex and cultures from 3 allocortical subregions: entorhinal cortex, piriform cortex, and hippocampus. Neocortex was less vulnerable to proteasome inhibitors than cultures from any allocortical subregion. The proteasome inhibitor MG132 raised ubiquitinated proteins and decreased proteasome activity in allocortex more than neocortex. One of the major defenses against proteotoxicity is the heat shock protein family. Thus, we contrasted heat shock protein expression in neo- versus allocortex. Allocortical cultures were much more responsive to MG132 in heat shock protein induction, as might be expected from neurons that are more stressed. For example, MG132 raised Hsp70 and Hsp32 to higher levels in allocortex. Inhibition of Hsp70 activity with VER155008 or MAL3-101 and Hsp32 activity with tin protoporphyrin exacerbated the toxicity of MG132 in allocortex more than neocortex. These findings suggest that allocortex raises heat shock proteins to higher levels because it needs to rely on these defenses more. However, the allocortical defenses appear insufficient to render allocortex as resilient as neocortex. Finally, enhancing Hsp70 activity with 115-7c protected neocortex against MG132 but failed to protect allocortex. These findings suggest that Hsp70 molecules in allocortex may already be maximally activated or overwhelmed with misfolded, ubiquitinated proteins. Thus, neocortical neurons appear to be less vulnerable than allocortical neurons to loss of protein homeostasis, consistent with their greater resistance to inclusion formation in Parkinson’s and Alzheimer’s disease.

5 An Early Development Budget Impact Model for the use of Melatonin in the Treatment and Prevention of Osteoporosis
Corry Bondi, Ph.D.
Co-Authors: Rahul Khairnar, Paula A. Witt-Enderby, Ph.D., Khalid M. Kamal, Ph.D.
Pharmacy Administration | Mylan School of Pharmacy
Faculty Advisor: Khalid M. Kamal, Ph.D.

In the U.S., there are approximately 9 million adults with osteoporosis (OP) and an additional 43 million at-risk. By 2030, this number is expected to increase to 68 million adults. The economic impact is estimated to be $23 billion by 2025. Current drug therapies either decrease bone resorption (e.g., bisphosphonates) or stimulate bone formation (e.g., parathyroid hormone analog). Melatonin may be a potential treatment option because research has shown it impacts bone metabolism by promoting
osteoblast differentiation and activity and by suppressing osteoclast differentiation and activity. As shown in the Melatonin Osteoporosis Prevention Study (MOPS; NCT01152580), melatonin improved bone health in perimenopausal women by renormalizing bone marker turnover. Also, it is well-tolerated and has a high safety profile. Given the chronic nature of OP, coupled with high treatment costs, economic evaluation of melatonin with existing treatments could be very useful for those who manage and plan healthcare budgets. The objective of this work was to determine the budgetary impact of the addition of melatonin to treat and prevent OP from a payer perspective. A 1-year budget impact model with a hypothetical plan population of 1 million was utilized for the analysis of OP and osteopenia. Whole sale acquisition costs of melatonin and comparators were taken from Red Book; market share and prevalence data were obtain from the literature. Sensitivity analysis was performed to assess if changes in market share and drug costs affected the results. All costs are in 2013 U.S. dollars. The introduction of melatonin produced a per member per month (PMPM) change of -$0.11 for OP and a PMPM of -$0.22 for osteopenia. In conclusion, the addition of melatonin to a formulary will provide substantial cost offsets to the payer in the treatment and prevention of OP under the assumption that the effectiveness of melatonin is equal to its comparators.

6 Analysis of a unique, conserved gene system regulating development-associated gene expression for Streptomyces coelicolor

Joseph Sallmen
Biological Sciences | Bayer School of Natural and Environmental Sciences
Faculty Advisor: Joseph McCormick, Ph.D.

Streptomyces coelicolor is a Gram positive, soil dwelling bacterium that exhibits a complex life cycle. Germination of a spore results in syncytial filament formation, which undergoes branching and tip extension to form a vegetative mycelium. Environmental signals and nutrient depletion coordinate the production of physiologically distinct aerial filament formation eventually resulting in the creation of chains of spores. Early genetic studies identified two classes of genes that resulted in developmental blocks, bald and white. The bald (bld) phenotype occurs when colonies cannot produce aerial hyphae and thus appear to have a smooth, lustrous appearance. White (whi) colonies exhibit incomplete sporulation or loss of production of the concurrently produced grey pigment. While some of the original mutants have been explored, the functions of many of the identified genes are not well understood. Of particular interest is a tripartite system of genes, with multiple homologues of each gene present in S. coelicolor chromosome and in other streptomycetes. These three genes encode a predicted helix-turn-helix protein (WhiJ-like proteins), a small, acidic protein of unknown function (BldB-like proteins), and an anti-sigma factor. In order to explore the roles of these genes in development, one such system involved in the regulation of spore-associated protein (sap) expression was analyzed. sapR and sapS are whiJ and bldB-like genes, respectfully, that may regulate the expression of the sapCED spore coat operon. In order to investigate the potential roles of this gene system, single and double null mutants were isolated using recombineering. Spore coat proteins were extracted and analyzed on a Coomasie Blue stained SDS-PAGE. Analysis shows an increase in the production of spore-associated proteins in both single mutants and double mutants, suggesting a role for these proteins in developmentally-associated gene regulation. This was further confirmed by genetic complementation of the sapR and sapS mutants.
7 Analyzing the function of Streptomyces coelicolor ParH in the process of chromosome segregation and identification of a novel segregation component

Metis Hasipek
Co-Authors: Rebekah Dedrick
Biology | Bayer School of Natural and Environmental Sciences
Faculty Advisor: Joseph R. McCormick, PhD

Background: Chromosome segregation in bacteria is of central importance in microbial cell and molecular biology. In Streptomyces coelicolor, there are five known components of the partition (par) system needed for developmentally-associated genome segregation: the cis-acting centromere-like sites (parS) and four trans-acting proteins (ParA, ParB, ParJ and Scy). parA encodes a Walker-type ATPase that is essential for proper DNA segregation and the placement of the evenly spaced ParB-parS nucleoprotein complexes in aerial hyphae. The purpose of this study was to characterize the function of a second ParA homologue ParH and investigate interactions between ParH with known segregation, condensation, and cell division proteins and to screen a genomic library to find novel interacting proteins. Methods: A parH null mutant was isolated and strains containing ParH-EGFP, and ParB-EGFP in a DparH strain were constructed and analyzed by fluorescence microscopy. Site-directed mutagenesis of parH was used to change a conserved lysine residue (K99E) in the ATPase Walker A box. To determine if ParH interacts with known segregation, condensation and division proteins, an E. coli bacterial two-hybrid system based on adenylate cyclase was used. Plasmids carrying parH, parH variants, and target genes fused with both T25 and T18 fragments of cyaA and were screened on MacConkey indicator plates. A random genomic library of S. coelicolor M145 was constructed to screen for novel ParH interacting proteins. Results/Conclusion: In aerial hyphae of the ∆parH mutant, >5% of spores are anucleate compared to 1% of spores in wild type and 24% in parA null mutant. In predivisional aerial filaments, ParH-EGFP occasionally localized into a bright band or bands of fluorescence in apical compartments or as increased diffuse fluorescence toward the tip in these filaments. Different localization patterns of ParH-EGFP in aerial hyphae suggests that localization of ParH might be dynamic. This may suggest that evenly-spaced ParH bands are either localized over evenly-spaced ParB-parS complexes or ParH co-localizes with FtsZ at the evenly-spaced sites of cell division. As judged by two hybrid analyses, ParH interacts with itself and ParB. However, the Walker A motif K99E mutation in ParH and N-terminal in-frame deletion in ParH impaired the two-hybrid interaction between ParH and ParB. No evidence was obtained to indicate there is an interaction between ParH with ParA (heterodimer), ParJ, SMC, ScpA, ScpB, or FtsZ. By screening a random genomic library, the highly conserved actinobacterial signature protein HaaA (ParH and ParA-associated protein A) was found as a novel interacting partner of ParH. Interestingly, HaaA, also interacts strongly with ParA in bacterial two-hybrid system. Preliminary characterization indicates that a haaA-null mutant exhibits slight developmental defects. These data suggests that a previously unidentified protein that may play a role in developmental chromosome segregation of S. coelicolor.
8 Anti-viral immune response in the central nervous system induces Glial commitment in Neural Stem/Progenitor Cells
Apurv A. Kulkarni
Co-Authors: Taylor Scully
Pharmacology | Mylan School of Pharmacy
Faculty Advisor: Lauren A. O'Donnell, Ph.D.

Anti-viral immune response in the central nervous system induces Glial commitment in Neural Stem/Progenitor Cells. Apurv A. Kulkarni* and Lauren A. O’Donnell. Graduate School of Pharmaceutical Sciences, Mylan School of Pharmacy Duquesne University, Pittsburgh PA 15282. Viral infections in the central nervous system (CNS) are characterized by infiltration of lymphocytes into the brain parenchyma and release of pro-inflammatory cytokines. The effects of cytokines on neural cell function and survival vary between cell types, and may depend upon the expression of endogenous signaling molecules. Both inflammatory and developmentally-regulated cytokines alter the activity of neural stem/progenitor cells (NSPCs), which are critical for CNS development and repair. Moreover, the proliferation and fate of NSPCs are affected during viral CNS infections. Interferon-gamma (IFNγ) is a cytokine that is released in response to a viral infection in the brain and is required for clearance of certain viruses from the CNS. IFNγ signals via the Janus kinase/Signal transducer and activator of transcription (Jak/STAT) signaling pathway, which is also activated by developmental cytokines during cell fate decisions. The activation of JAK/STAT pathway could lead to decreased protein levels of G1/S phase cyclin/CDK complexes, leading to decreased hyperphosphorylated Rb (Y795) proteins and increased expression of CKIs (p21, p27) that could ultimately affect NSPC proliferation. Therefore, we will test the hypothesis that the IFNγ influences NSPC proliferation and differentiation through Jak/STAT signaling. In preliminary studies, we found that IFNγ activates STAT1 and STAT3 proteins, decreases NSPC cell cycle progression and proliferation. Through these studies, we will define the role of the inflammatory response in modulating NSPC activity during viral infections. These studies will also identify new targets for therapy that could salvage the CNS from harmful effects of an anti-viral immune response.

9 Baseline Water Chemistry Studies on the Allegheny River, Pennsylvania through the 3 Rivers QUEST program
Emily Mashuda
Co-Authors: Beth Dakin, Brady Porter, Ph.D.
Center for Environmental Research and Education | Bayer School of Natural and Environmental Sciences
Faculty Advisor: Brady Porter, Ph.D.

As the most important natural resources in Pittsburgh, the Allegheny, Monongahela, and Ohio Rivers are great sources of drinking water. The Allegheny alone supplies water to over one million people, and yet its use is threatened by our economic and industrial activities. Clean water is essential for life and it is important that we make efforts to monitor and improve the quality of the water on which both people and the environment are reliant on.
Working with 3 Rivers QUEST, a comprehensive water quality monitoring and reporting program, sampling of all three rivers, their headwaters, and their tributaries has taken place over the past years, with the Iron Furnace Chapter of Trout Unlimited sampling sites on the Upper Allegheny, Duquesne University sampling the Lower Allegheny River, West Virginia University sampling the Monongahela River, and Wheeling Jesuit University sampling the Upper Ohio River. This research focuses on the data collected biweekly from 14 sites on the Lower Allegheny River and its tributaries by Duquesne University. Water temperature, pH, and specific conductance were taken with a multiparameter probe. Grab samples were collected to measure Total dissolved solids, alkalinity, several anions (Bromide, Chloride, Sulfate), and several dissolved metals (Magnesium, Calcium, Sodium, Manganese, Aluminum, Iron, Strontium) and are analyzed through a certified lab for consistency. Each chemical parameter serves as an indicator for specific types of pollution and several have established levels for safe drinking water quality.

The measured parameters are believed to be significant indicators of specific types of water pollution including abandoned mine drainage (AMD), deicing salt runoff, and brine water produced from the hydraulic fracturing process for natural gas extraction. Although not toxic by itself, Bromide is considered an indicator for brine water pollution and can create carcinogenic Trihalomethanes when exposed to chlorine at drinking water facilities. Sulfate, on the other hand, is considered an indicator of AMD and has a secondary drinking water standard of 500 mg/L due to its impact of the smell and taste of drinking water. Many of the sites chosen for continuous sampling are located near major coal fired power plants, brine treatment facilities, and AMD treatment facilities, which can have drastic effects on the ecosystem. Nearby USGS stations produce stream discharge measurements, thereby facilitating conversions of concentrations (in mg/L) to stream loading (in metric ton per day). Our biweekly water quality data will establish current baseline conditions along the Allegheny River and its major tributaries for comparison to past and future data.

10 Bullying of LGBTQ Students in Southwestern Pennsylvania
Julie Buzgon
Co-Authors: Daniel Wells, Cassandra Berbary, Lisa Nesson, Amanda Griffin, Jered Kolbert, Ph.D.
School Psychology | School of Education
Faculty Advisor: Laura Crothers, D.Ed.

Approximately 30% of all U.S. students report being bullied by peers sometime during their school careers (Nansel et al., 2001). Among those at greatest risk for being bullied, are youth who identify as having a minority sexual orientation (lesbian, gay, bisexual, transgendered or questioning). Many sexual minority students encounter discrimination and victimization at school, and thus they perceive it to be an unsafe environment (Adams, Cox, & Dunstan, 2004). Particularly unsettling is that much of the victimization of sexual minority students occurs at such a low level that school-based professionals frequently do not detect these acts. An additional area of concern is the research indicating that few schools specifically address issues pertaining to sexual orientation in their anti-bullying policies (Adams et al., 2004). Therefore, in order to gauge the experiences of bullying of sexually-diverse children, a survey was constructed to measure the incidence and negative effects of bullying perpetrated against
the gay, lesbian, bisexual, transgender, and questioning (LGBTQ) student population in southwestern Pennsylvania. More specifically, the current study examines the frequency and types of bullying LGBTQ students experience, the relationship between bullying victimization and LGBTQ students’ peer and family relationships, academic behaviors, the perceived effectiveness of school anti-bullying policies, and the support that LGBTQ students feel they receive by their peers, families, and/or the school system regarding their sexual orientation, gender identity, or gender expression. The survey was administered to middle and high school students who receive services through the Persad organization, a human services organization that seeks to improve the well-being of the LGBTQ community. Descriptive and inferential statistics were utilized to report the results of students’ perceptions regarding the bullying of LGBTQ students. Frequencies and means were examined to better understand the occurrence of bullying of LGBTQ children and the impact bullying has on these students social-emotional and academic functioning.

11 Bureau of Land Management: A Case Study of Public History
Abigail Kirstein
Public History | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor: Micahel Cahall, Ph.D.

Like the National Park Service, the Bureau of Land Management (BLM) manages sites of great importance to the fields of prehistory, history, and natural history; however, BLM locations such as Cleveland- Lloyd Dinosaur Quarry (CLDQ) lack proper programming to engage the public. As Public Historians it is our duty to utilize public lands for interpretation, education, and outreach. Through these efforts, we will bridge the gap between BLM professionals and the community. As identified in the mission statement of the BLM, let us develop proper programming to “manage and conserve the public lands for the use and enjoyment of present and future generations under our mandate of multiple-use and sustained yield”. CLDQ is home to the densest concentration of Jurassic dinosaur bones in the world. With such great importance, CLDQ was recognized as the first National Natural Landmark in 1965. Soon to follow was the on-site construction of the first ever BLM) Visitor’s Center in 1968. Since its renovation in 2007, the site has suffered from scientific neglect and declining number of visitors. I propose by updating the Junior Explorer program, refocusing exhibits to include public participation, partnering with other institutions for community outreach, and the formation of onsite educational events for all ages, CLDQ can once again gain the recognition it deserves! In addition, an update of the BLM Interpretive Guideline is in need and we as publicly minded professionals are just the group to do it! Although with this document the BLM has proposed the use of interpretation throughout some sites, I urge the conversation for contemporary scholarship to be included in the guidelines. Thus, on a national scale, we can expand the knowledge and influence of public history among our beloved landscapes!
12 Characterization of serotonin receptor subtype 2C (5-HT2C) in pain and depression using novel compounds derived from marine cyanobacteria

Neil Lax
Co-Authors: CM Ignatz, K Ahmed, KJ Tidgewell, BJ Kolber
Biological Sciences | Bayer School of Natural and Environmental Sciences
Faculty Advisor: Benedict J. Kolber, PhD

Chronic pain and major depressive disorder are widespread conditions in the United States. Interestingly, these conditions often occur comorbidly, with each individual disease amplifying the symptoms of the other. Many medications available on the market today for treating pain or depression target G-protein coupled receptors (GPCRs), implying that this class of receptors may be involved in the development of the comorbidity of these conditions. Our lab has sought to characterize a poorly understood GPCR, the serotonin 2C (5-HT2C) receptor, and the role that it plays in comorbid pain and depression. Our approach for targeting this receptor uses compounds isolated from filamentous marine cyanobacteria collected off of the coast of Panama in the Pacific Ocean. Compounds from this cyanobacterial collection show strong affinity for the 5-HT2C receptor. These compounds were screened for in vivo activity using a series of pain and depression behavioral assays. Compounds were delivered in male C57Bl/6J mice via intra-cerebroventricular (ICV) cannulas. Compounds were tested in naïve mice or in mice subjected to a model of comorbid pain and depression, the Spared Nerve Injury (SNI) surgery. SNI surgery involves ligating two of the three branches of the sciatic nerve, the tibial and common peroneal branches, while leaving the third branch, the sural branch, intact. SNI surgery induces mechanical hypersensitivity in the ipsilateral paw (modeling pain) and also induces depression-like behavior. We have found that ICV injections of the compound isolated from the marine cyanobacterium induce effects in several standard behavioral assays. Our results suggest that the 5-HT2C receptor may be a key target in the future development of compounds used to treat comorbid pain and depression.

13 Cognitive Correlates of Relational and Social Aggression in an Urban University Female Sample

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Despite an increase in bullying research and intervention, almost one-third of adolescents still report experiencing bullying victimization (Robers, Zhang, Truman, & Snyder, 2012). Two types of aggressive behaviors that contribute to this rate of victimization are referred to as relational and social aggression. Relationally aggressive acts are those that are typically directed at another individual with whom one has an existing relationship, and when the aggressor has the specific aim of causing psychological harm to the victim. Socially aggressive acts, however, are completed in order to manipulate and/or damage the victim’s social status or group membership, through either covert or overt means. While the pattern of behavior associated with relational and social aggression, as well as the aggressive individual’s goals for completing these types of behaviors, has been studied, little is known about the
underlying cognitive skills and processes that may be necessary in order to complete this type of aggression. This investigation examines whether certain cognitive skills, including verbal comprehension abilities, visual-spatial abilities, fluid reasoning, short term memory, long term memory, auditory processing, and processing speed are related to the use of relational and/or social aggression in an adolescent female sample. In order to determine the relationship between cognitive skills and aggressive behaviors, adolescent females attending an urban university in the mid-Atlantic region were recruited to complete a short battery of assessments. Consenting subjects were administered the standard battery of the Woodcock-Johnson Test of Cognitive Abilities – Third Edition in order to ascertain each individual’s cognitive abilities. Subjects were also administered the Young Adult Social Behavior Scale; a self-report measure of healthy and maladaptive behaviors in friendships or relationships. Correlational and regression analyses were then completed to determine whether subjects’ cognitive abilities were related to, or could predict, subjects’ rate of self-reported behaviors consistent with relational and social aggression.

14 Critical roles for interferon-gamma producing immune cells during neonatal central nervous system infections.

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Viral infections in the central nervous system (CNS) are associated with devastating neurological consequences (mental deficits, seizures, and death), particularly in newborns. Despite mounting both innate and adaptive immune responses, neonates are often unable to control viruses in the brain and suffer extensive neuronal loss, potentially due to deficits in anti-viral cytokine production. In order to study the response of the neonatal immune system to viral CNS infections, our laboratory uses a transgenic mouse model (NSE-CD46) of neuron-restricted measles virus (MV) infection. NSE-CD46 mice express the human isoform of CD46, a MV receptor, under the control of the neuron specific enolase (NSE) promoter, allowing for infection only in CNS neurons. Adult NSE-CD46+ mice clear MV from CNS neurons in an interferon gamma (IFNg)-dependent and T-cell dependent manner. In contrast to NSE-CD46+ adults, neonatal NSE-CD46+ mice succumb post-infection and show 100% mortality at 15 days post infection (dpi). Neonatal mice lacking IFNg (CD46+/IFNg-KO) succumb more rapidly than NSE-CD46+ neonates (100% mortality by 10 dpi) despite higher levels of CD4, CD8 T-cell and NK cell infiltration into the brain. Adult CD46+ and CD46+/IFNg-KO have a higher infiltration of CD4+ T-cell compared to neonates in their respective genotype. In CD46+/RAG-2-KO neonates, which lack T- and B-cells, show reduced mortality in comparison to other immunocompetent neonates, with 20% of the pups surviving the infection. CD46+/RAG-2-KO neonates also have lower viral RNA in the CNS than immunocompetent NSE-CD46+ and immunocompromised CD46+/IFNg-KO neonates. We hypothesize that MV control in CD46+/RAG2-KO neonates could be provided by IFNg-producing natural killer (NK) cells. Current experiments aim to define the role of NKs in the enhanced viral control observed in CD46+/RAG2-KO neonates and to identify relative levels of IFNg expression in adult and neonatal brains over the course of MV infection.
**15 Determination of API Content Uniformity and Water Content in Transdermal Drug Delivery Systems Using Near-infrared spectroscopy (NIRS)**

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Transdermal drug delivery systems (TDDS) deliver drugs through epidermis, bypassing the hepatic first-pass metabolism. This delivery route offers advantages such as avoidance of gastrointestinal side-effects, controlled release rates and improvement of bioavailability. By far, the methods used to establish patch quality involves repeated tests of the finished products for different physiochemical properties. Near infrared spectroscopy (NIRS) is a potential tool to help characterize multiple patch attributes all at one time. However, the difficulty in measurement is low signal level caused by the low patch thickness and the significant interference due to physical variations. It is the objective of this study to develop NIR methods to facilitate the extraction of relevant information for quantifying drug content and water content in drug-in-matrix transdermal patches. The patches were prepared based on a three-component formulation. The active pharmaceutical ingredient was acetaminophen, and two polymers used were polyvinyl pyrrolidone (PVP) and hydroxyl propyl methylcellulose (HPMC). A central composite design was employed where the factors varied were the API content and the ratio between the two polymers. The humidity model was calibrated from data collected during real-time drying process. A test set was composed of samples equilibrated at high relative humidity environment. The resultant models were able to accurately determine drug uniformity and water content in transdermal patches. The fast NIR method would permit continuous quality control of chemical constituents as well as humidity levels in the production line.

**16 DNA Barcoding as a Non-invasive Strategy for the Identification of Prey from the Feces of Louisiana Waterthrush (Parkesia Motacilla)**

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Diet studies provide ornithologists with vital information regarding the environmental needs of avian species, which may improve the outcome of conservation efforts. The molecular approach of DNA barcoding offers researchers an accurate and non-invasive alternative to the antiquated techniques often utilized in avian diet studies. For insectivorous taxa, the fecal sacs of developing nestlings contain residual DNA from digested prey, which can be identified via molecular techniques. In this study, we developed a non-invasive technique for analyzing the diet of the Louisiana Waterthrush from collections of nesting fecal sacs. The fecal sacs were collected from multiple Waterthrush nests within the Carnegie Museum of Natural History’s Powderrmill Nature Reserve near Rector, Pennsylvania. The fecal sacs were rich in undigested insect remains and residual DNA, which were amplified with insect-specific primers using Polymerase Chain Reaction (PCR). Due to environmental exposure, the DNA was highly degraded,
and thus, necessitated the use of primers capable of amplifying short segments of DNA (157 bp) within the Cytochrome C Oxidase Subunit I (COI) gene. The resulting DNA amplicons were TA cloned, sequenced and identified using the Barcode of Life Database (BOLD). In our preliminary findings, we successfully identified three unique arthropod genera, all of which are known to naturally occur at our study site: Epeorus (Mayfly), Heptagenia (Mayfly) and Nigronia (Hellgrammite). In all cases, the amplicon obtained from fecal sac DNA matched the published sequences by greater than 95%.

17 Effect of reproductive condition on the hypothalamic-pituitary-adrenal axis of a terrestrial salamander
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In vertebrates, many stress responses are mediated by the hypothalamic-pituitary-adrenal (HPA) axis, of which corticotropin-releasing factor (CRF) and glucocorticoids (GCs) such as corticosterone (CORT) are components. The axis is sensitive to various factors and many species exhibit seasonal changes in both baseline and stress-induced GCs with levels being elevated during the breeding season (Romero, 2002). Reproductive condition is thought to play a role in regulating the HPA axis. To examine this relationship, we conducted a field study using female red-legged salamanders (Plethodon shermani) which oviposit every other year, allowing comparison of reproductive and nonreproductive females under similar environmental conditions. We evaluated baseline and handling-induced levels of plasma CORT as well as the number and distribution of immunoreactive (IR) CRF neurons in both reproductive and nonreproductive females. In previous work, we identified five populations of CRF neurons in female P. shermani: subpallial amygdala, magnocellular preoptic area (POA), parvocellular ventral POA, hypothalamus, and locus coeruleus (LC). Of these populations, cells found in the POA, analogous to the mammalian paraventricular nucleus (PVN), are implicated in the HPA axis. We hypothesized that reproductive condition would modulate the HPA axis, with reproductive females having elevated baseline plasma CORT, blunted CORT responses to handling, and fewer CRF-IR neurons in the POA. We saw no differences in baseline plasma CORT, and neither reproductive nor nonreproductive females had CORT responses to handling. The total number of baseline CRF-IR neurons was significantly higher in nonreproductive compared to reproductive females, due in part to differences in the LC, an area of the brain involved in activation of the sympathetic nervous system (SNS). While no effect of reproductive condition on plasma CORT or CRF-IR neurons in the POA was observed, our results suggest that reproductive condition may affect CRF in its role as a neurotransmitter in the SNS.

18 Establishing skill-based core curriculum in the laboratory setting with a uniform approach
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The medical field is constantly adapting to the newest technology and research. Staying current on best
clinical practice can be challenging for adjunct clinical faculty who have years of practice. Nursing students need to learn skills and competencies that are founded on current evidence. In order to achieve this goal with the ever increasing graduating class size in the school of nursing, a uniform educational approach was initiated in the clinical laboratory setting. It included a curriculum change to incorporate Health Assessment and Fundamentals of Nursing Practice and Ethics into one laboratory class. The students are provided the core information in two separate lecture courses and then meet jointly for the laboratory component of the course. There are thirty-eight adjunct faculties instructing in the laboratory setting for these courses. To ensure that each instructor was able to teach the students the most current, evidence based clinical practices and to provide a uniform learning experience for the students; each instructor was provided with standardized teaching “keys”. As a graduate assistant, it has been my responsibility to organize the laboratory setting and provide the instructors with the key information required to maintain a uniform learning experience for the students. I also provide assignments to the students prior to coming to the laboratory in order that they are prepared to have a hands-on learning experience. This presentation will discuss the need for standardized clinical experiences, the implementation of the standardized approaches, and evaluation of its effectiveness.

19 Evaluating Polyglutamine Peptide Monomers and Dimers With Enhanced Sampling MD Simulations
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Huntington’s disease is a neurodegenerative disease characterized by mutations causing polyglutamine (polyQ) repeats in proteins. Mutated proteins misfold, aggregate, and form amyloid-like fibrils in the neuron. Experimental techniques such as resonance Raman, circular dichroism, and ssNMR are used to analyze properties of polyQ systems, but lack the ability to monitor the molecular aggregation mechanism. In this work, polyQ peptide monomers and dimers are studied using molecular dynamics (MD) methods in order to better understand early stages of aggregation. We have characterized the monomeric conformational ensemble of D2Q10K2 peptides in aqueous and protein-globule environments using metadynamics MD simulations. Metadynamics enables exploration of the free energy conformational landscape for these peptides The differences between peptide structure in these conditions may play a key role in nucleation. We’ve also begun investigation of the dimerization properties of polyQ peptides. Adaptive biasing force paired with MD is used to evaluate the dimerization free energies and conformations of D2Q10K2 peptides. Classical MD is used to simulate the favorable dimeric conformations in equilibrium, as to better understand the interactions and dynamics of these structures. Results from these simulations will be presented and discussed.

20 Genetic analyses of ftsK and ftsK-like genes for development-associated chromosome segregation in Streptomyces coelicolor
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Streptomyces coelicolor is a gram-positive soil bacterium with a complex life cycle, which has been used to study development for many years. During morphological differentiation, aerial hyphae synchronously divide into chains of unicellular compartments metamorphosing into spores. Synchronous division involves faithful simultaneous segregation of the replicated linear genome into newly formed prespores. Among other proteins, the DNA translocase FtsK directs chromosome segregation by forming a hexameric ring structure around the DNA at the septa. In S. coelicolor, in addition to ftsK, there are two other potential ftsK-like coding genes that have not yet been examined for redundancy of function during development-associated segregation. The purpose of this study is to construct ftsK-like mutant strains using a PCR-directed mutagenesis (recombineering) approach for genetic and phenotypic analyses using DNA staining and fluorescent gene fusions. Mutants for one gene have been isolated and are currently being characterized. Once verified, double mutant strains for ΔftsKΔftsK-like deletion will be constructed. Another part of this project is to investigate whether segregation proteins interact with FtsK by employing a bacterial two-hybrid (BACTH) system. To explore potential interaction partners of FtsK, the 3’ end of the ftsK encoding the cytoplasmic motor domain of FtsK was cloned into BACTH vectors and was analyzed for interaction with itself. Preliminary observations indicate interaction of FtsK with itself corresponding to the multimerization of its structure and weak interaction with two other segregation proteins ParA and ParJ. Analyses of the roles of FtsK and FtsK-like proteins can further elucidate the complexities of chromosome segregation in filamentous and sporulating bacteria.

21 Greater Trochanter-Ischial Impingement: A Potential Source of Posterior Hip Pain
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Purpose: Retro-trochantic hip pain is poorly understood. Preliminary investigation has identified that greater trochanteric-ischial impingement can occur when the hip is in a flexed, abducted and externally rotated position. The purpose of this study was to describe greater trochanteric-ischial impingement and the hip position where the impingement occurs.

Subjects: Twenty-five hips from 14 embalmed cadavers (7 male; 7 female) with a lifespan ranging between 46-91 years were used for this study.

Methods: The pelvic region of each cadaver was skeletonized leaving the hip capsule and sciatic nerve. The hip capsule was then vented. From 90° of flexion, the hip was extended while maintaining a position of 30° abduction and 60° lateral rotation. A positive finding was defined when the greater trochanter came into contact with the ischium. When a positive finding was noted the degree of hip flexion was recorded. The procedure was repeated in 0° abduction. A FABER test was then performed on all specimens, looking for greater trochanteric-ischial impingement, as defined above. Each test was performed 3 times by two examiners to ensure intra- and inter-tester reliability.

Results: A positive finding with Patrick-FABER test was noted in 96% (24/25) of hips. In 30° abduction a positive finding was noted in 92% (23/25) of hips at an average of 47° flexion (SD 10; range 20-60°). In 0° abduction a
positive finding was noted in 32% (8/25) of hips at an average of 59° flexion (SD 6; range 52-70°).
Conclusion: The greater trochanter can impinge on the ischium when the hip is extended from 90° flexion in a 60° externally rotated position. This impingement occurred more commonly when the hip was in 30° abduction compared to neutral abduction. The Patrick-FABER test reproduced impingement in almost all specimens.

22 Investigation of the role played by the RNA G-quadruplex structure in ALS/FTD pathology
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Amyotrophic lateral sclerosis (ALS) is a fatal neurodegenerative disorder resulting in motor neuron loss in brain and spinal cord. Frontotemporal dementia (FTD) is one of the most common forms of young onset dementia and second most common form of dementia overall, after Alzheimer’s, resulting in degeneration of temporal lobes along with personality changes and language impairment. ALS and FTD are now recognized as members of a broad continuum of neurodegenerative disorders, linked by similar pathology, mechanisms, and overlapping clinical symptoms. Two RNA-binding proteins of interest that link the two diseases are TAR DNA-binding protein 43 (TDP-43) and the fused in sarcoma/translocated in liposarcoma protein (FUS), which are the major protein components in over 90% of ALS and over 50% of FTD inclusions. We hypothesize that the G-quadruplex RNA structure might play an essential role in the pathogenic mechanisms of FUS in ALS and FTD. In this study, the G-quadruplex RNA binding properties of the wild type and C-terminal NLS mutant FUS protein implicated in ALS/FTD will be analyzed.

23 Investigation of Well Water Contamination Associated With Natural Gas Storage
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Groundwater is an important resource in Pennsylvania, where more than three million residents obtain drinking water from private wells (the second highest number in the United States). Water quality monitoring is therefore vital as the oil and gas industry expands throughout the state. While hydraulic fracturing has received much attention, transportation (through trucks, rail, pipelines, etc.), storage, and processing should also be examined for groundwater impacts. Underground injection of natural gas is a common storage mechanism, wherein natural gas is injected into subsurface reservoirs and stored under pressure for later use. This study examines private well water quality in Bedford County, Pennsylvania with several new natural gas storage wells, to investigate the possibility of aquifer contamination. Twenty-four homes were sampled, each in both the spring and fall of 2013. Over 50 parameters were analyzed, including pH, conductivity, heavy metals, and volatile organic compounds. A comparison of results from two seasons could shed light on possible impacts from natural gas storage activities.
24 Justification of the Use of PGD for choosing Savior Children
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Faculty Advisor: Glory Smith

Is it ethical to use Pre-implantation Genetic Diagnosis to create babies to save others? This presentation will review the main ethical arguments that discuss the Use of PGD for choosing Savior Children. The main arguments will first discuss the Pre-implantation Genetic Diagnosis and the possible Recipients to the savior child. Then it will argue the normative debate on whether a savior child is ethical. Later, it will examine the normative debate over how to use the savior child after its birth. Lastly, it will assess the normative ethical criterion to justify Pre-implantation Genetic Diagnosis for choosing a savior child through the Principles of Double Effect. The presentation will argue that the practice is morally and ethically acceptable under the scientific, the ethical and the religious conditions. All previous arguments do not establish a sufficient ground to forbid parents to use Pre-implantation Genetic Diagnosis and tissue typing to save not only a sibling, but even any other loved ones.

25 Ligand Design Based on Tetradentate Tris(2-pyridylmethyl)amine (TPMA)Skeleton for Copper Catalyzed Atom Transfer Radical Polymerization (ATRP)
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Tetradentate ligand, tris(2-pyridylmethyl)amine (TPMA) has resulted in the formation of highly active and stable copper complexes used for catalyzing various radical processes such as atom transfer radical addition (ATRA), cyclization (ATRC) and polymerization (ATRP). These reactions are the fundamental organic transformations used to generate C-C bond via addition of the alkyl halides across alkene in the presence of the reducing agents. In pursuit to design even more active catalytic system to activate C-X (X= Cl, Br) bond for less active alkyl halides, three new ligands 1-(5-methoxy-4,6-dimethylpyridin-2-yl)-N,N-bis(pyridin-2-ylmethyl)methanamine (TPMA*), bis(5-methoxy-4,6-dimethylpyridin-2-yl)-N-(pyridin-2-ylmethyl)methanamine(TPMA2*), tris((5-methoxy-4,6-dimethylpyridin-2-yl)methyl)amine (TPMA3*) with TPMA backbone were designed. These ligands have electron-donating groups such as methyl and methoxy are attached at 3,4,5 position on the pyridine rings. Using these ligands, six novel copper based catalytic systems were synthesized and characterized using IR, UV-Vis spectroscopy, cyclic voltammetry and single crystal X-ray crystallography.

26 Mechanisms underlying the effect of melatonin, strontium citrate, vitamin D3 and vitamin K2 on bone marrow stem cells and peripheral blood monocytes grown as co-cultures
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The bone remodeling system preserves bone integrity by balancing the activities of bone-forming osteoblasts and bone-resorbing osteoclasts. Shifting of this equilibrium system towards osteoclastic bone resorption leads to osteopenia, osteoporosis and major fractures. A clinical trial, Melatonin-micronutrients Osteopenia Treatment Study (MOTS), was designed to assess the efficacy of a combination of bone tropic agents: melatonin, strontium citrate, vitamin D3 and vitamin K2 (MSDK) on bone health and quality of life in post-menopausal osteopenia. One aspect of this translational study examined the mechanisms underlying MSDK’s effects on osteoblast and osteoclast differentiation using a novel co-culture system of human bone marrow stem cells (hMSCs) and human monocytes (hPBMCs). Using a treatment paradigm that closely mimics the in vivo condition, hMSC/hPBMC co-cultures were exposed to vehicle or MSDK in osteogenic (OS+) or growth medium (OS-) for 21 days. Co-cultures grown in OS+/MSDK medium demonstrated enhanced osteoblast differentiation with inhibited osteoclast differentiation. To identify potential mechanisms underlying MSDK’s action, osteoprotegerin (OPG) and RANKL levels were measured in both hMSC/hPBMC co-cultures and in hMSC monocultures. Osteoblasts grown as a co-culture with osteoclasts and exposed to OS+/MSDK had decreased OPG: RANKL ratios; this was due to increases in OPG and decreases in RANKL. Ratios of secreted OPG: RANKL were also decreased however, this was due to increases in sRANKL only. Human MSCs grown as a monoculture and exposed to OS+/MSDK had increased ratios of OPG: RANKL, which was due to increased OPG levels only. In conclusion, our data reveal that MSDK has dual actions on bone cells in-vitro to enhance osteoblast differentiation while inhibiting osteoclast differentiation; and this occurs through a modulation of OPG and RANKL expression and release from the osteoblast. These findings also suggest that the presence of the osteoclast plays a significant role in MSDK-mediated modulation of OPG: RANKL ratios, especially on RANKL expression in differentiating osteoblasts.

27 Muscular Power Tests Predict Knee Joint Excursion but not Initial Contact Angle in NCAA-D1 Female Athletes
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Context: Existing methods to predict ACL injury risk from landing kinematics require sophisticated equipment and expertise. Utilization of field-based tests that predict landing kinematics would provide a practical means to identify sub-optimal landing kinematics. Objective: To develop a predictive model for sagittal plane tibiofemoral landing kinematics from the results of muscular power tests. Design: Descriptive laboratory study. Setting: University research laboratory. Patients or Other Participants: 29 female, NCAA-D1 college athletes (age= 19.03±1.09years; weight=66.56±13.47kg; height=171.16±7.92cm) participated. Interventions: Participants performed five unilateral, dominant lower extremity (LE) landings from a 35cm platform onto a forceplate (Bertec Corporation; Columbus, OH). LE three-dimensional kinematics during the landing task were captured with electromagnetic sensors (Ascension Technology; Milton, VT) interfaced with motion analysis software (Innovative Sports Training; Chicago, IL). Then in a randomized order, participants performed three standardized field-
based tests of LE power: single limb triple hop (SLTH), countermovement vertical jump (CMVJ) and the
Margaria-Kalamen (MK) test. The kinematic trials were signal averaged for each participant. Sagittal
plane tibiofemoral joint angle at initial contact (IC) and excursion (EXC) values in the first 0.1s after
ground contact were determined and entered into a statistical software package. Main Outcome
Measures: Multiple linear regression analyses produced one model predicting IC and one predicting EXC
from the independent variables. Alpha levels were set a priori at P≤ .05. Results: A two variable (MK,
SLTH) linear regression model that predicted EXC was significant (r²=.269, P=.017), however the model
that predicted IC was not (P=.890). Conclusions: A statistically significant amount of variance for EXC
may be explained with select field power tests using a multiple linear regression model. The clinical
meaningfulness however, is unclear. The field based power tests utilized in this study were not capable
of predicting sagittal plane IC during the unilateral landing task.

28 On-Line Separation and Fluorescent Tagging of Bioactive Lipids Using Droplet-Based
Microfluidics and Single Photon Counting Detection
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Primary fatty acid amides (PFAMs), a subclass of fatty acyls, have been found in several specific tissues
and biological fluids, and have been shown to exhibit a wide range of physiological effects. Endogenous
PFAMs have been found in the nM range, requiring sensitive detection systems for quantitation at
physiological concentrations. Mass spectrometry has been predominantly used as the optimal detection
system; however, its limits of detection and quantitation fall on the periphery of biologically native
PFAM concentration, thus, laser induced fluorescence (LIF) becomes an attractive detection system as it
presents the ability to approach single molecule detection limits. Microfluidics enables both chemical
reactions and detection to be performed on-chip at nL volumes. By utilizing droplet-based microfluidics,
reaction efficiency and time are greatly improved, allowing primary fatty amines (PFAM derivatives) to
be fluorescently tagged at physiological concentrations. PFAMs must be converted to their conjugate
amines prior to fluorescent tagging due to the delocalization of electron density caused by the carbonyl
group on the amide. Naphthalene dicarboxaldehyde (NDA) was used for fluorescent tagging reactions
and subsequently tagged amine standards were serially diluted to show detection limits of five
fmol/amine using reverse phase high performance liquid chromatography coupled to a fluorescence
detector. The use of a microfluidic platform with LIF and single photon counting detection system has
currently lowered detection limits to the low amol/droplet range. Droplet-based microfluidics acts as
total analysis system enabling chemical separation, fluorescent tagging, and detection to all be
performed on-line with little user interaction, thus increasing reproducibility and throughput. The
optimized methodology will be used to determine endogenous concentrations of PFAMs extracted from
biological samples. All work was supported by the National Institute of Health (2R15 NS038443)
29 Optogenetic Investigation of Bladder Pain Processing
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Traditionally, sensory information from midline visceral organs like the intestines and urinary bladder was thought to be processed equally by the central nervous system. Recent studies however have suggested unequal processing of pain information from these structures in the left and right central amygdala (CeA). Located in the left and right brain hemispheres respectively, the left and right CeA are homologous structures that are part of the brain’s emotional processing system. It has been shown that pharmacological activation of the right CeA causes an increase in pain responses to bladder distension, however the contributions of the left CeA to this same process remain unknown. To learn more about this asymmetrical processing of visceral pain, we used optogenetics to activate the left or right CeA while performing bladder distension. Optogenetics is a novel technique in which animals are genetically engineered to express light-sensitive ion channels in a brain region of interest. Introduction of laser light into this brain region will then result in membrane depolarization and activation of ion channel-expressing cells. Reported here are the results of left CeA activation and right CeA activation in the context of highly-painful and relatively non-painful bladder distension. Additionally, the results of off-target activation are presented. Finally, using staining techniques, we identify the cells in each amygdala that may be depolarized following optogenetic activation.

30 Regulation of the 3’ UTR in BDNF mRNA at the DNA level
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Brain-derived neurotrophic factor (BDNF) is part of the neurotrophic family of genes encoding for proteins known to promote survival of neurons in the peripheral and central nervous systems. The expression of the BDNF gene results in the production of two mRNAs with different lengths, one with a short 3’ untranslated region (UTR) and the second with a long 3’ –UTR, which are believed to serve different functionalities. The long 3’ -UTR mRNA is found in both dendrites and soma, whereas the short 3’ -UTR is only found in the soma, implying that the long 3’ -UTR BDNF mRNA is involved in maintaining the neuroplasticity of the brain. A sequence of the BDNF mRNA 3’ UTR has been analyzed for its potential to form the secondary structures G-quadruplex and i-motif which are suspected to play a role in regulation of 3’ –UTR length.
Edward Hahnenberg draws on the Cappadocian Trinitarian ontology of “Being-in-Relation” to describe the sacramental character of Orders. Because this tradition assumes that being is irreducible to substance and must be rooted in personhood, he is able to suggest that the ontological change of Ordination is a change in personhood. His concept of “ecclesial repositioning” in many ways enlivens the notion of sacramental character, yet it lacks adequate reflection on the permanence of an “indelible mark” so pervasive in Roman Catholic theology. This paper briefly examines the historical and theological context of the Cappadocian view of being. Secondly it summarizes Hahnenberg’s appropriation of “Being-in-Relation” to describe the idea of “ecclesial repositioning,” noting where it is in discontinuity with the Western tradition. Lastly, as a moderating position, I turn to the postmodern notion of narrative. Lieven Boeve describes the necessity of a Christian narrative that is open to interruption. I suggest that when the individual’s narrative is interrupted by the narrative of the Christian community through Ordination, the individual’s narrative is forever changed. The newly formed relationships through the sacrament create an ontological change in the ordained. This interruption acts as a permanent modification in the person’s narrative. In this narrative scheme, the ontological change is both rooted in personhood and indelible.

Thinking, playing, and learning are the occupational activities for children to apply in their daily life. However, children often don’t engage in these activities appropriately and adults don’t always teach children proper engagement activities. What we do instead is ask them to memorize trivial facts about numbers, grammar, and the French Revolution. The question is that why don’t we make them think, learn, and play (Papert, 2005). Teaching children programming is a new way to make them think, learn, and play. Also, develop their computational thinking and problem solving skills. In particular, in this century, computational thinking and problem solving via coding is the best way to solve science, technology, engineering and mathematics (STEM) problems, and that is also what students need. ScratchJr block-based programming language for iPad designed for young novice programmers, ages 5 to 7. The goal with ScratchJr is not simply to help young kids learn to code. The world of ScratchJr is expanding opportunities for young novice programmers to imagine, create, and learn through coding. The ultimate goal is to help young novice programmers develop as creative thinkers, makers, and innovators. References Papert, S. (2005). Teaching children thinking. Journal of structural learning,4(3), 219-230.
33 Severely stressed astrocytes can still protect neighboring neurons

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Protein misfolding stress or proteotoxicity and oxidative stress are hallmarks of neurodegenerative diseases and impact both neurons and glia, two major cell types in the brain. Astrocytes are exposed to proteotoxicity and oxidative stress in neurodegenerative disorders but, unlike neurons, do not appear to die in large numbers. Some studies also suggest that astrocytes within resistant brain regions increase their synthesis of the antioxidant glutathione in neurodegenerative disorders. These observations suggest that astrocytes may be able to adapt to severe proteotoxic and oxidative stress. In order to determine how astrocytes can defend themselves against severe proteotoxicity and oxidative stress, we treated primary cortical astrocytes with lethal concentrations of the proteasome inhibitor MG132 or the oxidative toxin paraquat and examined the survivors for potential stress adaptations. We found that astrocytes exposed to high concentrations of MG132 or paraquat were resistant to proteotoxic or oxidative insults applied as a second hit. The protection was so robust that severely stressed astrocytes were even protected against a third hit. MG132 induced a rise in glutathione and inhibition of glutathione synthesis rendered surviving astrocytes highly sensitive to a second MG132 hit. Severe stress also increased glutamate cysteine ligase, an enzyme that catalyzes glutathione synthesis. These data suggest that glutathione defenses are essential for preventing proteotoxic cell death in stressed astrocytes. MG132 also raised ATP levels in this model, an adaptive response that may fuel the increase in glutathione synthesis. Finally, we discovered that severely stressed astrocytes can still protect neighboring neurons against MG132 in mixed astrocyte/neuron co-cultures. These findings demonstrate that astrocytes can survive severe stress in a glutathione-dependent manner and that stressed astrocytes retain their neurosupportive roles. The ability of astrocytes to adapt to severe proteotoxic and oxidative stress may therefore be reflected in the slow and protracted nature of neurodegenerative disorders.

34 Single Cell Detection of Circulating Melanoma Via Photoacoustic Flow Cytometry

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Melanoma is estimated to kill 9,710 men and women in the United States this year alone. This form of skin cancer grows roots down into the surrounding tissue where metastatic cells split off and spread throughout the circulatory and lymphnotic system creating secondary tumors anywhere in the human body. Current methods of detection include the tagging of florescent and magnetic nanoparticles, immunocytochemical staining with monoclonal antibodies against epithelial proteins and PCR based assays. These techniques are used in the enrichment and detection of circulating tumor cells (CTCs) but are faced with challenges such as lack of sensitivity, white blood cell contamination, sample loss in the enrichment process and signals that are compromised by cell contamination. In photoacoustic flow
cytometry a sample of blood is spun down using centrifugation until the red blood cells, white blood cells and plasma have been separated into individual layers. The white blood cell layer is extracted from the sample and flowed through a detection chamber where it is irradiated with high frequency laser light. Due to the circulating melanoma cell’s absorbance of light, the cell begins to contract and expand at such a rate that it emits an ultra-sonic acoustic wave. This wave is acquired by a transducer which converts the acoustic wave into a voltage and is effectively detected at a known point. Knowing where the CTC is, the volume it occupies, and the flow rate of the sample, researchers are able to isolate the cell for further diagnostic analysis. We have tested 9 stage IV melanoma patients to find 2-66 CTCs in 1ml samples. Using fluorescent tagging, we imaged the captured cells and verified their identity by targeting the MART 1 antigen that is a defined characteristic of melanoma. Photoacoustic flow cytometry can be used for the in vitro detection of a single circulating melanoma cells. Detection of these rare metastasis play a vital role in collecting data that can be used in the diagnosis of patients and development lifesaving therapies.

35 Stress And Disease: The Effects of Corticosterone on Chytrid Fungus Susceptibility in the Red-Legged Salamander Plethodon Shermani
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The fungal pathogen Batrachochytrium dendrobatidis (Bd) infects amphibian species and can cause the disease chytridiomycosis. Bd-associated population declines have been observed worldwide, and research into the mechanisms underlying Bd susceptibility is needed. It is thought that long-term exposure to environmental stressors can suppress immunity via release of the stress hormone corticosterone (CORT), thus increasing the virulence and lethality of Bd. Therefore, we hypothesized that a repeated elevation of plasma CORT would increase Bd susceptibility and chytridiomycosis development in red-legged salamanders, tested in 2 separate experiments. For Experiment #1, plasma CORT was exogenously elevated in animals for 9 consecutive days using dermal patches, then animals were inoculated with either a high dose of Bd or sham inoculum. For Experiment #2, CORT was elevated for 7 consecutive days, then animals were inoculated with a low dose of Bd or sham inoculum, after which CORT was elevated for another 7 days. In Experiment #1, compared to sham-inoculated animals, Bd-treated animals showed greater body mass loss, skin sloughing, and mortality. Additionally, while Bd infection intensity increased throughout the study, there were no significant differences in infection loads between Bd-treated animals with elevated CORT and Bd-treated animals exposed to oil patches. In Experiment #2, Bd-treated animals showed no significant infection or disease development, compared to sham-inoculated animals. However, Bd-inoculated animals sloughed their skin significantly more than sham-inoculated animals, and Bd-treated animals with elevated CORT showed significantly more skin sloughing than Bd-treated animals exposed to oil patches. Overall, a long-term CORT elevation did not impact infection intensity or fatal chytridiomycosis development. Skin sloughing, possibly influenced by CORT, may have prevented Bd infection from occurring at the lower dosage.
36 Surface Modifications of Polymer Nanoparticles for Nitric Oxide Delivery

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Biofilms are often a result of the colonization of Pseudomonas aeruginosa bacteria. Recent studies have shown that high quantities of systemic nitric oxide, a highly reactive free radical, are effective at biofilm dispersal and inhibition through nitrosative stress. Here it is posited that small quantities of nitric oxide delivered directly to the site of infection could also be effective. The nanoparticles were synthesized from biocompatible poly-lactic-co-glycolic acid and polyvinyl alcohol polymers. A 16-phosphonohexadecanoic acid thin film was formed on the nanoparticle surface. Diffuse reflectance infrared Fourier transform spectroscopy and ultraviolet-visible spectroscopy was used to confirm film formation and monitor the subsequent attachment of cysteamine. Nitric oxide release was quantified using a nitrate/nitrite colorimetric assay. Particle size and charge were determined using a Zetasizer. Additional nitric oxide releasing molecules will be tethered to the formed thin films on the nanoparticle surface.

37 Surveying Five Pennsylvania State Threatened Darters Using Traditional and Environmental DNA (eDNA) Techniques

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Within the upper Ohio River system of Pennsylvania there are several species of state threatened fish called darters. Darters, which are small-bodied benthic fish (they live on the river bottom), are considered indicator species of habitat integrity and should be incorporated into models that predict the effects of urbanization (increased storm run-off and impervious surfaces). The U.S. Environmental Protection Agency determined that darters are indicator species for bioaccumulation of chemicals that are harmful to humans and biota. Darter populations in the upper Ohio River system are disjunct because of previous water quality degradation, and the navigational lock and dam (L/D) system (and its maintenance, i.e. dredging). In addition, the conservation management of imperiled fish species is often hindered by the difficulty to obtain accurate survey data using traditional sampling methods. Electrified benthic trawling in large rivers can be challenging because it is labor intensive, potentially dangerous to personnel, and may harm the captured fish from abrasion due to rocks and debris entering the trawl. We focused our efforts on sampling below lock and dam installations on the lower sections of the Allegheny and Monongahela Rivers, and the upper Ohio River. Our five target species include the bluebreast darter (Etheostoma camurum), the Tippecanoe darter (Etheostoma tippecanoe), the spotted darter (Etheostoma maculatum), the gilt darter (Percina evides), and the river darter (Percina shumardi). Trawling surveys are being compared to a non-invasive environmental DNA (eDNA) method that uses water samples. eDNA is captured on filters, extracted, and amplified with species-specific primers using
polymerase chain reaction (PCR). Each darter species is detected by a unique combination of a fluorescent color and sized PCR product during fragment analysis on an ABI 3130 genetic analyzer. This method shows promise as a new non-invasive technique for species detection within habitats that are traditionally difficult to survey.

38 Synthesis and characterization of substituted pyrazole ligands capable of hydrogen bonding for copper-catalyzed atom transfer radical cyclization
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Atom transfer radical cyclization (ATRC) is a useful tool for the conversion of dialkenes to cyclic compounds. In order to achieve high yields for ATRC, the deactivation rate (kd) needs to be small relative to the deactivation rate for atom transfer radical addition (ATRA). A relatively successful catalyst for ATRC has been [Cu(TPMA)Br][Br] (TPMA= tris(2-pyridylmethyl)amine), but only modest yields have been achieved due to the high rate of deactivation. One potential way to decrease kd is to create a ligand which can hydrogen bond to the halogen in the copper complex; however, synthesizing a TPMA-based ligand with hydrogen bonding capabilities requires an 11-step synthesis. Replacing pyridines with substituted pyrazoles reduces the synthesis to a four step process. Various ligands containing pyridine and substituted pyrazoles were synthesized, and were complexed to CuBr2. Cyclic voltammetry and single crystal diffraction studies were also conducted.

39 Synthesis, Characterization, and Substitution of Quaternary Diamond-like Semiconductors
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Quaternary diamond-like semiconductors (DLSs) are of great interest due to the tunable properties that arise from their flexible compositions. DLSs have shown to be promising materials in photovoltaics, non-linear optics, and thermoelectric applications. In this work, target compounds were synthesized via direct combination in an argon filled glove box and then heated at many different heating profiles with varying max temperatures and hold times. These compounds were then characterized by X-ray Powder Diffraction, Single Crystal Diffraction, and Optical Diffuse Reflectance UV-Vis-NIR spectroscopy. These methods provided experimental X-ray powder patterns, crystal structures, and band gap energies that could be compared to literature references to prove if intended products were synthesized. Morphological and composition characterization including Scanning Electron Microscopy and Energy Dispersive Spectroscopy were also performed to determine the compounds homogeneity. Multiple synthesis techniques were explored to obtain phase purity. Substitution is being performed to optimize properties for potential applications.
40 Technology for Math Class: An Analysis of Activities Designed by Pre-Service Math Teachers
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We examined how pre-service teachers (PSTs) integrate SmartBoard, graphing calculator, and Internet sources into instructional activities for the middle school mathematics classroom. Data were collected from 26 pre-service teachers during a methods course entitled “Teaching Middle Level Mathematics,” with a strong focus on the selection and implementation of cognitively challenging mathematical tasks. PSTs worked in 10 pairs/groups of 2-3 PSTs each, generating 30 technology activities (3 per group) for analysis in this study. Technology activities were rated on the level of cognitive demand (or type of thinking) of the technology-based instructional tasks, descriptions of how those tasks would be implemented during instruction, and the expected student response (or product), using the Instructional Quality Assessment in Mathematics rubrics. Results indicated that PSTs overwhelmingly selected or created technology-based instructional tasks with high-level cognitive demands (25/30; 83%), planned instructional activities to engage students in cognitively challenging mathematical work and thinking (26/30; 87%), and expected high-level student-responses and products (29/30; 97%). The results suggest that a methods course focused on cognitively challenging tasks and task implementation may have supported PSTs to incorporate technology into instruction in ways that support students’ learning of mathematics.

41 The effect of hippocampal and/or striatal injection of α-synuclein fibrils on novel object and novel place recognition in rats
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The effect of hippocampal and/or striatal injection of α-synuclein fibrils on novel object and novel place recognition in rats  Negin Nouraei, Rehana K. Leak, David A. Johnson  Dementia is a common non-motor symptom of Parkinson’s disease and cellular accumulations of α-synuclein is a histological hallmark of that disorder. The impact of α-synuclein pathology in specific telencephalic structures on cognitive function has not been elucidated in experimental models of Parkinson’s disease. In the present study, male Sprague-Dawley rats were injected bilaterally in the hippocampus and/or dorsal striatum with α-synuclein fibrils. Four to seven months later the animals were tested for declarative memory using novel object and novel place recognition paradigms. Pilot results demonstrate a significant impairment of performance in novel object recognition but not novel place recognition in animals injected in the dorsal striatum with α-synuclein (P<0.01) and a trend toward impairment of novel place recognition but not object recognition in rats injected in the hippocampus (P=0.06). Histological examination of hippocampi injected with α-synuclein fibrils revealed a significant loss of NeuN+ neurons in the CA1
sector by six months after infusion (P<0.01). These preliminary results suggest that specific cognitive impairments in Parkinson’s disease may be related to neuronal loss associated with α-synucleinopathy in cortical and subcortical structures.

42 Towards Structural and Functional Determination of Human α1 Glycine Receptor
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Glycine receptors (GlyR’s) are inhibitory ligand-gated receptors in the nicotinicoid receptor superfamily. GlyR’s mediate neurotransmission in CNS and are typically activated by glycine. GlyR is implicated in pain signaling to the brain. In order to better understand the silencing electrical activity of the brain and also the structure and function of GlyR in its open state, ivermectin (IVM) sensitive GlyR channels are developed as IVM is shown to stabilize GlyR in its non-desensitizing state. Double mutant F207A/A288G in α1 human GlyR has been shown to increase IVM sensitivity and reduce/remove sensitivity for glycine. We are developing photo crosslinking methodologies linked with mass spectrometric analysis on systematically generated single Cys mutations in GlyR with both Cysnull and IVM sensitive backgrounds to enable us to study state-dependent structure of GlyR in a desensitizing and a non-desensitizing manner. Distance constraints obtained from the above studies for the different states of GlyR can be used to update the computational models of GlyR and can help perform comparative studies between the different states of GlyR.

43 Utilizing chronic constriction injury in rats to study the immune response involved in neuropathic pain
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Worldwide chronic pain affects more than 1.5 billion people and approximately 60 million suffer from neuropathic pain (GIA, 2011). Neuropathic pain can be described as pain caused by a lesion or disease of the peripheral somatosensory system (IASP, 2014) and is a type of chronic pain characterized clinically by mechanical allodynia, hyperalgesia, spontaneous and ongoing pain and biologically by neuroinflammation. Neuroinflammation is caused by the production of a neuroimmune response at the site of injury, including an influx of immune and immune-like cells as well as the production of pro- and anti-inflammatory mediators. Following nerve injury, macrophages (both resident and hematogenously-derived) assist with debris removal, are also responsible for secreting inflammatory mediators, and increase the expression of other macrophage-derived factors such as prostaglandins. Using the chronic constriction injury model (CCI), our lab was able to emulate neuropathic pain and produce neuroinflammation in the associated PNS tissues. In addition, previous studies by Pollock and Janjic labs have employed the use of a novel perfluorocarbon nanoemulsion to monitor neuroinflammation in vivo (Vasudeva, 2014). The Near Infrared (NIR) labeled nanoparticles injected intravenously in the CCI rat are
phagocytosed by inflammatory cells (monocytes and macrophages) in the bloodstream and carried to at
the site of injury. We hypothesized that when the CCI rat is injected with an anti-inflammatory drug-
loaded nanoemulsion, developed in Janjic lab (Patel, 2013; Janjic, 2014), the neuroimmune response
would be reduced as well as the rats’ pain behavior. In this way, CCI model is allowing us to study the
neuropathic pain both n vivo and ex vivo setting focused on both the injury on the sciatic nerve and the

44 Well water quality in Butler County, Pennsylvania in areas with unconventional shale gas
extraction (USGE) using hydraulic fracturing
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The significant increase of unconventional shale gas extraction and hydraulic fracturing since 2006 in
Pennsylvania has also seen an increase in number of claims of groundwater contamination to the PA
Department of Environmental Protection (PA DEP). In order to determine if the two are connected, we
have investigated the quality of well water by conducting a survey and water testing in several
communities in Butler County, PA. File reviews of the PA DEP indicated that as of October 10, 2014, there
has been 376 unconventional wells drilled in Butler County, and at least 78 violations cited. Starting in
late 2011, when we initiated our study, 204 Butler County residents have participated in the survey. A
total of 94 wells have been sampled, and a total of 185 water samples have been tested. Testing
included in field measurements of pH, specific conductivity, and dissolved oxygen, lab testing of anions
(chloride, bromide, nitrate, nitrite, phosphate, sulfate), as well as a suite of 34 cations. A subset of water
wells was also tested for light hydrocarbons (methane, ethane, ethylene, propylene, propane, butane).
This data was supplemented with information from PA DEP file reviews (e.g., well permits, completion
reports, violations) and maps indicating legacy oil, gas, and coal activities (PA Spatial Data Access, PA
Geospatial Data Clearinghouse) and GIS maps were created. The results of this study indicate that while
there is high quality groundwater in Butler County, both legacy issues (e.g., abandoned coal mines, gas
and oil wells) and new drilling activities could possibly be contributing to changes in water quality. The
data have provided a better understanding of the quality of groundwater in Butler County and
suggestions for protecting sources of drinking water in the future.
45 Wish You Were Here? Exploring the “Dark Tourism” of Incarceration
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Dark Tourism can be defined as sites of individual or large-scale tragedy and death that offer visitors outlets for experiencing macabre, sacred and liminal experiences. This project examines both the motivations and experiences of visitors to two sites of incarceration, the Trans-Allegheny Lunatic Asylum in Weston, West Virginia and the West Virginia State Penitentiary in Moundsville, West Virginia. Both TALA and WVPen share similar institutional histories and function as loci for heritage tourism and supernatural experiences. Like most heritage tourism sites, TALA and WVPen attempt to maintain a balance between education (historical or philosophical narratives) and entertainment (supernatural experiences). This project uses visitor experiences, in the form of TripAdvisor reviews, to examine the motivations behind and experiences of visiting “haunted” historic sites. This exploratory study analyzes the text of the reviews to understand how visitors understand the history and significance of these sites as well as what constitutes appropriate interpretive techniques and messages. The visitors’ experiences reveal both the narratives disseminated by these sites as well as the messages they take away. Interpretive activities at both TALA and WVPen encourage visitors to conceptualize these places as sites of entertainment rather than heritage or education. At both sites, history and location are the raw material used to create a visitor experience that focuses on the supernatural. Historical narratives give these sites authenticity that fuels more popular and lucrative supernatural-focused activities. Focusing on entertainment provides crucial financial support for the upkeep of these sites, but this focus squanders opportunities for education and contemplation on the significance of these sites for the issues of today.

46 Revisiting Advance Directive Planning from a Holistic Perspective
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Faculty Advisor: Glory Smith, Academic Advisor

End-of-life decision making has become more prominent in ethical debates as both the aging populations increases and medical technologies advance. These factors provoke questions concerning treatment options, quality of life, and the natural dying process. Such factors and concerns highlight the importance of accurate and authentic advanced directive planning. In this presentation, it will be argued that current advanced directive planning lacks an adequate framework to promote a fruitful conversation about end-of-life decisions. This will be supported by first presenting the intention of advanced directives. There will then be an assessment of the current advanced directive methods in light of this intention. Thereafter, an alternative approach will be presented which emphasizes the importance of a multidisciplinary holistic advanced directive. This approach is argued to achieve the true intentions of advanced directives by promoting decision making conversations unique to each individual. Successful advanced directive planning conversations should be initiated earlier, the focus of an annual appointment, and be considered from a multidisciplinary perspective.
47 Losing Schools to the Economic Chasm
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The No Child Left Behind (NCLB) era of educational reform, which is now at the close of its 14th year, focuses on improving student learning by using research-based teaching techniques, making evidence-based decisions, hiring quality teachers, holding schools and school districts accountable for student performance, and allowing families to leave a “failing” school to attend one with a better report card. The goal of NCLB is to make sure each and every child reaches certain learning outcomes before he or she graduates high school. However, school performance measures show that fourteen years of NCLB funding and efforts has not reached every school and, consequently, not every child. Many schools are still “failing” as a result of numerous low performing students. The purpose of this study is to examine the amount of variance in the new Pennsylvania school performance data that is explained by IRS-based income values. Upon initial inspection of school performance, it appears that scores decrease as income decreases. If this correlation is true and a statistically and practically significant amount of variance in school performance can be explained by income, then income is an underlying problem that cannot be resolved by NCLB efforts alone. The problem of low performing schools cannot be fixed until underlying issues are recognized and resolved. The goal of formally exposing income as a confounding variable in the school performance model is to bring a new awareness to the persistence of the economic chasm that separates school districts, schools, and people.

48 Quality of Life of African Americans with Inflammatory Bowel Disease
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The incidence of inflammatory bowel disease is increasing in industrialized countries. Over 70,000 new cases are being diagnosed every year within the United States, however, there are no national statistics regarding the prevalence of this disease within the African American population. There is a paucity of research regarding the lived experiences of African Americans with inflammatory bowel disease and how this affects their quality of life, which may signify the lack of culturally competent care received by this population and contribute to decreased patient health care outcomes within the United States health care system. The goal of this study is to explore the quality of life of African Americans with inflammatory bowel disease. These findings seek to assist health care workers in providing culturally competent care for increasing numbers of African Americans that will be seeking health care due to the Patient Protection and Affordable Care Act; and to improve patient health care outcomes of African Americans with inflammatory bowel disease, which is congruent with the missions of the National Institute of Health as well as the Institute of Medicine report which are focused on improving patient quality within the United States health care system.
49 Censorship and the Archive: A Case Study in Power, Intent, and Editorial Theory
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This paper sets out to answer the question: How is it possible that the authoritative critical edition of a literary text could actually constitute a new version of the book—a version that, strictly speaking, the author never wrote and that his publishers never published? Using poet Robinson Jeffers’s volume The Double Axe (1948) as a case study, this research focuses first on the work’s multiple editors: the post-World War II commercial editors (at Random House) who affixed a disclaimer to the book to distance the publisher from the book’s incendiary anti-war politics; the editors of “restored’ versions of the 1970s, who discovered excised manuscript poems in the archives and who subsequently cast the poet as a victim of censorship, silenced by corporate and political guardians intolerant of dissent; and the scholarly editor who prepared a critical edition of the text at the end of the century and whose own archival research (in manuscripts, correspondence, and editorial negotiations) led him to conclusions strikingly different from those of earlier editors. The paper then studies in detail the numerous factors at work in the production and subsequent metamorphoses of a text, factors that the Jeffers case encompasses in microcosm: 1) the very nature of suppression, censorship, and the essential component of power, 2) the impact of different eras’ political climates on the editorial decisions of the times, and 3) the ever-evolving editorial theories that underpin textual procedures and that have determinative implications on the interpretation of authorial intent. Archival and historical research is increasingly essential to the formation of authoritative editions of texts, and this study sheds new light on the dynamic interplay of theory, culture, and procedure in divergent interpretations of archival material.

50 Does Teacher Questioning Matter in Student Engagement?
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The primary objective of this study is to examine the relationship between the questions teacher asks during a mathematical discussion in class and responses provided by students. In this study, we look closely at the teacher-student dialogues and more specifically the ways in which students participate in relation to teacher questioning. Previous research has presented frameworks and questioning styles that teachers can use to make their own questioning more effective (Sorto, et al. 2009; Boaler & Humphreys, 2005; Nikki, 2003). This study aims to extend the literature to show how one can analyze questions and more importantly students’ responses in context to better understand close connection between them. We examine whether a higher order teacher question indicates high-level student response in mathematical context and seek to understand what types of higher order teacher questions generate high-level student responses. The data were collected from 3 mathematics teachers in a large urban school district. Three lessons were analyzed from video recordings of 90-minute block class periods for: 1) types of questions teacher ask, 2) types of responses student provides, 3) number of words
included a student response. Teacher-student dialogues were obtained from whole-class discussion part of the classroom hour. Frameworks used in the analysis include Boaler & Humphreys’ (2005) questioning types, Wimer’s categories of higher order and lower order questioning, and Boston’s rubrics for high vs. low-level student responses. General teacher questions were asked during a mathematical discussion and 19 out of 40 were higher order questions. 84 percent of the identified higher order teacher questions generated high-level student responses. High-level questions were responded by up to 28 words while the number of words used on average were 6. The findings are important because some teacher questioning practices were more likely than other to yield longer student explanations leading students engage more during the discussion.

51 Global Health Disparities from a Catholic Social Teaching Perspective
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Faculty Advisor: Henk ten Have, MD, PhD & Gerard Magill, PhD

In Evangelium Vitae, Pope John Paul II refers to Catholics as “the people of life and for life,” as he concludes his teachings on issues of human sacredness. Within those concerns he accounts for the Catholic responsibility to assist the vulnerable which includes the sick and the poor of the world. Perhaps the greatest concern for global health is the reconciliation of health inequalities which is an aspect of what John Paul II was referring to in his writing. Along with the Catholic responsibility to assist the sick and poor is the basic human right for all people to health at the highest possible level. Global health disparity is defined by the dispersal of disease and lifespans and the ranges between the poor and wealthy are significant. This challenge equates to 20 million deaths per year and that hasn’t shown much of a change in the last 20 years. When discussing this global challenge along with the directives for Catholic social responsibility which is seeking to realize a common good, this paper will explore the ethical justification for a global right to health from a Catholic perspective. The health care situations of both developed and developing countries will be outlined to establish a starting point for this ethical dilemma. The factors that are contributing to the disparities will be discussed based on the findings of the Commission on the Social Determinants of Health. Catholic theological concepts will be covered through the encyclicals related to Catholic Social Teachings. Health as a human right will be examined through the constitution of the World Health Organization and the Universal Declaration of Human Rights of 1948. The issue of health inequalities and the Catholic position will be viewed from principles of The UNESCO Universal Declaration on Bioethics and Human Rights. The progress that has been made in improving the gap in health disparities will conclude the discussion which will include health governance and humanitarian assistance.
Exploding into the national consciousness in late 1990, political correctness (or PC) quickly assumed the status of “common sense.” Conservatives and liberals alike took PC as the most obvious way to understand the cause of an apparent crisis of censorship and declining academic standards on campuses. However, PC was a construction of radical conservatives, and served as a cover for widespread attacks on higher education meant to rescind the expanded access to colleges and universities since the Second World War. A key in disguising this assault was a campaign against affirmative action waged in the name of terms like “merit,” “fairness,” and “standards,” exemplified by Dinesh D’Souza’s Illiberal Education (1991), which itself became common sense. I analyze a trio of academic novels (which centre on the lives of faculty) that treat PC and take this common sense understanding of it as their starting point. Organised around the “victim” of the forces of PC whose oppression is held to be more real than that of women and minorities, Michael Downing’s Perfect Agreement (1997), Philip Roth’s The Human Stain (2000), and Ishmael Reed’s Japanese by Spring (1993) all dramatize the assault on affirmative action in the name of academic standards that galvanized the PC crisis’ most intense phase. Ultimately, however, the totalizing nature of this common sense proves limiting, and the novels are unable to escape the contradictions that increasingly come to the fore in their explorations of PC. Denied a way to realistically represent academe outside of PC, the novels cannot resolve the supposed tension between affirmative action and academic standards, opening up space for further assaults on higher education based on the same rhetoric the novels have demonstrated as so limiting.

Scholars have long observed the absence of atonement theology in Luke-Acts, and the guild has largely concluded Luke’s soteriology does not describe Jesus’ death as the means of acquiring salvation. Only twice does Luke explicitly identify Jesus’ death as the means of accomplishing salvation. In Acts 20:28, such a notion is affirmed in one of Paul’s statements, but this is likely more representative of Paul rather than the author of Luke-Acts. The only other relevant passage is the Last Supper discourse in Luke 22:19-20, which depicts Jesus’ death as the New Covenant sacrifice. However, this passage is fraught with questions. Many reject its textual authenticity. Luke 22:19a-20 is absent from some of the manuscripts, and many prominent biblical scholars conclude that Luke 22:19a-20 is a later scribal interpolation. In fact, one argument against the authenticity of Luke 22:19a-20 is made precisely on the basis that it contravenes Luke’s supposed deletion of atonement theology. However, other scholars who believe that Luke 22:19a-20 represents the original text still aver this passage is not representative
of Lukán theology. According to Joel Green and others, the author blindly copied this saying into his text from tradition, but it is not his theology. My research has led me to challenge these widespread conclusions of Lukán scholarship. In this project, I will identify linguistic and ideological connections between Luke 22:19-20 and other portions of Luke-Acts in order to support the hypothesis that Luke 22:19-20 is neither scribal interpolation nor parroted tradition. Instead, based upon the Eucharistic allusions in the Emmaus episode (Luke 24:13-35) and the belief that Jesus ushered in the New Covenant era with the forgiveness of sins (Acts 13:13-52) one can conclude that Luke 22:19-20 is representative of the author’s own theology and the original text.

54 Ressourcement Theology and the Supernatural Debate: Toward a Christological Ontology
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What is human nature? What sorts of things do we desire? What is our proper goal? Questions like these have always haunted theologians—not least in the twentieth century, when an emerging school of mostly French Catholic theologians—often called Ressourcement theologians, or, pejoratively, ‘la nouvelle théologie’—proposed that the human desire to be supernaturally united with God is not a gift of grace, but is essential to human nature. The establishment theologians of the day envisaged a more purely natural human nature. For them, human orientation toward supernatural union with God is always a matter of divine grace and always mediated through the Church. In this essay, we will explore the landscape of this so-called “supernatural debate,” which became one of the most important and most vicious theological disputes of the twentieth century. We will see that, while the terms of the debate are somewhat ethereal the abstract, the implications are real, and they are far-reaching. We will make note in particular of those places where both sides in this debate share certain assumptions and points of departure. And in the end, I will suggest that pushing back against precisely these shared assumptions may create space for new avenues of creative engagement.

55 Shallow talk of Chinese higher education: Inequity within Chinese Higher Education Admission
*Zhe Ji
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Graduate symposiums Abstract Shallow talk of Chinese higher education: Inequity within Chinese Higher Education Admission The number of Chinese students pursuing overseas academic degrees in the United States has skyrocketed in recent years. According to the Open Door Report (2013), Chinese students occupied the number one place of origin of international college students studying in the U.S. for four consecutive years from 2009 to 2013. In 2013, 235,597 Chinese college students came to the United States, which was an increase of 21 percent from the previous year. Chinese students continue to drive foreign student growth in the United States. A number of previous research studies have identified the pushing-pulling factors and features that influence Chinese students choices of study abroad destinations, especially the U.S. This research extends understanding by identifying the current
inequitable Chinese higher education system under sociocultural context in order to understand the specific phenomenon of Chinese students coming to the U.S. Additionally, this research will analyse the Chinese students per se by categorizing Chinese students into three classes under anthropological perspective in order to provide a profound understanding of current Chinese students rather than stereotypical impressions for all other stakeholders, foreigners, and audiences. (P.S. Oral presentation will focus on Chinese students who studying at Duquesne University, present Duquesne Chinese students as an instance).

56 Spinoza's Ethology
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Faculty Advisor: Daniel Selcer, Ph.D., Graduate Student Advisor

For the past four years I have worked towards completing a theoretically challenging and highly nuanced doctorate on the philosophical system of Seventeenth Century lens grinder and philosopher Benedictus de Spinoza. Not only is Spinoza's primary text the Ethics considered one of the most difficult systems in the history of Western philosophy to fully understand, but Spinoza challenges anyone who reads his system to incorporate it into their own life and practice. He encourages this because his system explores not only important philosophical, systematic details using the geometric method, but also human psychology, the three types of knowledge we can have, Nature as a moving intensity composed of both eternal laws (as natural laws) and also that which has infinite ways of expressing itself as variations in power and intensity. It is also a system of ethics and incorporates the creative use of one's life as a combination of imagination, reason, and intuition. Where such a system becomes really powerful is when it creates original, caring, and efficient affects with others as a group effect. This is not an easy thing to do regularly by any means, but when accomplished has the power to enrich the lives of all involved individually. Spinoza's philosophical insights and proto-physics of force contribute to bettering humanity, and, as a result, it is a source of great tolerance, joy, enhanced creativity, and contemporary relevance. Needless-to-say, taking on such a system has been and remains littered with immense challenges for one's limits of rational systematizing on a singular level and daily interactions with a multitude of other personalities. In the end, studying Spinoza is an intellectual, yet immensely rewarding and practically applicable activity. Through working on this system deductively in our own ways we become transformed. Some questions I answer in my project according to the epistemological, ontological, and aesthetic philosophical system Spinoza offers us involve problems in how we error in reasoning and how we can turn to the use of imaginative ideas in order to strengthen the force of our understanding and our actions. To end I focus on the interdisciplinary ways in which such a system can be applied today.

57 Towards a model of trauma-informed correctional care
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Treating clients with trauma histories often involves a system of individuals who participate in the task of helping clients to understand their trauma experiences and to integrate them into a meaning-making process as a way of healing or recovering. Yet, little emphasis has been placed on systemic approaches to trauma and this training failure has been and continues to be problematic (Pryce, Shackelford, & Pryce, 2007). It is exacerbated in a correctional setting where staff often has no training whatsoever in trauma, necessitating a trauma-informed training program for correctional staff. My research explores how training correctional staff to be trauma-informed (e.g., recognition, interventions, treatment, policies, and procedures) can impact professional quality of life for correctional staff and improve organizational functioning at a facility in Pittsburgh, PA. Part of this process includes training existing staff, both clinical and non-clinical staff members, because a better understanding of trauma improves an institution’s focus on safety, support of good coping skills, and reinforcement of treatment gains. The prevailing view in trauma-informed counseling is this: Unless traumatic experiences are addressed and the survivor honored and respected, the individual will seek maladaptive behaviors to cope with the psychological, emotional and often physical damages by engaging in risky behaviors. These risky behaviors may include masking feelings through substance use, engaging in burglary and/or prostitution to support a drug habit, and eventually become involved in the criminal justice system. Further, once individuals are justice-involved, under-reporting of trauma history is common, perhaps because of mistrust, guilt, shame, and self-blame. This sequence is likely to repeat unless treatment specific to the needs of the person with the trauma history are met and correctional staff are knowledgeable about the effects of trauma.

58 Benjamin and Contemporary Art: Communicating Truth in Experience
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Faculty Advisor: Ronald Polansky, Ph.D

Contemporary art is in a difficult situation in its relationship to the public and even to those within the walls of academia. People often find themselves at a loss when attempting to interpret either the internal meaning of contemporary art pieces or the relevance of the pieces to a larger concept of knowledge, truth or experience. In this paper I will show that by using Benjamin’s concept of truth, one is able to articulate the importance of contemporary painting as a source of “profane illumination”, and as a medium in which experience is kept alive and transmitted. There are three components to this argument. Initially, I will present Benjamin’s notion of truth and its relationship to contemporary painting. Benjamin spent his life writing about, and arguing for, a new definition of truth, one where truth is presented as a group of ideas resonating together to form a constellation that presents itself in the “now of knowability.” I use Benjamin’s writings on philosophy, art and literature to develop a precise theory of painting based on this definition of truth. The second component of my argument is an analysis of three modern paintings to illustrate exactly how the theoretical components of my argument are located within the works of art themselves. Finally, I respond to Benjamin’s most well-known writing on the work of art, his critique of the effects on art by mechanical reproduction. I will argue that Benjamin is premature in his critique because art has, at least in some places, found a way to use mechanical reproduction to its advantage. I conclude by alluding to the possibility that this
interpretation of contemporary art through the schematics of Benjamin’s concept of truth could be extended as a lens for interpreting all periods of art.

59 Campus Buildings as Living Laboratories: Overcoming Challenges to Zero-Energy Retrofitting — A Case Study
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Faculty Advisor: Robert Sroufe, Ph.D.

Net-zero-energy (NZE) buildings — those that produce as much energy as they consume on an annual basis — have many proven benefits, including utility bill savings, occupant comfort, resiliency, and reduction of greenhouse gas emissions. It is a goal of particular urgency, as the building sector consumes nearly half of all energy produced in the United States. However, retrofitting the existing 5.6 million commercial U.S. buildings poses two key challenges: financing, and timing when to perform the upgrades with least disruption for occupants. Facing these very challenges in retrofitting Duquesne’s Rockwell Hall, alumni, students, and faculty of the Palumbo Donahue School of Business are implementing a novel NZE strategy. Rather than delaying upgrades until a wholesale retrofit can be approved, financed, and performed, the strategy entails tackling net-zero upgrades piecemeal over time, as general-maintenance needs arise for the 56-year-old building. Building on five years of student Leadership in Energy and Environmental Design (LEED) competitions, and recent commitments to join the Pittsburgh 2030 Challenge, this pioneering field-based research has practical application and real-world significance. As a first step, alumni, students, faculty and local efficiency companies have completed a blower door test at Rockwell Hall that is believed to be among the first ever performed at a business school building. The air-leakage data gleaned from the test, along with data to come from the forthcoming installation of advanced metering infrastructure at Rockwell Hall, will provide benchmarks for a NZE plan created with Duquesne alumni. The team envisions the Rockwell Hall NZE project as the first step in a campus-wide program that will position the University as a leader in sustainability and, with the support of secondary research and primary data collection from this field-based study, be a leading example for what can be done with millions of other existing buildings.

60 Counseling implications for Muslim graduate international students: A Practical Approach
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Many Muslim graduate international students want to study abroad, especially in the USA, because higher education in the United States has broad opportunities in many different fields. Therefore, increasing numbers of Muslim graduate international students are moving away from their home countries for the sake of studying abroad. Many studies show that international students struggle with many challenges such as language barriers, cultural barriers, etc. Common challenges associated with international students have been studied extensively, but relatively little is known about Muslim graduate international students. For this reason, it is believed that there is a need to explore Muslim
graduate international students’ common challenges in order to encourage the success of these students in their education. This presentation will focus on counselor strategies for assisting Muslim graduate international students, as well as ways to better understand and communicate with these students. This presentation also emphasizes the point that counselors can have a significant impact in every Muslim graduate international student’s life. Finally, the importance of increasing awareness regarding the common challenges international Muslim graduate students face on their education will be highlighted.

61 Predicting viral cross-reactive epitopes in adalimumab, infliximab and etanercept: implication of therapy failure due to anti-drug antibodies
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Patients’ immune systems are exposed to vast array of viral antigens over their lifetime. The immune system recognizes viral epitopes and primes B cells to create preformed antibodies. If similarities exist between epitopes from biologic protein products and viral epitopes from previous infections, the body may inactivate the biologic and decrease drug efficacy through epitope mimicry. The purpose of this study was to use a systematic computational analysis of human leukocyte antigen (HLA) ligands to yield possible similar sequences in influenza virus hemagglutinin (HA) and TNFα inhibitors. This could allow prediction of drug treatment failure in select patient populations.

62 "The Interactive Primer Model: Where High Tech and Old World Collide."
*Eric Perry
Counselor Education and Supervision | School of Education
Faculty Advisor: Jared Kolbert, PhD, LPC, NCC - Department Chair / Associate Professor

In recent years, technology has enabled educators to create new and innovative learning experiences. These advances allow students to interact with the material they are studying to a degree never before possible. The battle between institutions with online, brick and mortar, and flip-classroom advocates surges on; however, a middle ground does exist that can allow the learner to take advantage of the positive aspects of these experiences. During this presentation, a new model of learning will be proposed that seeks to utilize the methods of the past in a manner fitting of 21st century learners. The Interactive Primer Model of Learning is based on the use of a primer learning experience, an interactive and LMS managed online learning module, which prepares learners for in-depth classroom instruction and experiential activity. Interactive learning modules studied have shown that “the constructivist approach to online module design, whereby the learner constructs knowledge through activity, appears to offer instructors and students a way of achieving learning outcomes (Slinger-Friedman and Patterson).” The interactivity of the model includes game-based and scenario-based activities that incorporate core material allowing the student to engage the content in resource-intensive tasks. Using well developed theoretical approaches to game construction, instructors can utilize these elements in a
way that allows them to “adapt and respond to the needs of learners and [other] educators (Hendrix, Knutov, Auneau, Arnab, Dunwell, Petridis, Lameras, de Freitas).” This model is separate from existing pedagogy in that it does not seek to replace classroom instruction; rather it exposes the learner to the material being covered in the classroom so that each student has the opportunity to gain more from the expertise and experience of the instructor. The Interactive Primer of Learning proposes that we retain this focus while allowing learners to engage content in a way never before possible.

63 To Pay or Not to Pay? Variables Influencing Hostage Outcomes in Terrorist Kidnappings
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The tragic death of Americans James Foley and Steven Sotloff at the hands of the Islamic State of Iraq and Syria (ISIS) once again brought terrorist kidnappings to the forefront of the American psyche. Terrorist groups have a long history of kidnapping citizens for multiple reasons, from political to monetary. Kidnapping for ransom is a lucrative means of funding for terrorist groups around the world, yet little is known about the factors influencing hostage outcomes in these situations. This study attempts to analyze the relationship between hostage and hostage-taker in situations where a terrorist group’s motivation for kidnapping is ransom; mainly asking: why are some hostages released while others are killed when taken by terrorist groups for ransom?

Using University of Maryland’s Global Terrorism Database, 1,004 individual hostage outcomes from 1970 – 2013 are collected and analyzed using SPSS statistical modeling. This research examines the variables influencing hostage outcomes (whether a hostage is released or killed), looking at variables such as nationality and target type, in an effort to understand terrorist patterns and predict outcomes for hostage situations in the future.

64 Normative data collection for the Standardized Touchscreen Assessment of Cognition
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The purpose of this research study is to collect normative data for the Standardized Touchscreen Assessment of Cognition (STAC). The STAC is a criterion-referenced test that assesses cognitive and linguistic functions and enables the examiner to receive both quantitative and qualitative information about a person's cognitive abilities. The STAC consists of theoretically validated tasks within the domains of attention, memory, visual and auditory memory, and executive functioning. The researchers will compare normative data on the STAC to participants’ scores on the Cognitive Linguistic Quick Test (CLQT), a speech-language pathology assessment, and the Cognitive Assessment of Minnesota (CAM), an occupational therapy assessment. The CLQT and CAM both include paper and pencil tasks while the STAC is self-administered on the iPad. The researchers plan to administer the three tests to 100
neurotypical adults between the ages of 18 to 85 years old. To date, data for 33 participants has been
collected and data analysis is underway. Each participant completed a demographic form and scored
within the normal range on the Mini Mental Status Exam (MMSE). The participants were administered
the STAC, CLQT, and CAM in a randomized order. The data from each participant is entered into the
computer and will be analyzed using IBM’s SPSS Statistics 22 software program. The overall scores on
the STAC will be correlated with the scores achieved on the CAM and CLQT. The clinical implications and
future research directions will be discussed.

65  Transport and Conformational Change: Reset of the Dopamine Transporter
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Neurotransmitter transporter proteins play a critical role in the synaptic cleft. Responsible for the
reuptake of neurotransmitters from the synaptic cleft, these proteins aid in terminating the action of
neurotransmitters. The dopamine transporter (DAT), a member of the monoamine transporter family, is
responsible for the reuptake of dopamine and displays ion dependence to drive transport. Experimental
research indicates the need for a single potassium ion (K+) to drive the reset of the serotonin
transporter, another member of this protein family. There is currently no experimental evidence
suggesting that K+ plays a similar role in DAT; however computational work has shown K+ coordinating
with the intracellular side of DAT. Our work aims to elucidate the reset mechanism of DAT
computationally by examining the interactions of K+ with the protein and changes in conformation.
Using a novel dual bilayer system and molecular dynamics, we can simulate these proteins as they
would function in vivo. Initial findings confirm entry of K+ to the binding pocket of DAT, suggesting its
accessibility to the intracellular side of the membrane, as well as the possibility for dependence on K+ to
allow conformational reset.