

COLLEGE OF SCIENCES AND HEALTH PROFESSIONS
ABSTRACTS
RESEARCH DAY 2016

Friday, April 8, 2016
CSU Student Center Ballroom

Agenda

- 11:00 - 11:00 am Open viewing of posters
- 12:00 am - 1:30 pm Lunch, Research Award Presentation and Keynote Speaker
- 2016 College of Sciences & Health Professions
Outstanding Research Award presented to
Yuping Wu, Ph.D., Associate Professor,
Department of Mathematics
- Keynote Speaker
Katherine Judge, Ph.D., Associate Professor,
Department of Psychology
- “I Wish They Would Remember that I Forgot: Understanding the
Illness Experience of Living with Dementia”**
- 1:30 - 4:00 pm Poster Session
- Posters of research, teaching and service topics presented by
students and faculty in chemistry, biology, geology, environmental
science, health sciences, mathematics, physics, and psychology**
- Poster authors at their posters during these times:
1:30 pm – 2:45 pm odd numbered posters
2:45 pm – 4:00 pm even numbered posters

001 METASTABILITY OF ONE-LEGGED STANDING

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We investigate an analysis of the trajectory of the center of pressure (COP) of a person standing on one leg. We show that the COP follows straight-lines corresponding to ballistic motion that is interrupted by sudden turns. We show that the turning points describe a stochastic dynamics of the COP: the COP undergoes small jumps that are interrupted by large jumps. A hierarchical dynamics is familiar from the theory of metastability: Small jumps characterize intra-basin dynamics, whereas the long jumps correspond to inter-basin dynamics. We find exponential behavior of inter-basin jumps characterized by a time constant.

002 TEMPERATURE-DEPENDENT HABITAT SELECTION BY FOREST-FLOOR FAUNA: A FIELD EXPERIMENT USING PASSIVE HEATING TO MIMIC FUTURE CLIMATE CHANGE

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The forest-floor supports a diverse community of organisms responsible for the decomposition of organic matter, nutrient cycling, and sequestration of carbon. However, key interactions among forest-floor biota remain poorly understood, especially the future effects of climate change. In particular, little is known about the extent to which small-bodied forest-floor fauna may utilize microhabitats that preserve favorable microclimates despite larger-scale climate change. We present results of an on-going field experiment designed to (1) evaluate the relationships among larger-scale climate variables and microclimatic conditions, (2) determine the microclimatic conditions utilized by major forest-floor fauna, and (3) determine how microclimate affects organism function and species interactions. In a woodlot on the campus of University School in Hunting Valley, OH, we established 120 open plots in which we used passive heating to increase variation in temperature among plots. Heating was achieved by using ceramic floor tiles of three different surface colors (white, gray, and black) and absorptivity of solar radiation. Ceramic tiles mimic flat rocks that are a favorite refuge for forest-floor fauna. In addition, we applied a litter thickness treatment (all litter removed, normal litter, and double litter thickness) intended to evaluate predictions climate change effects on the litter layer, i.e., slowed vs. accelerated leaf litter decomposition. The experiment consisted of 12 control plots (no tiles or litter manipulation) plus 12 replicates of each combination of tile color and litter thickness. The passive heating method resulted in temperature variation that included

future temperature projections for NE Ohio. We present multiple regression equations that provide downscaled predictions for forest-floor habitat from larger-scale meteorological data. Further, we found differential use of thermal microclimates by forest-floor fauna. We analyze the effects of temperature selection and climate change on species interactions and the energy budget of the Eastern Red-Backed Salamander, the dominant forest-floor predator in eastern North America.

003 A NOVEL LIQUID CHROMATOGRAPHY MASS SPECTROMETRY METHOD FOR THE DETERMINATION OF DIASTEREOMERS

Mohammad Alyamani, MSc^{1,2}, Zhenfei Li, PhD², David Anderson, PhD¹, Nima Sharifi, MD.^{1,2,3}

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Abiraterone [administered orally as abiraterone acetate (AA)] is an FDA-approved drug to treat patients with castration-resistant prostate cancer. Steroidogenic enzymes convert abiraterone to the more potent analogue D4A, which can block steroidal enzymes and drive the anti-tumor activity of AA in prostate cancer. In addition, similar to testosterone and androstenedione, D4A has a Δ^4 , 3-keto structure, which allows D4A to be further metabolized by steroidogenic enzymes. We determined that 6 structurally related metabolites were generated from D4A metabolism, one of which can promote tumor progression. Therefore it is important to determine whether these metabolites are present in patients treated with AA. Conventional techniques, even with the most advanced mass spectrometry, will not allow the accurate determination and quantification of these metabolites due to their similarity in structure and mass transitions. Consequently, here we developed a liquid chromatography tandem mass spectrometry method that allows one not just to determine the metabolites but also to accurately quantify their concentration in patients with castration-resistant prostate cancer treated with AA. In the method, an AB Sciex 5500 Qtrap mass analyzer with electrospray ionization in positive mode was applied, the mass analyzer was coupled with UPLC station, and the analytes were separated using a Zorbax Eclipse Plus C18 150 x 2.1 mm, 3.5 μ m column at 40°C. The method was validated according to US FDA guidelines for bioanalytical method validation. Despite the similarities in structure and mass transition between the metabolites, the validated method separated all the metabolites, including diastereomers, to allow accurate identification and quantitation of each compound.

004 EFFICIENT GENOME EDITING CATALYZED BY MOS TRANSPOSASE EXPRESSED FROM SINGLE COPY INTEGRATED TRANSGENES

Swetha Ramani Joswala, M.Sc. and Aaron F. Severson, Ph.D.

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Transposons, or jumping genes, are pieces of DNA that jump around in the genome. Autonomous Class II transposons require the enzyme transposase to catalyze their transposition. Many transposases can catalyze both insertion and excision of transposons independently of any host-derived factors. The *Drosophila mauritiana* transposon *Mos1* has been domesticated for use in *Caenorhabditis elegans*, and *Mos1*-dependent methods have revolutionized genome editing in the worm. Transposon insertion has been used to disrupt genes in genetic screens and to carry payloads into random genomic regions. Transposon excision has been utilized to create DNA double strand breaks that can be repaired using an exogenous template, allowing deletion or modification of nearby genes and insertion of transgenes into the genome. These approaches all rely on expression of the transposase from plasmid DNA injected into the worm gonad. Injected transgenes can form multi-copy, extrachromosomal DNA arrays that are heritably transmitted through the germline.

Unfortunately, the techniques reliant on *Mos1* mobilization all suffer from low efficiency, perhaps due to epigenetic silencing of the transgene encoding the transposase. We hypothesized that expression of transposase from an integrated, single copy transgene would increase transposase expression and thereby improve transposition rates since repetitive extrachromosomal arrays are prone to transcriptional and post-transcriptional silencing in the germline, while single copy integrations are not. We have generated several strains expressing *Mos* transposase from integrated transgenes and are currently quantifying the rates of *Mos1* insertion and excision to determine whether transposase expression from an integrated transgene will improve the efficiency of *Mos1*-mediated genome engineering in worms.

005 GESTURE PRODUCTION IN BROCA'S AND WERNICKE'S APHASIAS

Natasha Livits, M.A., CCC-SLP¹; **Monica Gordon Pershey, Ed.D.**; CCC-SLP²; **Violet Cox, Ph.D.**, CCC-SLP²

¹Saber Healthcare;

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The study of the production of gesture by persons with aphasia provides an important window into the affects that aphasia has on the semantic system. The purpose of this study was to identify the gestures produced by one person with Broca's (nonfluent) aphasia and one person with Wernicke's (fluent) aphasia during interpersonal communication. The research

addressed whether there are differences in the quantity and/or quality of gestures produced by these contrasting participants.

Participants were a 56-year-old African American woman, three years post onset of moderate Broca's aphasia, and a 70-year-old Caucasian woman, six years post onset of mild-to-moderate Wernicke's aphasia. Both women had communication skills that were functional for daily living, given family supports for more complex tasks.

Each participant engaged individually in a 30-minute structured conversation session with the first author. The session was video recorded. The video file was then uploaded to a video annotation software program, EUDICO Linguistic Annotator. Conversational samples were coded for the number and types of gestures produced.

The person with Broca's aphasia produced 316 total gestures, as opposed to the person with Wernicke's aphasia, who produced 235 gestures. Gestures per minute averaged out to be 21 per minute of conversation for the person with Broca's aphasia and 15.6 gestures per minute for the person with Wernicke's aphasia. The types of gestures differed in terms of their semantic content. These results indicated that the woman with Broca's aphasia produced the greater number of gestures with little or no semantic value as well as the greater number of gestures with moderate semantic value. Both participants used gestures to facilitate word retrieval, which offers rehabilitative potential.

006 TMCO1 PROMOTE CANCER METASTASIS THROUGH REGULATING PKC PATHWAY

Qiaoyun Zheng, M.S.¹; Qiaoxia Zheng, M.S.²; Aimin Zhou, Ph.D.¹

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Metastasis is the main cause of mortality from solid tumors and remains the most poorly understood aspect of cancer pathogenesis. Transmembrane and coiled-coil domains 1 (TMCO1), recently characterized in our laboratory as an endoplasmic reticulum associated protein, is highly conserved in amino acid sequence among species and ubiquitously expressed in all human tissues. Homozygous frameshift mutation in TMCO1 causes distinctive craniofacial dysmorphism, skeletal anomalies, and mental retardation. In this study, we found a very low level of TMCO1 expression in highly migrated lung cancer clinical specimens. To confirm the observation, we knocked down TMCO1 in A549 cells, a lung carcinoma cell line. TMCO1 deficient cells were migrated significantly faster than wild type cells in Transwell migration and wound healing assays. *In vivo* results demonstrated that TMCO1 was necessary to suppress A549 cell xenografted tumor metastasis in the mouse model. Mechanistic study revealed that protein kinase C (PKC) may be a target of TMCO1 because the migration capability of TMCO1 deficient A549 cells was remarkably inhibited in the

presence of GO6983, a potent PKC inhibitor, and promoted after treatment with 12-O-tetradecanoylphorbol 13-acetate (TPA), an activator of PKC. Our studies provide not only new mechanistic insight into lung cancer metastasis, but also critically evaluate the significance of TMCO1 as a novel target for therapeutic treatment of the disease.

007 LIPID EFFECTS ON THE COFACTOR ACTIVITIES OF THROMBOMODULIN

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Thrombomodulin (TM) lies at the nexus of anticoagulant and antifibrinolytic pathways by activating protein C (PC) and thrombin activatable fibrinolysis inhibitor (TAFI), respectively. TM is a membrane protein and lipid membrane association is involved in both activation processes, however, molecular details remain uninvestigated. In this report, we investigated the lipid effects on the cofactor activities of TM *via* liposomal constructs containing full TM with different lipids: phosphatidylcholine (PtCho), phosphatidylserine (PtSer) and phosphatidylethanolamine (PtEtn). Liposomal TM showed increased PC activation activity in 5% PtEtn lipid environments in comparison to liposomal TM with PtCho only. On the other hand, slightly decreased TAFI activation was observed in 5% PtEtn and 5% PtSer environments while 10% PtEtn and PtSer lipids indicated apparent reduction in TAFI activation in comparison to liposomal TM with PtCho only. Subsequent studies measured fibrinolysis at physiological enzyme concentrations, confirming reduced clot stability in the high PtSer lipid environments due to lower TAFI activation. Meanwhile, lipid effects on PC activation of liposomal TM did not translate into significant differences in thrombin downregulation under our assay conditions. Taken together, this work indicates the importance of aminophospholipids in TM-mediated PC and TAFI activation and implied their involvement in TM functions in the hemostatic balance.

008 NOVEL BIOMARKERS FOR CARDIOVASCULAR DISEASE

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Cardiovascular disease (CVD) is the leading cause of death worldwide. A novel biomarker for early identification of individuals at risk for future cardiovascular events is still critical to provide new ways to diagnose disease states and reveal new metabolic pathways connected to CVD pathogenesis. To identify novel biomarker, we performed non-targeted Gas Chromatography / Mass spectrometry-based (GC-MS) analysis on subjects at risk for CVD in a semi-quantitative fashion to screen for plasma small-molecule metabolites that predict risk for CVD. Among these metabolites, several mono-, di-, and tri carboxylic acids (with/without additional hydroxyl groups) and polyols showed significant potential for prediction of CVD risk. We are further developing two targeted stable-isotope dilution high performance liquid chromatography-electrospray ionization-tandem mass spectrometry methods (LC-ESI-MS/MS) for the quantitation of carboxylic acids and polyols in order to demonstrate their clinical utility by analyzing them in a cohort study of 2000 subjects.

009 PRECLINICAL EVALUATION OF SYNTHETIC INHIBITORS TARGET HER2 PROTEIN IN OVARIAN CANCER

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In 2016 American Cancer Society estimated that new ovarian cancer cases exceed 22 thousand including 14 thousand expected death case. Clinically, the standard chemotherapy drugs used to treat patients with ovarian cancer are combination of a platinum-based drug such as carboplatin or cisplatin with a taxane such as paclitaxel or docetaxel. These drugs used to treat patients with this disease show undesirable drug resistance after the initial promising treatment. Therefore, the development of new drugs is urgently required to enhance the drug pharmacological activity and to reduce its side effects. The nimesulide drug is used in our research lab as a starting material to synthesize a series of analogs, which have anticancer effect. These compounds target tubulin and Heat shock protein27 (HSP27) because of their important cellular functions in the cell, and they are up-regulated in cancer cells. Tubulin is a dynamic structure protein and is involved in cell movement, intracellular trafficking, and mitosis. HSP27 also plays a role in tumor cell proliferation, differentiation, invasion, metastasis, and death. This study also provides the involvement of HER2, which is a trans-membrane protein tyrosine kinase receptor. HER2 is regulated by HSP27 through kinase phosphorylation and over-expression of HER2 is associated with a malignant phenotype in many cancers, including ovarian cancer. The goal for this study is to test nimesulide analogs toxicity effect on the ovarian cancer cell

proliferation (SKOV3) and select the potent agents that reduce HER2 expression. The preclinical data demonstrate that our agents have strong anticancer activity, and they reduce SKOV3 cell growth invitro through HER2 pathway. This series of potent agents that target both tubulin and HSP27 and reduce HER2 expression will be identified as future HER2 inhibitors for ovarian cancer therapy. In sum, synthetic nimesulide analogs, which target HER2 have confirmed successful ovarian cancer cell proliferation reduction.

010 SCALING AND SINGULARITIES FOR CREEPING FLOWS IN RECTANGULAR CAVITIES

Miron Kaufman, Ph.D. and **Petru S. Fodor**, Ph.D.
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We analyze the creeping flow in rectangular cavities in which the fluid is driven by the motion of one of the boundaries defining the cavity. The high resolution mapping of the flow structures formed within the cavity reveals that in the vicinity of the stationary points corresponding to the cavity corners the streamline function, velocity fields and shear rates, follow scaling laws similar with those found for thermodynamic critical phenomena. In particular the behavior near corners defined by stationary walls is analogous to second order transitions. On the other hand at corners defined by one stationary and one moving wall the behavior corresponds to a first order transition. These analogies provide a new perspective on analyzing the solutions of the Navier-Stokes equations for cavity flows.

011 THE EFFECTS OF AQUATIC THERAPY IN THE PEDIATRIC POPULATION: A SYSTEMATIC REVIEW

Julie E. Goldston, B.S.H.S.; **Kayla E. Beebe**, B.S.H.S.; **Julie E. Goldston**, B.S.H.S.; **Samantha H. Howard**, B.S.; **Jessica L. Klonk**, B.S.; **Ashley C. Rossi**, B.S.H.S.; **Kristen Pataki**, OTD/L
Master of Occupational Therapy Program, School of Health Sciences, Cleveland State University

The objective of this systematic review was to determine the benefits of aquatic therapy when used in the pediatric population, ages 0-21, with children diagnosed with Autism Spectrum disorders and Cerebral Palsy, as well as to determine common interventions used and positive recurring outcomes of water-based therapy with this population. The review was completed with an occupational therapist perspective. Electronic databases and academic journals were extensively searched for relevant literature published between 2005-2015. Twenty-one articles met all inclusion criteria and were analyzed to support the use of aquatic therapy interventions with children and adolescents. Group and individual interventions were utilized to address aquatic, motor, cardiovascular, musculoskeletal, and social goals.

From this in-depth search, it can be concluded that the most significant improvements appeared in aquatic skills, gross motor function, and improved quality of life and were carried over to land based skills. This systematic literature review confirmed the necessity for more skilled research to be performed on occupational therapy based aquatic therapy intervention.

012 ADIPONECTIN IN RENAL ALLOGRAFTS

Sreedevi Danturti, M.Sc.¹; **Ran Fan**, M.D.²; **Karen Keslar**, M.S.²; **Nina Dvorina**, M.D.²; **William M. Baldwin, III**, M.D., Ph.D.¹

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Adiponectin is usually classified as an anti-inflammatory cytokine because decreased adiponectin levels are associated clinically with cardiovascular disease and type 2 diabetes. In vitro, adiponectin decreases the production of TNF α , IL-6 and IFN γ by leukocytes, while increasing IL-10. In vivo, adiponectin knockout mice reject cardiac allografts more acutely. On the other hand, adiponectin deficiency is reported to protect the kidney from ischemia-reperfusion injury, and fibrosis. Although adipose tissue is the main source of adiponectin, other parenchymal tissues produce adiponectin, including both skeletal and cardiac muscle, vascular endothelial and smooth muscle cells. More recently, macrophages and lymphocytes have been found to produce adiponectin.

To determine the effects of adiponectin on immune responses to renal allografts, we transplanted A/J (H-2^a) kidneys to C57BL/6 (H-2^b) wild type or adiponectin knockout recipients. RNA was isolated from the kidneys and q-PCR was performed by the dd CT method. A panel was assessed for M1 and M2 markers.

T cell and macrophage infiltrates progressively increased with time after transplantation. CXCL9 expression was increased by day 6 and decreased to near control by day 28 in both groups. Other M1 markers such as TNF α , IL-1 β , CD80 and CD 86 followed a similar pattern but at lower levels. Other M2 markers, such as Fizz1 and CD 206 followed a similar pattern at a lower level. Local expression of adiponectin was not detected in the renal allografts to either wild type or knockout recipients at 6 or 14 days even though the donors were wild type A/J mice. At 28 days adiponectin expression was increased in the allografts to the wild type but not the knockout recipients. Our data suggest that circulating wild type leukocytes express adiponectin and adiponectin expression increases in the allograft as the macrophages shift from a proinflammatory M1 to a wound healing M2 phenotype.

013 COORDINATION CHEMISTRY OF N,N' AZODIOXIDES

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The transition metal coordination chemistry of organic derivatives of nitric oxide (NO) has not been extensively investigated compared to that of NO itself. Some nitrosoalkanes and nitrosoarenes are in equilibrium with dimeric species, *N, N'*-azodioxides. The *cis* diastereomers of azodioxides can act as bidentate chelating ligands for both main-group and transition metals, but thus far only one azodioxide complex has been structurally characterized. The delocalized π system of azodioxides suggests that they may be able to act as redox-active ligands. The objective of this project is to further develop the coordination chemistry of *cis*-azodioxides and to investigate their ability to behave as redox-active ligands. The synthesis and characterization of novel *cis*-azodioxide complexes of first-row transition metals is the first step. Treatment of first-row transition metal chlorides with thallium hexafluorophosphate (TlPF₆), followed by addition of nitrosobenzene, is carried out to abstract chloride as insoluble TlCl and yield cationic azodioxide complexes as salts of the non-coordinating, non-redox-active PF₆⁻ anion. The complexes prepared will be investigated for evidence of electroisomerism (a phenomenon characterized by low-lying electronic excited states characterized by metal-to-ligand or ligand-to-metal charge transfer and the ability of *cis*-azodioxide complexes to catalyze organic reactions will be investigated).

014 THE BENEFITS OF INCORPORATING ANIMALS IN OCCUPATIONAL THERAPY FOR THE GERIATRIC POPULATION

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According to the Administration on Aging, close to 45 million adults aged 65 and older lived in the United States in 2013, and this number is expected to increase. While many of these adults live independently, others need the assistance of occupational therapy. Occupational therapy aims to improve individuals' health and well-being in order to promote their participation in various occupations. Research has shown that working with animals during therapy can improve an older adult's overall quality of life and self-perceived life satisfaction. Benefits of animal assisted therapy (AAT) include: decreased loneliness and depression, increased physical activity, increased emotional well-being, increased socialization, and increased independence. Benefits to one's physiological system include decreased blood pressure, cholesterol, and heart rate. Occupational therapists working in long-term care facilities (LTCFs) can use animals in a variety of therapeutic ways, such as having a client brush a dog to improve upper extremity range of motion or as a motivational tool. Despite the evidence that shows the benefits of using

animals during therapy, many LTCFs in the Greater Cleveland area are not utilizing animals within therapy sessions. After conducting an extensive literature review, this research group prepared to educate LTCFs not only the benefits of using animals within practice, but also on the variety of ways animals can assist clients in achieving different occupational therapy goals. In addition, different avenues for LTCFs to explore in the Cleveland area to acquire a therapy animal for use were reviewed. Overall, the response to the information shared was positive, with LTCFs showing interest in exploring how to obtain a therapy animal for use within the therapy program.

015 AGING AND EMOTION RECOGNITION: AN EXAMINATION OF STIMULUS AND ATTENTIONAL MECHANISMS

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Department of Psychology, Cleveland State University

Previous research suggests that older adults demonstrate emotion recognition deficits, particularly for facial expressions of anger, fear, and sadness, relative to younger adults. The current study investigated how general age differences in emotion recognition might be influenced by attention patterns toward specific target facial features that help distinguish specific expressions. A sample of younger and older adults viewed static facial expressions depicting anger, fear, sadness, happiness, and disgust while their eyes were tracked. For the eye tracking analyses, focus was placed on the proportion of time fixated on the eye vs. mouth regions of the face. This was implemented on account of previous research suggesting that certain expressions are best discriminated through the eye region (i.e., anger, fear, and sadness) or the mouth region (i.e., happiness and disgust). Overall, participants were more adept at recognizing happy expressions relative to all the negative expression categories, with anger being the least recognized. Surprisingly, no age differences emerged in overall recognition performance or for any specific emotion category. In terms of fixation patterns, significantly greater fixation preferences for eye relative mouth regions was observed for sad, anger, and fear relative to happy and disgust, but only for younger adults. In terms of gaze direction, an averted gaze for sad and disgust was better recognized versus a direct gaze, again only for younger adults. We discussed how facial cue information and visual attention patterns may modulate age differences in emotion regulation for certain types of facial stimuli.

016 NOVEL REGULATION OF THE PRO-APOPTOTIC PROTEIN PUMA IN RESPONSE TO HYPOXIA

Shuai Zhao, BS and Crystal M. Weyman, PhD
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Ischemic injury in skeletal muscle caused by hypoxic (low oxygen) conditions occurs in response to traumas, diseases and following reconstructive and transplantation surgeries. Hypoxia induces apoptotic cell death. The protein PUMA (p53 up-regulated modulator of apoptosis) has been shown to mediate the apoptotic signal of hypoxia in neurons and cardiomyocytes, which established PUMA as a promising therapeutic target in hypoxic injury and disease. We have previously reported that the muscle specific transcription factor, MyoD, plays a role in apoptotic processes by directly increasing the expression of PUMA. Therefore, to completely understand the regulation of PUMA expression would identify potential new therapeutic targets in treating muscle-related disorders and diseases. Herein, we report the hypoxic conditions induced by treatment with cobalt chloride (CoCl₂) increased PUMA mRNA and protein in skeletal myoblasts. Interestingly, we noted that, while the basal expression of PUMA protein in growth medium (GM) is constant, the induced expression of PUMA protein peaks and then declines within a four-hour time frame. Further experiments needed to test the hypothesis that the half-life of PUMA protein under steady state conditions is distinct from the half-life of PUMA under induced conditions.

017 HOW THE ILLNESS EXPERIENCE PREDICTS KEY PSYCHOSOCIAL OUTCOMES IN VETERANS WITH BRAIN INJURY

Carmen M. Tyler, B.S.¹; Katherine S. Judge, Ph.D.¹; Virginia S. Daggett, Ph.D.²; Richard L. Roudebush²

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Examining the first-hand illness experience of veterans who have suffered either a stroke or a traumatic brain injury (TBI) should allow the prediction of key psychosocial outcomes such as depression or role strains. Many older veterans are now facing the debilitating repercussions of strokes (risk of stroke doubles each decade over age 55 (Stroke Association, 2012)) and numerous younger veterans have sustained traumatic brain injuries as a result of their service in the Middle East (estimates of TBI from Operation Iraqi Freedom alone number as many as 320,000 (Aarabi & Simard, 2009)). Although their etiologies may differ, both TBI and stroke can cause massive insults to the brain and monumental aftereffects. Objective consequences of brain injury are highly individualized, but the subjective perceptions and appraisals of the influence of those injuries are also unique to the survivor. Perceptions built from the survivor's own personal characteristics and experiences combine with family, medical, and social expectations to add up to what constitutes that individual's illness experience. It is hypothesized that: 1) Perceptions of role captivity, social/recreational role strain, dyad relationship role strain, self-esteem strain, and caregiver burden will not only be related to depression but will each contribute uniquely to higher levels of depression in veterans with brain injuries; 2) Perceived distress and role captivity will

be related to social/recreational role strain and each will contribute uniquely to higher levels of social/recreational role strain in veterans with brain injuries. Correlation and regression analysis of answers to Time 1 questionnaires collected from participants (intervention and control) in the larger Telephone Assessment and Skill-Building Intervention for Informal Caregivers (ANSWERS-VA) will be used for this study. Predictors of depression and role strains may allow for timely intervention to lessen or prevent these outcomes in veterans with brain injuries.

018 QUANTIFICATION OF SOLUBLE THROMBOMODULIN FROM MONOCYTE AND MACROPHAGE SUPERNATANT

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Department of Chemistry, Department of Chemical and Biomedical Engineering and Center for Gene Regulation in Health and Disease (GRHD), Cleveland State University, Cleveland, OH 44115

Thrombomodulin (TM) is a membrane-bound glycoprotein which is mainly expressed on the surface of endothelial cells, but is also found in monocytes, platelets, and neutrophils recently. The major function of TM is to modulate the activity of thrombin from a procoagulant to an anticoagulant protease. Circulating thrombin is captured by TM and is changed from a fibrin forming enzyme to a catalytically active protein which activates Protein C. Activated protein C serves as an anticoagulant, which selectively inactivates coagulation factors Va and VIIIa. When endothelial cells are injured, TM shed off from cell surface and found circulating in plasma and urine in a soluble form known as soluble thrombomodulin (sTM). sTM has potential uses as a biomarker for a vast number of diseases. The expression level of TM on monocytes and upon differentiation to macrophage is unknown. In this study, THP-1 cells were used as model of monocytes and was differentiated to macrophages using PMA and the levels of TM were monitored. The cells were split after two days into two culture plates. One plate was used to lyse the cells, and the other plate was used to collect the cell supernatant. A western blot was used to visualize the difference in the amount of TM from the lysed cells. An ELISA was used to determine the concentration of sTM in the cell supernatant. It showed that there is a significant increase in the concentration of sTM in macrophage supernatant compared to monocyte supernatant. Future experiments will examine the activity of TM from monocytes and macrophages.

019 THE FACTOR STRUCTURE OF TIME BELIEFS AND PERCEPTIONS: PREDICTING PUNCTUALITY, PROCRASTINATION, AND THE USE OF TIME

Katrina Slivka¹, Michelle Paul, B.A.², Maria Rowlett, M.A.², Steve Slane, Ph.D.¹

¹School of Health Sciences, Cleveland State University,

²Department of Psychology, Cleveland State University

Time is important in our language, thinking, and in the regulation and control of behavior. However, psychological research on time has largely been restricted to the development of assessments of time beliefs and perceptions. There are several existing scales that assess time beliefs and perceptions that are widely used, but psychometric properties of these instruments is not well-established. Further, the instruments are not highly inter-correlated, though they measure the same domain. One way of clarifying the confusion is to examine the factor structure common to the instruments. I conducted a principal components factor analysis of three popular scales: The Zimbardo Time Perspective Inventory (Zimbardo & Boyd, 1999), Time Perception Assessment (Paul, 2014), and Time Beliefs Scale (Toshiaki, 1996). A six factor solution was considered most appropriate to the data: Negative View of the Past, Time Management, Living in the Moment, Sluggishness, Powerlessness, and Impatience. As validation of this analysis, factor scores were used to predict several time behaviors. People who arrived early for their experiment appointment scored higher on Living in the Moment. Those who tended to procrastinate scored higher on Negative View of the Past and lower on Time Management. People who completed the experimental tasks more quickly scored lower on Sluggishness and higher on Impatience. The factor structure presented here offers promise as an alternative to the currently available but largely ineffective scales. The current factor structure was useful in predicting major dimensions of time behavior and thus demonstrates construct validity.

020 THE EFFECTS OF TRAUMATIC SYMPTOMOLOGY, MORTALITY SALIENCE, AND SELF-AFFIRMATION ON THE EFFECTIVE MANAGEMENT OF DEATH-THOUGHT ACCESSIBILITY

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According to terror management theory (TMT), healthy human functioning involves the effective management of the awareness of mortality by perceiving oneself as an object of value within an ordered and seemingly permanent cultural world. Indeed, prior research has shown that when non-traumatized individuals are reminded of mortality they subsequently displayed increased accessibility of death-related cognitions, unless they engaged in a self-affirmation task (affirming their self-worth and cultural values). Traumatic experiences, however, represent a strong threat to that perception, undermining one's value and the security provided by one's cultural worldview. Thus, anxiety-buffer disruption theory (ABDT) has recently been developed to help explain posttraumatic stress disorder as stemming from a disruption of normal anxiety-buffer functioning. The current research aimed to assess if self-affirmation proved to be ineffectual in bolstering death-thought accessibility (DTA) in highly traumatized individuals when reminded of mortality (due to disruption of their cultural anxiety-buffer). A 2 (group: low vs

high traumatic-stress) x 2 (mortality salience [MS] vs. pain salience) x 2 (self-affirmation vs. control topic) ANOVA revealed a main effect of MS such that DTA was higher in the MS condition than in the pain condition, replicating prior research. The ANOVA also revealed the predicted 3-way interaction. Among those with low levels of traumatic stress, MS increased DTA in the control topic condition but not in the self-affirmation condition, replicating prior work and indicating the presence of effective anxiety buffering among the low-trauma sample. However, among those with high levels of traumatic stress, MS increased DTA in the control topic condition *and* in the self-affirmation condition, revealing that the otherwise effective anxiety buffer (one's cultural worldview) was disrupted and ineffective among the high-trauma sample. Practical and theoretical implications are discussed.

021 HIGH-THROUGHPUT PROTEOMICS ANALYSIS BY LC-MS WITH AJS-CESI TECHNOLOGY

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Although LC-MS techniques are well developed for proteomics workflow, there will always be needs for high sensitive and reproducible methods when sample amount is limited. Nano LC/MS system may be a remedy; but it requires the use of a nano-pump (e.g., 0.2-0.3 $\mu\text{L}/\text{min}$) and a nano-column (e.g., 75 μm , i.d.). Moreover, the maintenance of a nano LC/MS could be difficult and column overloading may result in skewed peaks with shifted retention times. Therefore, a compromise would be the use of smaller column (e.g., 1 mm, i.d.) with a flow rate of $\geq 50 \mu\text{L}/\text{min}$.

Agilent jet stream technology with electrospray ionization (AJS-ESI) was developed by improving electrospray droplets. Compared to the conventional ESI, AJS-ESI improves MS and MS/MS signal-to-noise ratio of 5 to 10 folds. Capillary electrospray nebulizer (CE-ESI) was developed to handle microliter flow rates. The combined use of these two technologies (AJS-CE-ESI) may provide a high-throughput platform for proteomics analysis. In this pioneering study, we have tested the use of AJS-CESI technology without significant changes of conventional LC-MS system and method to improve the detection limit and sensitivity of small amount of protein sample.

In our experiments, tryptic digested bovine serum albumin was used as model protein, and peptides were separated on a Zobrax C18 LC column (1 x 150 mm, 3.5 μm) at a flow rate of 50 $\mu\text{L}/\text{min}$ and analyzed by Agilent 6540 Accurate-Mass Q-TOF LC/MS system. Our data showed that on average a 50-fold improvement in the sensitivity with a LOD at 15 nmol/L by 3.0 μL injection (or 45 femtomoles) could be attained using AJS-CESI technology.

**022 ATYPICAL PATTERNS OF
PARASYMPHATHETIC NERVOUS SYSTEM
INDICES AT REST AND IN RESPONSE TO A
SAD MOVIE DO NOT PREDICT
BORDERLINE PERSONALITY DISORDER
SYMPTOMS**

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Borderline personality disorder (BPD) is a severe mental illness, characterized by emotional instability, chaotic interpersonal relationships, and emotion regulation (ER) problems that affects about 1%-2% of the general population. A growing literature suggests that abnormalities in the parasympathetic nervous system (PNS) may be particularly important for understanding risk for BPD because the PNS regulates emotions. Examining PNS activity across resting and emotionally evocative states may provide greater insights into BPD risk than either index alone, as evidenced by recent work on atypical PNS activity in ER deficits and depression risk. Given that mood and ER problems are hallmarks of BPD, the present study aims to explore their utility of combining PNS indices across emotional states in predicting BPD. We hypothesized atypical patterns of PNS activity, indexed via the fluctuations of heart rhythms during respiration (respiratory sinus arrhythmia, RSA), at rest and in response to sadness will predict BPD symptoms.

Participants were 130 students and community-dwelling adults who completed a self-report measure of BPD symptoms and a psychophysiological protocol during which respiratory sinus arrhythmia was measured via electrocardiogram (ECG) while participants rested (resting RSA) and were induced into a negative mood state by watching a sad film clip. RSA reactivity was calculated as the difference between resting RSA and RSA during film clip.

Findings showed the sad film clip evoked increased feelings of sadness and RSA reactivity relative to baseline levels, which supports the validity of our mood induction procedure. However, contrary to our hypothesis, neither resting RSA, RSA reactivity, nor their patterns predicted BPD symptoms. These null findings suggest that PNS activity during rest and in response to sadness may not be specific to BPD. Examining atypical patterns of PNS activity during interpersonal conflicts that hall mark BPD may provide greater insights into the physiological underpinnings of this disorder.

**023 PROTEIN LIPIDATION FOR CELL SURFACE
RE-ENGINEERING VIA LIPID FUSION
APPROACH**

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The cell surface, filled with a variety of different proteins, including receptors, ligand proteins, and adhesive proteins, is an important platform for the occurrence of many biological processes, such as cell signaling, cell-cell adhesions, and other extracellular/intracellular communications. This cellular response can be modified by the artificial presentation of bioactive molecules on the cell surface according to a process known as cell surface engineering. Hydrophobic anchoring to the cell membrane is an attractive technique for cell surface engineering as it has several advantages, such as lower cytotoxicity, rapid modification, and its ability to be applied to a wide variety of different molecules and cells. Practically, the process of hydrophobic anchoring simply involves mixing the hydrophobic anchors with cells, which allows for the spontaneous transfer of the anchors from the solution phase to the outer leaflet of the plasma membrane. Here we report a protein lipidation approach for effective cell surface re-engineering with Raw 267.4 cells as model. Briefly, we have developed a fluorescently labeled antigen, ovalbumin, with a phospholipid anchor that can be delivered to a macrophage *via* lipid fusion. We aim to study how the introduction of this antigen alters the cell's ability to initiate an immune response. This study suggests the possible use of phospholipid for cell surface re-engineering applications.

**024 EXAMINING TABOO EFFECTS IN YOUNGER
AND OLDER ADULTS' NATIVE AND NON-
NATIVE LANGUAGE**

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In the proposed experiment, we will examine Stroop interference effects of taboo words compared to neutral words using computer mouse-tracking. Participants will be instructed to identify the color in which neutral or taboo words appear. We will compare younger and older native (L1) and non-native (non-L1) English speakers. Previous research has found older adults are less likely to attend to negative information. However, more recent research found longer color-naming reaction times for taboo words in younger and older adults. A separate area of research has also produced mixed results, with some studies reporting the same effects - and other studies reporting different effects - of negative emotional stimuli in L1 and non-L1. Thus, there is conflicting evidence regarding the effects of age and language on responses to negative emotional stimuli. These inconsistent findings could be due, at least in part, to a lack of sensitivity in traditional measures. Consequently, we will use a more sensitive measure, mouse-tracking, to examine the underlying dynamics of these online cognitive processes. To the best of our knowledge, the proposed study will be the first to investigate effects of age (younger and older adults) and language (L1 and non-L1) in a taboo Stroop task. We will use a visual mixed presentation of the Stroop task, presenting taboo or neutral words. On each

trial, participants will respond to the font color of the presented word by clicking on response options on the screen. We will record participants' mouse movements, including how fast participants move toward the correct response (x-coordinates over time). Overall, we predict that younger L1 speakers of English will show the greatest interference effects of taboo words compared to the other groups. These results will have important theoretical consequences of emotional language processing in younger and older adults' L1 and non-L1.

025 HOW LIVED EXPERIENCES INFLUENCE THE DECISION MAKING OF INDIVIDUALS WITH TETRAPLEGIA WHO CHOOSE TO PURSUE IMPLANTATION OF AN FES APPLICATION

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Background: Functional electrical stimulation (FES) has been shown to improve the respiratory function, arm, and hand use of individuals with tetraplegia secondary to Spinal Cord Injury (SCI). However, little is known about how lived experiences influence the decision-making processes of individuals who choose to pursue FES.

Objective: The following research questions were addressed: (1) How do clients with tetraplegia describe the decision making process employed to pursue implantation of an FES application? (2) How do they describe their lived experiences before FES application and after FES application? (3) How will these lived experiences influence their future decision making to pursue additional augmentative treatment? (4) How will these lived experiences influence how they will advise another person with tetraplegia who is deciding whether or not to have an FES application?

Methods: Using a qualitative case study design, data collection included individual interview, observations, and photo-elicitation. Six investigators conducted individual analyses, met to compare findings and came to consensus.

Findings: Four themes emerged: "Wanting to be more able bodied," "Everything will be alright," "Experiences of vulnerability," and "Reclaiming occupational identity."

Clinical Implications: Healthcare providers must understand how the meaning of personal experiences and occupational identity before and after injury influence the decision-making process of individuals with SCI as they pursue FES implantation.

Conclusion: Because there are no decision-making models unique to individuals with SCI pursuing FES implantation, this research can provide a framework for understanding the decision making process of individuals considering FES implantation.

026 ENHANCING TRAIL-INDUCED APOPTOSIS BY QUERCETIN-MEDIATED TRAIL RECEPTOR UPREGULATION

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Skin cancer is among the most commonly-diagnosed cancers with malignant melanoma being associated with the highest rate of metastasis and mortality. We propose the application of Tumor necrosis factor-Related Apoptosis-Inducing Ligand (TRAIL) as a potential therapeutic for malignant melanoma. TRAIL induces apoptosis in a broad range of transformed human cells by binding to receptors on the outside of the cell. However, some cancers are resistant to TRAIL due to decreased expression of TRAIL receptors. Here we analyze Quercetin as a potential cotreatment with TRAIL to overcome the intrinsic resistance of melanoma. Found in a wide variety of sources from onions and apples to red wine, quercetin is a good candidate for TRAIL cotreatment due to its ability to upregulate TRAIL receptors. To determine if the cotreatment, TRAIL plus quercetin, is able to sensitize melanoma cells to TRAIL-induced apoptosis, we treated resistant melanoma cell lines, MeWo and WM164, with TRAIL plus sub-cytotoxic concentrations of quercetin. Quercetin was able to sensitize both MeWo and WM164 to TRAIL-induced apoptosis marked by the fragmentation of PARP, a hallmark of apoptosis, and the activation of executioner caspases 3, 6 and 7. Specifically, quercetin was able to sensitize resistant melanomas to undergo TRAIL-induced apoptosis as evidenced by the cleavage of procaspase 8 to caspase 8, a marker for the initiation of TRAIL-induced apoptosis. Quercetin also promoted the TRAIL-mediated activation of the intrinsic pathway of apoptosis marked by the release of cytochrome C from the mitochondria. Post-treatment cells were analyzed for membrane expression of TRAIL receptors by FACS analysis. In both MeWo and WM164, quercetin was able to upregulate the membrane expression of TRAIL receptors. These preliminary data demonstrate that quercetin is a good potential cotreatment for TRAIL; however, further research is needed to reveal the mechanism of quercetin-mediate upregulation of TRAIL receptors.

027 EVALUATION OF QUERCETIN-ENHANCED TRAIL-INDUCED APOPTOSIS IN BREAST CARCINOMA

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Breast cancer is the most commonly diagnosed cancer in women in the United States. There is a continued need for the

development of selective and specific treatment options for all types of breast cancer. Recombinant human Tumor Necrosis Factor-Related Apoptosis-Inducing Ligand (rhTRAIL), the optimized form of the endogenous death ligand, shows potential as an effective anti-cancer therapeutic due to its ability to induce apoptosis in cancer independent of p53 function, while displaying minimal toxicity to normal cells. However, a majority of breast cancer cell lines exhibit resistance to TRAIL treatment due to up-regulation of pro-apoptotic proteins and/or down-regulation of anti-apoptotic proteins. To overcome TRAIL resistance, a cotreatment option has been explored utilizing the natural compound Quercetin (Q). Q is a flavonol found in certain fruits, vegetables, and teas. As a single agent, Q has been shown to have pro-apoptotic effects on a variety of cancer cell lines. The aim of this study is to examine the capacity of Q to enhance TRAIL's pro-apoptotic effects on hormone dependent (MCF-7) and triple negative (BT-20) breast cancer cells. Sulphorhodamine B (SRB) assays were performed on breast cancer cells to determine if the cotreatment of Q and TRAIL hinders cell growth. Growth for both breast cancer lines was substantially inhibited by single agent Q treatments but not by single agent TRAIL treatment. Moreover, BT-20 and MCF-7 cell growth was further inhibited by cotreatment with both agents. Q's ability to sensitize breast cancer cells to TRAIL-induced apoptosis was examined by western blot analysis. Compared to single agent treatments, the combination of Q and TRAIL enhanced the induction of apoptosis as indicated by increased PARP cleavage and the activation of the executioner caspases. Overall, these findings suggest that the cotreatment of Q and rhTRAIL possesses the potential to be an anti-breast cancer therapeutic.

028 STEP LENGTH AND CENTER OF MASS DIFFERENCES BETWEEN VOLUNTARY LIMITS OF STABILITY AND REACTIVE STANDING SLIPS

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Balance training has been shown to be effective in preventing or lessening the severity of falls among older adults. This training is either proactive, which is anticipatory and includes self-initiated actions, or reactive, which includes unexpected perturbations that cause a loss of balance. The purpose of this study was to investigate differences in the step length and the center of mass (COM) position at first step initiation during voluntary limits of stability (LOS) testing vs. reactive standing slips. Five older adults with an average age of 61.2 years volunteered for this case series pilot study. First, the subjects were suited with a harness and had reflective markers placed on them. Next, they performed an anterior voluntary LOS test which entailed standing with their feet shoulder width apart and leaning as far forward as possible until they had to take a step. Then, the subject stood on a Slip Trainer and underwent repeated slip perturbations. Subjects' COM position and step

length at step initiation were calculated from the motion capture data. The subjects stepped on average 26 cm longer during LOS testing than during the reactive standing slips. The subjects' COM was closer to or further ahead of their front toe on the second LOS test than the first. During the reactive slip trials, the subjects were initially surprised by the first slip and their COM was more forward due to a later step. During the second slip they adapted and stepped sooner, as evidenced by a more posterior COM position vs. the first slip. Over the final three slips, their COM at step initiation became more consistent. In general, the results indicated that the older adults adapted appropriately to repeated slip perturbations and that both proactive training may have the potential to contribute to learning COM control for balance training as well as reactive.

029 METAL-DECORATED GRAPHENE FOR PEROXYNITRITE DETECTION

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Recent clinical research indicates that the cytotoxicity role of peroxynitrite (ONOO⁻) plays an essential role in several cardiovascular dysfunctions and other diseases triggered by oxidative stress. Peroxynitrite (PON) is a powerful oxidizing agent that attacks vital components inside the body and initiates deleterious effects via direct and indirect interactions. It reacts directly with lipids, DNA, and proteins and indirectly serves as a trigger of radical chain reactions. In vivo, PON is produced from the diffusion-controlled reaction between nitric oxide radical ([•]NO) and superoxide anion-radical ([•]O₂⁻).

Recently, we have shown that hemin and hemin-modified graphene can be used as catalytic platforms for electrochemical detection and enhanced quantification of peroxynitrite. In this work, we prepare metal-decorated graphene-based composite materials as potential catalytic interfaces for sensitive electrochemical determination of PON. We first describe the method of preparation of metal-modified graphene materials. We characterize the hybrid materials using a number of methods including scanning electron microscopy (SEM), atomic force microscopy (AFM), Raman, and x-ray photoelectron spectroscopy (XPS). The modified metal-graphene composite is then tested on carbon electrodes for PON detection and quantification using voltammetry and dose-response amperometry. We compare and contrast the performance of the new metal-graphene materials with hemin-only based electrodes as well as bare graphene based electrodes.

030 SYNTHETIC MELANIN FILMS AS POTENTIAL INTERFACES FOR PEROXYNITRITE DETECTION

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Peroxynitrite (PON) is a very reactive nitrogen species. It facilitates both oxidation and nitration reactions. PON emerged as a major cytotoxic agent, implicated in a host of pathophysiological conditions. Peroxynitrite is the primary product of the reaction of superoxide anion-radical and nitric oxide radical. PON is relatively a new member of the nitroxidative array of reactive metabolites. Early clinical reports emphasized the deleterious physiological reactivity of PON with many cellular targets including DNA, proteins, and lipids in cell membranes.

Melanin is a natural pigment that has many physiologic functions including neutralizing highly reactive oxidative species. Tyrosine and its derivative 5,6-dihydroxyindole (DHI) are some precursors of eumelanin, a black form of melanin that is also photostable.

In this work we examine the chemical interaction between synthesized peroxynitrite and polymerized films of DHI as a model of melanins on electrodes. First we studied the electrochemical characteristics of polymerized 5,6-dihydroxyindole, and then monitored the changes after addition of peroxynitrite. This part of the work reports mainly on chemical changes within the electropolymerized films of melanin on the electrode. We also studied the rates of chemical decay of peroxynitrite in the solution with and without exposed melanin films using absorbance spectroscopy. Ultraviolet-visible spectroscopy showed a dramatic difference between the decomposition rates of peroxynitrite alone and peroxynitrite in the presence DHI films.

We will discuss the implication of the changes of the electrochemical signal of DHI films. We will also compare and contrast the reactivity of peroxynitrite in the absence and presence of DHI films. Finally, we will explore the possibility of using DHI films as a platform for quantitative detection of peroxynitrite in solutions.

031 NON-TRADITIONAL FIELDWORK PLACEMENT IN RURAL NEW MEXICO WITH NATIVE AMERICAN YOUTH

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Occupational Therapists (OT) provide skilled services that address individual and collective group needs as various challenges prevent occupational participation. One aspect of occupational therapy is occupational justice, which emphasizes the rights, responsibilities, and liberties that enable

individuals to experience health and quality of life through engagement in occupations. All individuals are not presented with the same opportunities, thus influencing quality of occupational justice within communities, such as the Native American reservations. New Mexico lacks healthcare providers, including occupational therapists. Creating a fieldwork site in New Mexico provides student-skilled services to the area and generates an opportunity for OT students to explore and experience, first-hand, the different needs of Native Americans in a rural area. Does adding a level one fieldwork site in New Mexico to the curriculum of the Cleveland State University Masters of Occupational Therapy program influence and meet the needs of the OT students? Students provided services to Just Us Kids preschools in Farmington and Aztec, New Mexico that consisted of both Native American and non-Native American students. Various needs were observed in all sites such as sensory, social emotional learning, developmental levels, and fine motor skills. The non-traditional fieldwork experience not only addressed the educational curriculum needs of OT students, but also provided an enhanced understanding of culture and beneficial learning experiences that are difficult to obtain with current established fieldwork sites. In conclusion, it is determined that Native American preschool students and their teachers can significantly benefit from OT services. Creating a fieldwork site in New Mexico would allow yearly services to Native American children. It would also give future OT students the opportunity to go through a non-traditional fieldwork site and gain an enriched cultural experience.

032 QUANTIFICATION OF MONOSIALOGLANGLIOSIDES IN HUMAN PLASMA BY A NOVEL UPLC/MS/MS ASSAY FOLLOWING CHEMICAL DERIVATIZATION

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Gangliosides are a large subfamily of glycosphingolipids that present abundantly on the plasma membrane of neuronal and glial cells of vertebrates. These molecules are structurally characterized by a distinctive oligosaccharide moiety attached to a ceramide portion with variable length on fatty acid chain. Physiologically, they are believed to play critical roles in the regulation of various receptor-mediated cell signaling pathways and cellular events. Disruptions and disturbances in their metabolic pathways have been found to pathologically facilitate the pathogenesis of numerous neurodegenerative disorders, such as Parkinson disease, Alzheimer disease, and ganglioside GM3 synthase deficiency (GSD). However, limitation on detection sensitivity has been the primary bottleneck for these molecules to be reliably measured in relevant biological matrices. Therefore, a reliable LC/MS/MS

method with enhanced sensitivity is urgently demanded for relevant biomedical studies.

In this work, a novel reverse phase UPLC/MS/MS method for determination of three monosialoganglioside species, GM1, GM2, and GM3, in human plasma has been developed and validated. This assay employed DMTMM & PAEA chemical derivatization for signal enhancement and D₃-labeled monosialogangliosides as internal standards (IS). The analytes and ISs were extracted from plasma using protein precipitation procedure, cleaned up through liquid-liquid extraction with a mixture of water/methanol/chloroform, dried under nitrogen purging, reconstituted with solvent, and derivatized with DMTMM & PAEA under optimized conditions. Thereafter, the samples were injected into a Shimadzu Nexera UHPLC system interfaced to an AB Scix Qtrap 5500 mass spectrometer that operating in ESI positive and Multiple Reaction Monitoring (MRM) mode to achieve superior sensitivity and specificity during the detection. Moreover, the instrumental responses of analytes have been enhanced for over 15 times after derivation, leading to more reliable and sensitive analysis.

This method has been applied to monitor plasma levels of monosialogangliosides in GSD patients for clinical diagnosis and therapeutic evaluation during the ongoing clinical trial.

033 EFFECT OF RNASE L ON THE PROTEIN EXPRESSION IN THE MOUSE LIVER TISSUE

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Interferons are cytokines that are participated in the innate immunity against viruses and other microbial pathogens. In addition, they also display anti-tumor, anti-proliferative and immuno-regulatory activities. The effects of interferons are mediated through proteins encoded by IFN-stimulated genes (ISGs). Ribonuclease L (RNase L) is a type of ISGs. Studies have shown that RNase L contributes to anti-viral process, apoptosis and anti-cell proliferation. RNase L knockout mice are significantly larger than wide type mice in terms of body weight, and have more oil droplets in the organ tissues such as liver and kidney, suggesting that RNase L may be involved in lipid metabolism. To determine if RNase L regulates the expression of any genes in the liver, liver tissue extracts from RNase L knockout and wild type mice were subjected to SDS-polyacrylamide electrophoresis and Coomassie blue staining. The differential protein bands generated from the two tissue extracts were excised and identified by the proteomic method. Interestingly, the results indicated that fatty acid synthase and hemoglobin subunit were significantly higher expressed in the liver deficient RNase L. Further investigation is warranted.

034 EFFECT OF MULTIDIRECTIONAL HARNESS SYSTEM ON PERCEIVED DIFFICULTY AND ACTUAL BALANCE PERFORMANCE DURING DYNAMIC KICKING TASK

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Background and Purpose: Balance is a physical ability that is often impaired in older adults. Loss of balance can lead to falls and serious injury. Balance training typically involves less intense proactive tasks such as heel to toe walking, and more intense reactive tasks, such as induced slips. Although reactive training is more effective, it is not well tolerated and/or safe for many individuals. This study examines a novel, more intense proactive balance training protocol utilizing a multidirectional harness system. Specifically, it asks if use of the harness system affects perceived balance difficulty as well as actual balance performance.

Subjects: Three community dwelling adults over the age of 60 participated in the study.

Methods: In this case series, each subject played a soccer video game that required kicking toward a randomly moving goal three times in a row in one-leg standing on the right and then left leg, both in and out of the harness system. Balance was assessed based subjects' perceived ratings of stability/balance difficulty (RPS scores) and the number of times the foot touched down between kicks in one-leg standing.

Results: All subjects touched the kicking foot down for balance fewer times while in the harness (mean 12%; range 0% to 45%), compared to out of the harness (mean 36%; range 0% to 80%). All subjects also reported lower RPS scores (higher perceived levels of stability) in the harness (mean 2.85/10; range 1-4.25) than out of the harness (mean 3.9/10; range 2-5.7). **Conclusion and Discussion:** The results indicate that the utilization of the harness system during this difficult proactive balance task improved both self-perceived and objective balance as compared to completing the task without a harness. These results also highlight the need for further research into the use and feasibility of multidirectional harness systems to improve mobility.

035 INVESTIGATION OF THE MECHANISM OF RIBOSOMAL INCORPORATION OF RPL13a DURING RIBOSOME BIOGENESIS AND L13a-MEDIATED TRANSLATIONAL SILENCING OF TARGET INFLAMMATORY GENES

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Ribosomal protein L13a is essential for transcript-specific translational silencing of mRNAs encoding several inflammatory proteins e.g. chemokines and chemokine receptors. Series of studies from our laboratory showed that phosphorylation-dependent release of L13a from 60S ribosomal subunit and its assembly into the IFN-gamma-activated inhibitor of translation (GAIT) complex is essential for translational silencing of GAIT element bearing mRNA transcripts. However, the amino acid residue(s) of L13a that interacts with the GAIT elements of the target mRNAs and the residue(s) important for ribosomal incorporation during ribosome biogenesis are still unknown. Previous studies in our laboratory showed that the incorporation of L13a takes place during maturation of the 90s pre-ribosome in the nucleolus and arginine at position 68 is essential for the incorporation. Structural homology modeling using crystal structure of prokaryotic L13 as a model showed that eukaryotic L13a possesses an extra helix at the C-terminal end. RNABindR, a Web based Server, identified a motif within this helix as a potential RNA binding site. We are particularly interested in understanding the function of this extra segment of human L13a. Interestingly, we observed that deletion of this extra helix makes L13a incompetent to translocate to the nucleolus. We have also identified three amino acids within this helix at position 185(V), 189(I) and 197(L) that are required for ribosomal incorporation of L13a. In addition, amino acids at positions 159(K), 160(R) and 161(K) are necessary for nucleolar import of L13a. Our future goal is to test the ability of these L13a mutants to silence the translation of GAIT element-bearing mRNA transcripts in an in vitro translational assay. Together, these studies will provide a comprehensive analysis of the critical amino acid residues for ribosome incorporation and translational silencing activity of L13a, thus providing molecular insights into the mechanism of ribosomal and extra-ribosomal function of this physiological attenuator of inflammation.

036 DIURNAL BEHAVIOR VARIABILITY OF AFRICAN ELEPHANTS AT CLEVELAND METROPARKS ZOO

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African elephants (*Loxodonta africana*) are easily recognizable and beloved members of zoological institutions. Their intellectual and social capabilities influence husbandry decisions that aim to increase environment enrichment and natural behavior. While observational studies are common in assessing captive elephant welfare, few studies compare daily and nightly behaviors. In an ongoing study at the Cleveland Metroparks Zoo, the behavioral patterns of four female African elephants are being observed to determine diurnal

activity budgets. Current data is collected using focal animal sampling with behaviors recorded at 60 second intervals for 100 minute observation periods. Observations occur both during the day (0700-1730) and night (1730-0700) and viewed by a remote camera system or by live observation. Daytime and nighttime activities will be averaged and reported per the amount of time elephants performed that behavior and activity. Individual behavioral trends will also be addressed and reported. Findings from the study will be summarized and submitted to the CMZ elephant management team to be referenced in husbandry decisions.

037 BENEFITS OF USING FLEXTIME ARRANGEMENT FOR ON-SITE RADIOLOGISTS: AN EXAMPLE OF A RADIOLOGY DEPARTMENT IN A HOSPITAL

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A hospital's radiology department strives to provide high quality of patient care, high levels accuracy in reporting in a short turn-around time. Advances in technology have now allowed radiologists to telecommute, providing the ability to access patient images from a remote location. This enables radiologists to continue their work after hours or on the weekends. Telecommuting gives radiologists access to more flexibility in scheduling, allowing better handling of workflow fluctuation. The current study looked to investigate the effects of flextime arrangement on radiologists' perceived autonomy in scheduling, job satisfaction, pride in the profession, relationships with coworkers and supervisors, and overall job performance of the department. A group of radiologists (n = 16) completed a measurement 6 months before and 6 months after the implementation of the flextime arrangement to provide investigators with information about the effects of the flexible work arrangement. After the implementation of the flextime arrangements, the radiologists' average scores on scheduling autonomy and pride increased, but average scores of coworker relationships decreased. Scores also reflected that work stress decreased significantly after the implementation of the flexible scheduling arrangement. A significant positive correlation was found between the variables of employee pride and department chair relationship, a moderately significant positive correlation was found between the variables of employee pride and autonomy in scheduling, and a moderately significant negative correlation was found between the variables of department chair relationship and work stress.

038 KIDNEY EPITHELIAL CELL PROLIFERATION INDUCED BY CHANGES IN FLUID FLOW VELOCITY

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It was previously determined that, in mouse cortical collecting duct cells (MCCDC's) bathed in pro-differentiation culture media (pcd), changes in fluid flow velocity (Δv_f) generated using an orbital shaker (os) lead to increased cell density, thought to result from proliferation (prol) transduced through the primary sensory cilia (psc), mechanosensory organelles. Since mature kidney epithelial cells (KECs) of all types exist in non-dividing states, this prol must result from cell cycle (CCy) re-entry. I hypothesized that MCCDC's and Madin-Darby canine kidney cells (MDCKC's) subjected to Δv_f de-differentiate into mesenchymal KEC's before re-entering and continuing through the CCy, subsequently dividing.

To investigate this hypothesis, MCCDC's and MDCKC's bathed in pcd were allowed to differentiate for ≥ 10 days under conditions of no fluid flow ($v_f = 0$; control). In order to expose cells to Δv_f , other MCCDC's were then subjected to fluid flow ($v_f = \text{max}$) for 30, 60, 120, or 240 min using an os. MDCKC's were subjected to $v_f = \text{max}$ for ~ 60 hrs using an os. Following these time periods, cells were either fixed in paraformaldehyde or chemically lysed, nuclei of fixed cells were DAPI stained for cell counting, and RNA/protein extracted from lysed cells. qRT-PCR/Western blot analyses of the extracted RNA/protein is being used to determine concentrations of mRNA transcripts/proteins considered markers of KEC prol/differentiation. Immunostaining of fixed cells was used to visualize the relative abundance and cellular localization of the differentiation markers. Differentiation markers include E-cadherin (E-cad), important in adherens junction formation, and acetylated tubulin (AT), critical for psc outgrowth. Prol markers include phospho-Akt (protein)/phospho-mTOR (protein)/phospho-ERK1&2 (protein)/cdk1 (mRNA)/c-Myc (mRNA). If MCCDC's and MDCKC's de-differentiate and divide in response to Δv_f , protein levels of E-cad and AT should decrease, those of phospho-Akt should decrease, those of phospho-mTOR/phospho-ERK1&2 should increase, and mRNA levels of cdk1/c-Myc should increase as compared to controls.

039 THE EFFECTS OF COGNITIVE LOAD ON THE PERCEPTION OF FOREIGN-ACCENTED SPEECH

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A significant amount of the research conducted in the area of foreign-accented speech has examined the influence that intelligibility, comprehensibility, and strength of accent have on the perception of foreign-accented speech. Factors such as speaking rate, signal-to-noise ratio, number of talkers, familiarity with the foreign-accent and, most relevant to the present study, cognitive load all play a role in how accented speech is perceived. In the current study, we explored the inverse of this relationship. We hypothesized that degree of cognitive load would affect participants' accent ratings. The

purpose of this research was to evaluate two competing hypotheses. According to a difficulty-based account, increases in cognitive load should lead to increased accent ratings, such that both native and non-native accents are rated stronger. According to an alternative resource-based account, increases in cognitive load should push accent ratings toward more neutral ratings, such that native accents are rated stronger and non-native accents are rated weaker, as there will be fewer available resources to attend to the accent-rating task. Results showed that cognitive load led to significantly weaker ratings of the foreign-accented speakers, as predicted by the alternative resource-based account. However, the influence of cognitive load only emerged in a high cognitive load condition, and cognitive load had no significant effects on the native-accented speakers. In addition to a number of potential practical implications for accented speakers, our results have important theoretical implications for the perception of foreign-accented speech and for the relationships between language and accent perception.

040 INVESTIGATION OF IRES-MEDIATED TRANSLATION OF PUMA mRNA, INITIATION FACTOR REQUIREMENTS AND SEARCH FOR IRES-TRANS ACTING FACTORS (ITAFs)

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Canonical translation initiation in majority of cellular mRNAs occurs by a cap-dependent/scanning mechanism, whereby the 43S preinitiation complex binds to the mRNA 5' terminal cap structure and scans the 5'UTR of mRNA in search of the initiation codon. Internal Ribosome Entry Sites (IRESs) are cis-acting elements, located in the 5'UTRs of some viral and cellular mRNAs that facilitate direct recruitment of the 40S ribosomal subunits near the AUG codon. IRES-mediated translation initiation may proceed without the help of many canonical initiation factors that are required during cap-dependent translation initiation, but may require additional IRES-trans-acting factors (ITAFs).

The proapoptotic Bcl-2 family member PUMA has been previously shown to contain an IRES element that is active under conditions of eIF2- α phosphorylation and hypophosphorylation of eIF4E-BP that inhibits cap-dependent translation.

To further investigate the mechanism of PUMA mRNA recruitment to the ribosome, we attempted the analysis of PUMA IRES initiation factor requirements. We found that unlike class III or IV viral IRESs, PUMA IRES is not able to bind 40S ribosomal subunits directly. Further, the use of specific inhibitors such as hippuristanol (that targets eIF4A helicase) and HRV2 2A protease (that cleaves the scaffolding

protein eIF4G) showed that PUMA IRES requires intact eIF4G and eIF4A for its activity, which is reminiscent of the hepatitis E virus (HEV) IRES requirements. RNA affinity pull down assays using biotin labeled PUMA IRES and cellular extracts from 23A2 myoblast cells grown in Differentiating Media (DM) for 3 hours (condition leading to PUMA IRES activation) and mass spectrometric analysis identified Hsp70 as one of the proteins that binds PUMA IRES with high affinity. Gel shift assays confirmed that the binding is specific. Experiments are under way to determine the role of Hsp70 in PUMA IRES-mediated expression.

041 TESTING THE IMPACT OF POST-TRAUMATIC STRESS ON EXISTENTIAL MOTIVATION FOR IDEOLOGICAL CLOSED- AND OPEN- MINDEDNESS

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According to terror management theory (TMT), humans manage their awareness of mortality by involving oneself into a seemingly permanent culture and establishing value within it. Humans also perceive those worldviews as fundamentally positive and true. Prior research has shown that when non-traumatized individuals are made aware of mortality they subsequently displayed increased self-esteem striving and ideological dogmatism (perceived veracity of one's own cultural values). However, when an individual faces traumatic experiences, they are presented with a strong threat to those worldview structures, undermining one's values and security that comes with one's cultural beliefs. Therefore when traumatic stress causes disruption to normal worldview functioning, the awareness of mortality may instead lead to a more open-minded (less dogmatic) approach to alternative cultures and beliefs to replace those challenged during the traumatic experience. Thus, the current research hypothesized that mortality reminders would cause increased ideological dogmatism among low-traumatized individuals, but reduce dogmatism (more open-mindedness) among high-traumatized people. A 2(group: low vs. high traumatic stress) x 2(mortality salience [MS] vs. pain salience ANOVA will be conducted, and practical and theoretical implications will be discussed.

042 CONTROLLING SIZE AND SHAPE OF THE ELASTIN-LIKE POLYPEPTIDE BASED MICELLES

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Elastin-like polypeptide (ELP) trimer constructs make reliable environmentally responsive micellar systems because they exhibit a controllable transition from being water-soluble at low temperatures to aggregating at high temperatures. It has been shown that depending on the specific details of the ELP design (length of the ELP chain, pH and salt concentration) micelles can vary in size and shape between spherical micelles with diameter 30-100 nm to elongated particles with an aspect ratio of about 10. This makes ELP trimers a convenient platform for developing potential drug delivery and bio-sensing applications as well as for understanding micelle formation in ELP systems. Since at a given salt concentration, the headgroup area for each foldon should be constant, the size of the micelles is expected to be proportional to the volume of the linear ELP available per foldon headgroup. Therefore, adding linear ELPs to a system of ELP-foldon should result in changes of the micelle volume allowing to control micelle size and possibly shape. The effects of addition of linear ELPs on size, shape, and molecular weight of micelles at different salt concentrations were studied by a combination of Dynamic Light Scattering and Static Light Scattering. The initial results on 50 mM ELP-foldon samples (low salt) show that Rh of mixed micelles increases more than 5-fold as the amount of linear ELP raised from 0 to 50 mM. It was also found that a given mixture of linear and trimer constructs has two temperature-based transitions and therefore displays three predominant size regimes.

043 ANTIVIRAL ACTIVITY OF 2'-5'-OLIGOADENYLATE SYNTHETASE-LIKE (OASL) PROTEIN IN INHIBITING RESPIRATORY SYNCYTIAL VIRUS REPLICATION

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Respiratory Syncytial Virus (RSV) is an enveloped, negative sense, single-stranded RNA virus. It belongs to the family Paramyxoviridae, subfamily Pneumovirinae, genus Pneumovirus. RSV is the leading cause of pediatric illness; every year it causes more than 85,000 hospitalizations in USA alone. Antiviral therapy is not very effective for hRSV. Viral infection induces Type-I interferon (IFN α/β) production to protect the host cells from infection. Previous studies have shown that two non-structural (NS) proteins of RSV, namely NS1 and NS2 inhibit interferon (IFN) α/β . Previously, our laboratory has shown that NS1 and NS2 of RSV, working singly as well as, together strongly suppress the host cell's

type I IFN-mediated innate immunity by degrading or inhibiting multiple cellular factors needed for either IFN induction or response, including RIG-I, IRF3, IRF7, TBK1, and STAT2. IFN signaling exerts the effect and establish the antiviral state by inducing several interferon stimulated genes (ISGs). 2'-5'-Oligoadenylate Synthetase-like protein (OASL) is one of these interferon-inducible antiviral proteins belongs to OAS family. It can synthesize 2'-5'-oligoadenylate (2-5A), induces RNA degradation by activating RNase L. Human OASL is related to the OAS family by its N-terminal OAS-like domain but is devoid of 2-5A synthetase activity. Human OASL contains two tandem ubiquitin-like (UBL) domains in the C terminus, which are absent in any of the other members of the OAS family. Unlike in humans, two OASL isoforms have been identified in the mouse, Oasl1 and Oasl2. In this study we have shown that hOASL and mOASL2 both are antiviral and can inhibit growth of RSV. An attempt to counteract the antiviral function of OASL and to allow virus growth, RSV NS1 can degrade the OASL protein and the degradation is proteasome dependent.

044 DOES THE USE OF MODIFIED RIDE-ON CARS IMPROVE GROSS MOTOR SKILLS IN YOUNG CHILDREN WITH DOWN SYNDROME?

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Children with Down syndrome (DS) present with neuromotor impairments, which can delay the acquisition of gross motor skills, including walking. Delaying the onset of walking affects a child's independence and can also impact cognitive, language, and social-emotional development. Therefore, therapeutic interventions are often implemented during early childhood to improve the development of mobility skills. This report aims to examine whether the motor skills of two children with DS improved after implementation of a modified ride-on car (ROC) as a novel mobility intervention. Gross Motor Growth Scores (GMGS) of the Bayley Scales of Infant and Toddler Development, Third edition (BSID-III) were analyzed to detect if changes in the acquisition of motor skills could be appreciated. The protocol for modified ROC intervention included a baseline and intervention phase. Within these two phases, a total of six assessments were completed. The GMGS in child A improved over time demonstrating relative advances in the development of motor skills, while the GMGS plateaued in child B after the second assessment. However, when plotted on a Growth Motor Growth Chart, successive GMGS revealed a relative regression of motor skills as demonstrated through greater deviations from age-expected normative standards in both child A and child B as they aged. However, it is unclear if the modified ROC had not been implemented, the deviations of GMGS from age-expected normative standards would have been more substantial. As this low-cost intervention poses minimal risk to children, additional research should be

pursued, specifically addressing if use of a modified ROC results in developmental changes of cognitive, language and social-emotional skills.

045 DEVELOPING AFFORDABLE WET-SAMPLE ELECTRON MICROSCOPY INTEGRATED WITH A TEMPERATURE CONTROLLED SAMPLE HOLDER

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Scanning Electron Microscopy (SEM) is widely used to analyze the size, shape, and composition of material systems. However, using this tool for analyzing such systems such as particles suspended in solution, requires drastic sample alterations, such as precipitation and fixation. Besides altering their environment, this exposes the particles to the harsh conditions within an electron microscope, such as high vacuum and electron beam exposure. To this end, the first goal of this study was to develop methodologies for imaging wet samples using electron microscopy. This is accomplished by creating a sandwich structure containing the solution of interest between a partially electron transparent window and a silicon substrate. The ability of the developed imaging cells to provide good imaging conditions is demonstrated with a variety of samples including polystyrene spheres, polymeric microgels and spindle shaped nanoparticles. As some of the systems investigated are temperature sensitive, the second goal of the project was to develop a temperature controlled stage that can be integrated with the SEM. In the future this heating stage will be used alongside the wet samples to image microgels and other temperature sensitive organic molecules above and below their critical solution temperature.

046 DEDUCING SHAPE OF ANISOTROPIC PARTICLES IN SOLUTION FROM LIGHT SCATTERING: SPINDLES AND NANORODS

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Depolarized Dynamic Light Scattering (DDLS) enables to measure rotational and translational diffusion of nanoparticles suspended in solution. The particle size, shape, diffusion, and interactions can then be inferred from the DDLS data using various models of diffusion. Incorporating the technique of DDLS to analyze the dimensions of easily imaged elongated particles, such as Iron (III) oxyhydroxide (FeOOH) Spindles and gold Nanorods, allows testing of the models for rotational and translation diffusion of elongated particles in solution. This, in turn, can help to better interpret DDLS data on hard-to-image anisotropic wet systems such as micelles, microgels,

and protein complexes. This study focused on FeOOH Spindles and gold Nanorod particles. The light scattering results of FeOOH analyzed using the basic model of non-interacting prolate ellipsoids yielded dimensions within 17% of the SEM measured dimensions. The dimensions of the gold nanorod obtained from the straight cylinder model of DDLS data provided results within 25% of the sizes that were obtained from TEM. The nanorod DDLS data was also analyzed by a spherocylinder model.

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In recent years, UDT (urine drug testing) is the mainstays for drug compliance monitoring/ abuse in pain management. Although, LC-MS/MS is considered as a gold standard for UDT, these methods are highly time consuming and require 3 separate LC-MS screening procedures, majority of the drugs are positively ionized and only barbiturates and EtG ionize better in negative mode. Thus, 3 separate and time consuming LC-MS/MS runs with different HPLC columns are needed. The main goal of this research is to develop a single novel and robust MS method to identify and quantify barbiturates and EtG in urine. The samples were rapidly prepared by simple one step dilution of blank urine (mixture of 6 lots) spiked with phenobarbital and EtG followed by flow injection of sample to MS with a carrier solvent, without HPLC. Quantification of both phenobarbital and EtG were achieved via MS analysis by ESI triple-quadrupole MS in MRM mode employing stable isotope- labeled internal standards (phenobarbital-d5 and EtG-d5). The validated method was linear at the range of 2.5-100ng/ml with correlation coefficient > 0.998. The %CV and RE for intra and inter assay at 4 QC levels (i.e., 2.5, 6.25, 22.5 and 80 ng/ml) were > 8.0% and > 10.0% respectively. The major advantages of our method: (1) Simple dilution: sample preparation, (2) FI-MS/MS analysis (no HPLC) with 2 minutes run time enabling much higher throughput. The acquired results proved that our method is simple, scalable, has the capacity to process >100 samples/day, and application of this method can permit rapid screening of multiple pain drugs in urine with short sample preparation recommended for clinical UDT studies.

047 THE IMPACT OF MORTALITY AWARENESS ON MEANING IN LIFE AMONG CHRISTIANS AND ATHEISTS

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Terror management theory (TMT; Greenberg, Pyszczynski, & Solomon 1989) holds that the awareness of death can motivate humans to rely on various worldview beliefs that offer a symbolic permanence, such as religious beliefs and their associated concepts (e.g., 'eternal life'). Research derived from TMT suggests that reliance on a terror managing set of beliefs, when reminded of death, can influence one's perception of meaning in life (Greenberg, Pyszczynski, & Solomon 1990; 1997). Other research suggests that religious concepts help to manage the anxiety brought on by mortality salience (the awareness of death) and when those concepts are expanded upon that leads to further exploration of the challenges of religious and atheistic terror management (Vail, Arndt, & Abdollahi 2012). The present study addresses the implications of accepting versus rejecting religious terror managing strategies. It is hypothesized that religious participants would be able to sustain perceived meaning in life when reminded of death but that atheists—who reject religious belief—would potentially be vulnerable to a reduction in meaning of life when reminded of death. To test that idea, Christians and atheists are first reminded of either mortality or control topic, and then are asked to rate how strongly they feel life is meaningful. Results are anticipated to show that ratings of meaning in life were lower in the mortality salience condition, relative to the control condition, among the atheists but not among the Christians.

049 HOW WELL DOES THE MICHIGAN HAND QUESTIONNAIRE CHARACTERIZE CARPAL TUNNEL SYNDROME PATIENTS' PERSPECTIVE OF HAND FUNCTION?

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The Michigan Hand Questionnaire (MHQ) is a standard survey administered to patients with carpal tunnel syndrome (CTS) to gauge hand function. As part of an ongoing study of grasping and pinching function in patients with CTS, the research question of this study was, what is the level of independence vs redundancy in the questions of the MHQ in measuring a patient's perception of CTS symptoms? To answer this question, 11 CTS patients completed all six scales of the MHQ. The responses from each scale of the questionnaire were tallied and analyzed by means of an item analysis to determine the extent of which the sections measured the same construct. We found that patients' response to the question regarding pain measured a separate construct than the remaining sections of the MHQ. Overall hand

048 AN ULTRAFLOW INJECTION TANDEM MASS SPECTROMETRIC METHOD FOR THE QUANTIFICATION OF PHENOBARBITAL AND EtG (ETHANOL METABOLITE) IN URINE

function, activities of daily living, work performance, aesthetics, and satisfaction with hand function were highly correlated, implying that they assess the same aspect of CTS. Our results suggest that further analyses should be completed to evaluate the internal consistency of the MHQ. Reducing superfluous items of the survey should be considered to ensure patient attentiveness when completing the MHQ, thus elevating the validity of the results.

050 HOW TAI CHI EASY HELPS CMHA RESIDENTS

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Tai Chi is known to improve quality of life. However, little is known about the effect Tai Chi Easy has on older adults with health disparities. The purpose of this project is to look at the impact of Tai Chi Easy on physical health and self-efficacy. **Methods:** Participants were older community based adults who speak English and did not have cognitive problems as measured by the Cognitive Linguistic Quick Test. The subjects participated in a 50 minute Tai Chi Easy class once a week for 4 to 6 weeks. Baseline measurements included blood pressure, heart rate, Stanford Self-Efficacy test, and Cognitive Linguistic Quick Test. The average age of the older adult was 68.8 years old. All of the participants were African American. 5 out of 6 participants were female. The average education level among the participants is some college education. **Results:** Preliminary results identify that Tai Chi Easy did not change self-efficacy. However, the group mean systolic blood pressure before Tai Chi Easy decreased (139 mmHg to 135 mmHg) over time. Individually, 3 of the 6 participant's systolic blood pressure decreased over time. After 4 to 6 weeks of exercise, the post exercise group heart rate decreased 81 bpm to 73 bpm. In conclusion, Tai Chi Easy may lower blood pressure in our sample and may lower the risk for cardiovascular problems.

051 EXAMINING WHETHER OR NOT BILINGUALS WILL BEHAVE LIKE EXPERTS IN A SIMULATED AIRPORT SECURITY SCREENING TASK

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Incera and M^cLennan (2015) used mouse tracking to demonstrate that bilinguals behave like experts in tasks that require managing conflicting information. These findings make an important contribution to the literature on whether or not a bilingual advantage exists, a topic of great debate in recent years (Bialystok, Craik, & Luk, 2012; Duñabeitia et al., 2014). In this study, bilinguals and monolinguals took part in a simulated airport security screening task designed to test whether or not bilinguals have an advantage in uniquely

detecting the presence of large liquids among trials containing large liquids, large non-liquid items, small liquids, and small non-liquid items interspersed with control trials. Participants were presented with stimuli modeled after x-rays of luggage shown to airport screeners and told to scan the image for "target items" in the form of large liquids. We compared bilinguals' and monolinguals' mouse-tracking performance in this detection task. The results of this study contribute to the literature on the bilingual advantage as well as the field of applied cognitive psychology.

052 DISTINCT EMOTION REGULATION CHARACTERISTICS ACROSS EMOTIONAL DISORDERS

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Introduction: Emotion regulation (ER) difficulties are associated with a range of emotional disorders such as Major Depressive Disorder (MDD), Social Anxiety Disorder (SAD), Generalized Anxiety Disorder (GAD) and Borderline Personality Disorder (BPD). ER includes an individual's ability to manage and express their emotions (Gross, 1998). Due to the centrality of ER deficits in each of these disorders, they are often comorbid. This study aimed to determine how each of the different disorders are marked by unique ER difficulties.

Methods: Participants were 321 undergraduates (76% women, Mage = 20.22, SD =4.83) completed measures of depression (CES-D), social anxiety (SIAS), generalized anxiety (PSWQ), and BPD symptoms (MSI-BPD). They also completed the Emotion Dysregulation Composite Scale (Mennin et al., 2007).

Results: Controlling for participants' age and sex, several patterns of ER deficits emerged for each disorder symptoms. Specifically, MDD symptoms were uniquely associated with difficulty managing emotions ($\beta = .12, p < .05$); SAD symptoms were associated with negative reactivity ($\beta = .15, p < .05$), poor understanding ($\beta = .18, p < .01$), and reduced intensity to emotions ($\beta = -.26, p < .001$); GAD symptoms were associated with increased emotional intensity ($\beta = .18, p < .01$), increased understanding ($\beta = -.17, p < .01$), and reduced emotional reactivity ($\beta = -.14, p < .05$); BPD symptoms were associated with negative reactivity ($\beta = .18, p = .01$).

Conclusion: This study supports previous research that specific ER deficits exist among diverse emotional disorders. While BPD and SAD were both associated with negative reactivity, SAD is also distinctly marked by poor understanding and reduced intensity to emotions. MDD is uniquely associated with difficulty managing emotions and GAD is marked by increased emotional intensity, better understanding, and reduced emotional reactivity. These findings suggest that future diagnoses should account for these distinct differences in ER characteristics across disorders.

053 CONSERVED TELOMERIC PROTEIN RAP1 LINKS TERRA TO DSB-ASSOCIATED VSG SWITCHING

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Trypanosoma brucei, the causal pathogen for human African trypanosomiasis, regularly switches its major surface antigen, VSG, thereby evading the host's immune response. VSGs are monoallelically expressed from subtelomeric expression sites, and DNA recombination is an important mechanism of VSG switching. We previously showed that *TbRAP1*, a telomeric protein, is essential for silencing subtelomeric VSG genes. We now find that depletion of *TbRAP1* leads to more DNA Double-Strand Breaks (DSBs) at VSG loci immediately upstream of the telomeric repeats and increased VSG switching frequencies. Most of the VSG switchers in *TbRAP1* depleted cells arose through VSG gene conversion events. *T. brucei* telomeres are transcribed into long non-coding RNAs (TERRA). Interestingly, depletion of *TbRAP1* resulted in increased TERRA levels and more telomeric RNA:DNA hybrids (R-loops), the latter of which have been shown to promote telomeric DNA recombination in yeast and human cells. R-loops are sensitive to Ribonuclease H (RNaseH), which specifically degrades the RNA strand of the RNA:DNA hybrid. As expected, upon ectopically overexpression of *T. brucei* RNaseH and simultaneous *TbRAP1* depletion, we detected decreased R-loops and slightly lower TERRA levels compared to that in *TbRAP1*-depleted cells. Similarly, the phenotypes of increased levels of subtelomeric DSBs at VSG loci and elevated VSG switching frequencies in *TbRAP1* RNAi cells were also suppressed by overexpression of RNaseH. Therefore, depletion of *TbRAP1* increased TERRA levels and telomeric RNA:DNA hybrids, which facilitates gene conversion events involving the active VSG gene by allowing more DSBs at the VSG loci immediately upstream of the telomeric DNA.

054 DO WE WANT THE SAME THINGS? THE IMPACT OF INCONGRUENT CARE PREFERENCES ON PERSONS WITH DEMENTIA AND THEIR CARE PARTNER

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In-depth interviews were conducted with 128 dyads each consisting of a person with dementia (PWD) and a family caregiver (CG). Data from the baseline portion of an intervention study were used to examine the relationship between the CG's care-related preferences, the PWD's care-

related preferences, and the CG's perception of the PWD's preferences. Preferences for three care-related domains were recorded: personal activities of daily living (PADLs), instrumental activities of daily living (IADLs), and socioemotional preferences. Primary outcomes included dyadic relationship strain, quality of life, and mood for both the CG and PWD. Results indicate that perceived incongruence of care preferences was a better predictor of negative psychosocial outcomes than actual incongruence. Actual incongruence for socioemotional care preferences was a predictor of greater relationship strain and worse mood for the PWD, while perceived incongruence for socioemotional care preferences was related to lower quality of life and worse mood for the CG. Interestingly, PADL incongruence predicted higher quality of life and better mood for the CG. Findings emphasize the importance of communication between care partners, especially regarding socioemotional care preferences. These socioemotional preferences, which may be overlooked in the creation of a care plan, may have important implications for the PWD's well-being. Given the impact of perceived incongruence relative to actual incongruence, a dyadic approach to care planning interventions may be most effective for facilitating communication and articulating care preferences.

055 ACCEPTABILITY AND FEASIBILITY OF A HEART HEALTH AND BEHAVIOR CHANGE INTERVENTION IN A VULNERABLE OLDER ADULT POPULATION

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Older minority populations in low socioeconomic classes are at high risk for cardiovascular disease, stroke, type 2 diabetes, and a host of other heart-related health conditions. Engaging in unhealthy behaviors such as poor diet, sedentary lifestyle, and poor use of health services is a major contributor to these health disparities. The *Heart Health Program* was developed to improve health outcomes by encouraging behavior change in a group of low-income older African Americans attending two urban senior centers. The Health Belief Model (HBM), which was used as a guiding framework for *The Heart Health Program*, has been used for nearly 50 years as a conceptual framework for understanding health behaviors and preventive health practices. This model emphasizes the importance of a person's perceptions about a health issue and his/her self-efficacy. These factors, combined with a cue to action, have been identified by the HBM as critical to whether or not a person will adopt healthy behaviors and/or change unhealthy behaviors. *The Heart Health Program* utilized bi-weekly group sessions conducted over the course of a three month period to encourage participants to adopt healthy behaviors. Session leaders engaged participants in educational activities and helped to develop individual "action steps," or actionable goals for each participant to strive toward as a means of

improving heart health. This poster presents the rationale and theoretical background for the Heart Health Program, the program protocols, data on program acceptability and feasibility, and results about the actions taken by the 25 participants.

**056 A COMPREHENSIVE ANALYSIS OF
EUKARYOTIC RIBOSOMAL PROTEIN uS9
(S16) FUNCTION IN TRANSLATION**

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Ribosomal protein uS9 is a conserved protein of the small ribosomal subunit. The protein is located on the solvent side of the subunit head and has a long protruding C-terminal tail (CTT) that reaches the mRNA cleft. uS9/yRps16 contributes to the molecular environment of the ribosomal P-site and contacts initiator tRNA when base-paired to AUG codon in the P site. The last positively charged C terminal residue (Arg) of uS9 is invariably conserved across all kingdoms of life and is believed to enhance interaction with the negatively charged tRNA. To investigate the function of uS9/yRps16 and, in particular, the role of its C-terminally conserved region, we have obtained and characterized yeast *Saccharomyces cerevisiae* strains in which the wild type uS9/yRps16 gene has been replaced by the mutant uS9 variants. These mutants contain CTT deletions/extensions and/or substitution of the C-terminal Arg with the negatively charged Glu. In vivo, biochemical analysis of the uS9 mutants showed that uS9 CTT plays an important role in the initiation and elongation steps of protein synthesis. We have found that uS9 C-terminal residues (their exact location and nature) are critical for efficient recruitment of the eIF2•GTP•Met-tRNA_i^{Met} ternary complex and for responding properly to an AUG codon in the P-site during scanning. We hypothesize that upon start codon recognition, the CTT of uS9 is important to hydrolyze GTP (from eIF2-GTP-Met-tRNA_iMet complex) to GDP and Pi. The efficiency of GTP hydrolysis may serve as a measure of efficiency of initiation process and start codon recognition. To monitor the ability of the wild-type and uS9 mutant ribosomes to function in GTPase assay, we are using reconstituted in vitro translation initiation system with purified recombinant initiation factors (eIF1, 1A, 2, 5) and ribosomes.

**057 ELEVATED LEVEL OF HYPOXIA
INDUCIBLE FACTOR 1 α CAN ALTER RENAL
EPITHELIAL FUNCTION**

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In the United States, about 600,000 people have Polycystic Kidney Disease (PKD) characterized by fluid filled structures (cysts) formed inside the kidney. Cysts interfere with normal renal function and lead to kidney failure. In the cystic epithelia, hypoxia inducible factor 1 α (HIF1 α) and HIF2 α were found to be elevated. It is hypothesized that kidney cystic epithelia transform from normal absorption to secretion leading to accumulation of fluid within the cyst lumen. The fluid accumulation and insufficient vascular supply result in localized chronic hypoxia i.e., elevated HIF1 α levels which may further promote cyst growth. We hypothesize that increased level of HIF1 α can promote switching of renal epithelial function from absorptive to a secretory phenotype, possibly due to loss of epithelial tight junction integrity and altered active ion transport.

HIF1 α level was pharmacologically elevated by cobalt chloride (CoCl₂) in monolayers of mouse cortical collecting duct cell line (mCCD 1296 (d)) grown on suspended permeable membranes. In our analysis, transepithelial electrical resistance (TEER) and voltage values were recorded using an Endohm chamber. Higher TEER values reflect reduced paracellular permeability indicating tight junction integrity which was verified by paracellular permeability assay using FITC-conjugated dextran molecules. Short circuit current (I_{sc}) was calculated using Ohm's law (I= V/R) to compare active ion transport. We found that treatment of cells with CoCl₂ caused increased paracellular permeability and altered active ion transport. We are investigating the effect of CoCl₂ on possible shift of active ion transport across the epithelial monolayer using specific sodium and chloride ion channel and transporter blockers. Using HIF1 α inhibitors, we are trying to establish the link between increased level of HIF1 α and altered epithelial transport. Thus, this study may provide a basis to understand how HIF1 α may cause loss of normal epithelial function leading to cyst progression.

**058 MOVMENT EXCURSION, VELOCITY AND
ACCELERATION IN MULTIDIRECTIONAL
HARNESSED BALANCE TRAINING**

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Introduction: Falling is a major problem, especially among the elderly, leading to injuries and death. This study examines a novel intensive training protocol, multidirectional harnessed balance training (MDH). The specific purpose of this study was to examine differences in movement excursion, velocity, and acceleration during training while wearing a harness (H) and without a harness (NH).

Method: In this case series, three participants (S1, S2, and S3) over the age of 60 completed the MDH protocol, one day in and the other day out of the harness system. They played four

different Kinect video games requiring different types of balance skills (20,000 Leaks, Soccer Kick, Table Tennis, and Reflex Ridge) on three different surfaces (solid ground, a gym mat, and an inflatable raft). Concurrent motion capture during gaming was completed using Cortex analysis software (Motion Analysis Corp.) to determine movement excursion, velocity, and acceleration of the sacral marker. Descriptive statistics were calculated. **Results:** Overall, participants moved more, faster, and with higher acceleration in the harness system than out. But there were exceptions depending on the subject and the activity. For example, in Target Kick movement excursion decreased by 39% and 24% out of the harness for S1 and S2, but increased by 4% for S3. Maximum velocity decreased by 34% and 16%, and maximum acceleration decreased by 77% and 17% out of the harness for S1 and S2 but increased by 63% (velocity) and 84% (acceleration) for S3.

Discussion: Overall, average excursion, velocity, and acceleration increased with the use of a harness for S1 and S2, but not S3. We hypothesize that S1 and S2 may have felt safer in the harness, pushing harder during the training. S3 had a history of falls that may have limited her movement and/or may have found the harness system limiting.

059 INVESTIGATION OF THE MECHANISM OF RIBOSOMAL INCORPORATION OF RPL13a DURING RIBOSOME BIOGENESIS AND L13a-MEDIATED TRANSLATIONAL SILENCING OF TARGET INFLAMMATORY GENES

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Ribosomal protein L13a is essential for transcript-specific translational silencing of mRNAs encoding several inflammatory proteins e.g. chemokines and chemokine receptors. Series of studies from our laboratory showed that phosphorylation-dependent release of L13a from 60S ribosomal subunit and its assembly into the IFN-gamma-activated inhibitor of translation (GAIT) complex is essential for translational silencing of GAIT element bearing mRNA transcripts. However, the amino acid residue(s) of L13a that interacts with the GAIT elements of the target mRNAs and the residue(s) important for ribosomal incorporation during ribosome biogenesis are still unknown. Previous studies in our laboratory showed that the incorporation of L13a takes place during maturation of the 90s pre-ribosome in the nucleolus and arginine at position 68 is essential for the incorporation. Structural homology modeling using crystal structure of prokaryotic L13 as a model showed that eukaryotic L13a possesses an extra helix at the C-terminal end. RNABindR, a Web based Server, identified a motif within this helix as a potential RNA binding site. We are particularly interested in understanding the function of this extra segment of human L13a. Interestingly, we observed that deletion of this extra

helix makes L13a incompetent to translocate to the nucleolus. We have also identified three amino acids within this helix at position 185(V), 189(I) and 197(L) that are required for ribosomal incorporation of L13a. In addition, amino acids at positions 159(K), 160(R) and 161(K) are necessary for nucleolar import of L13a. Our future goal is to test the ability of these L13a mutants to silence the translation of GAIT element-bearing mRNA transcripts in an in vitro translational assay. Together, these studies will provide a comprehensive analysis of the critical amino acid residues for ribosome incorporation and translational silencing activity of L13a, thus providing molecular insights into the mechanism of ribosomal and extra-ribosomal function of this physiological attenuator of inflammation.

060 BRANCHES OF AUTONOMIC NERVOUS SYSTEM MODERATION OF DISPOSITIONAL CHARACTERISTICS AND GAMBLING BEHAVIOR

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Investigating the physiological and dispositional correlates of pathological gambling could have far-reaching impacts when designing and implementing new treatments for those struggling with this disorder. Previous research has shown inconsistent results while examining individual branches of the autonomic nervous system, the sympathetic (SNS) and parasympathetic (PNS) nervous systems, and dispositional characteristics in individuals with gambling problems. To clarify these inconsistencies, we designed a protocol that gathered information on participants' Behavioral Inhibition (BIS) and Behavioral Activation (BAS) (Gray, 2000). Activity in these systems was quantified by the BIS/BAS scales and physiological activity of both the PNS and SNS at rest and during the Iowa Gambling Task (IGT), which involves participants choosing between four decks of advantageous or disadvantageous cards reflecting different risk/reward contingencies for winning and losing money in the game. Participants' PNS activity was indexed via the high frequency band of heart rate variability that falls within the respiration frequency (respiratory sinus arrhythmia, RSA), and SNS activity was quantified via electrodermal skin conductance responses (SCR). These autonomic nervous system indices were measured while participants rested during a paced breathing task and during feedback trials on the IGT when participants learned the monetary gains and losses from their deck selections. Risk for gambling problems was measured via the Canadian Problem Gambling Index (CPGI). We hypothesize that risk for problem gambling would be associated with (1) low resting RSA, (2) low BIS activity as reflected in low scores on the BIS self-report measures and low magnitudes of SCRs to monetary losses on the IGT, and (3) high BAS activity as reflected in high scores on the BAS self-report measure and high magnitudes of SCRs to monetary gains on the IGT. Results and clinical implications our major findings are discussed.

061 CLOCK GENE BIOLOGICAL RHYTHMS IN NAKED MOLE RAT SHOW INTERESTING DIVERGENCE FROM THAT IN COMMON LAB MICE AND MAY PLAY KEY ROLE IN ENHANCED LONGEVITY IN THE SPECIES

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Enhancing human health-span is the objective of research in anti-aging intervention strategies. Recently the biological clock has been implicated as a prime axis of biological aging. The biological circadian clock is a hierarchical system of molecular oscillators produced centrally at the suprachiasmatic nucleus (SCN) of the anterior hypothalamus and peripherally at every major tissue like liver, pancreas, muscle etc. They comprise of protein products of a network of core clock genes [CCGs] with transcriptional-translational feedback loops that display rhythmic expression patterns.

The current concept in the circadian field claims that longer lived species tend to have more robust oscillations of the CCGs. One such long lived species is the Naked Mole Rat [*Heterocephalus glaber*] - a type of rodent found in the East African Savannah. It has the highest average lifespan-30 years-among all rodent species. Compared to lab mice, this is up to 10 fold higher even though the two species have comparable body weights. To check the existing paradigm, we therefore checked CCG biorhythms in Mole Rat livers. We picked the liver tissue as the first point of study as it is important in metabolic homeostasis of the organism. We did observe significant oscillations in the gene products of the 10 CCGs. Intriguingly, however, the amplitude of oscillation is mostly much lower among the mole rats compared to lab mice.

We speculate that the diminished clock gene oscillations in the mole liver actually point to a liver that is special in circadian terms compared to other tissues. Liver being the metabolic rheostat of the body, such adaptation translates to special metabolic homeostasis translating to longer lifespan. **We hypothesize that the naked mole rat liver is privileged in circadian terms as compared to its other tissues in having a mildly oscillating transcription program of the core clock genes.**

062 LONG TERM 30% CALORIE RESTRICTION (CR) CHANGES EXPRESSION PROFILES OF MICRORNA'S

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Calorie Restriction (CR) is the restriction of the calorie taken in the diet with adequate nutrients content. It is the

natural way which has been found to increase life span in diverse organism. The mechanism by which CR brings about the beneficial effect on the extension of lifespan is suggested to be evolutionary conserved though exact mechanism is not yet known but experimental studies suggests that it effects various metabolic pathways. Regulation of gene expression as demonstrated by past studies, is one by which CR brings about its beneficial effect on the life extension. MicroRNA is a small 22nt long non coding RNA molecule which is involved in the post-transcriptional regulation of gene expression. We report change in the circadian expression of the MicroRNA's upon long term calorie restriction. Liver tissues from the female mice who were subjected to 2yr long term CR were used to conduct MicroRNA microarray analysis. Out of 988 miRNA's probed we found 13 miRNA's undergoing change in their expression profile. 9 out of 13 miRNA's are found to be expressed in a circadian manner after treatment while rest 4 were circadian before CR treatment. Next validation of microarray data was performed for selected few miRNA's using RTQ-PCR. MicroRNA mmu-125a-5p, conserved in humans and mouse, is selected from this pool. MicroRNA mmu-125a-5p expression get induced upon CR treatment. We studied the transcript levels of its predicted target and they are found to be down regulated. . STAT3 is the member of signal transducer and activator of transcription (STAT) family. miR-125a-5p has been previously reported to inhibit expression of STAT3 in regulatory T-cells. We report down regulation of STAT3 protein in the female mice subjected to CR treatment.

063 OXYGEN ISOTOPES OF DISSOLVED SULFATE IN SURFACE WATERS FROM LAKES, RIVERS, AND OCEANS IN THE UNITED STATES

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Oxygen isotopic composition ($\delta^{18}\text{O}$) of geological materials, in particular water, ice and carbonate minerals, has been widely used as a powerful tracer to study climatic and environmental changes on a variety of spatial and temporal scales. However, our understanding of changes in $\delta^{18}\text{O}$ of dissolved sulfate in natural environments remains elusive. One question is outstanding - whether the changes in $\delta^{18}\text{O}$ of aqueous sulfate ($\delta^{18}\text{O}_s$) are primarily induced by kinetic or equilibrium isotopic fractionation or both? Here we present water oxygen isotopic ratios ($\delta^{18}\text{O}_w$) and $\delta^{18}\text{O}_s$ of 55 water samples collected from 11 lakes (Tinemaha Reservoir, Yuba Lake, Lake Erie, Great Salt Lake, Utah Lake, Mono Lake, Pyramid Lake, Walker Lake, Owens Lake, Searles Lake, and

Salton Sea), 2 effluent-affected streams (the Cuyahoga and Monongahela Rivers), and two ocean localities off the San Diego coast in southern California. Our results indicated that these lake water samples were featured by large isotopic variations, with $\delta^{18}\text{O}_w$ ranging from -15‰ to 5‰ (V-SMOW) and $\delta^{18}\text{O}_s$ ranging from 1‰ to 21‰ (V-SMOW), while these water samples from the two rivers were characterized by small changes in $\delta^{18}\text{O}_w$ and large changes in $\delta^{18}\text{O}_s$, with $\delta^{18}\text{O}_w$ ranging from -10‰ to -8‰ (V-SMOW) and $\delta^{18}\text{O}_s$ ranging from -3‰ to 12‰ (V-SMOW). The sea waters were isotopically uniform, with an average $\delta^{18}\text{O}_w$ of -0.4‰ (V-SMOW) and an average $\delta^{18}\text{O}_s$ of 7.8‰ (V-SMOW). Combining these oxygen isotope results with other published data from southern Colorado and elsewhere across the world showed that $\delta^{18}\text{O}_s$ is more or less associated with $\delta^{18}\text{O}_w$ but that the range of variations in $\delta^{18}\text{O}_s$ is much greater than that of variations in $\delta^{18}\text{O}_w$. These findings suggest that processes other than local/regional hydroclimate changes (as represented by changes in $\delta^{18}\text{O}_w$) may have played an important role in $\delta^{18}\text{O}_s$ in an aquatic ecosystem.

064 INVESTIGATING THE ROLE OF OPEN BIGRAMS IN WORD PERCEPTION

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Some models of word identification suppose visual-system units that are responsive to bigrams—letter pairs—that may not be adjacent in a letter-string stimulus. According to such models, the stimulus BIRD activates both units representing adjacent-letter bigrams (BI, IR, and RD) and units representing nonadjacent-letter (open) bigrams (BR and ID). Grainger, Mathot, and Vitu (*Acta Psychologica*, 2014) had participants classify as words or nonwords strings flanked by adjacent-letter bigrams from the target or by bigrams containing letters not in the target. Grainger et al. found, for words, better performance when flanking bigrams contained target-string letters (e.g., BI BIRD RD; RD BIRD BI; IB BIRD DR; DR BIRD IB) than when they did not (e.g., CE BIRD NT); and better performance when flanking bigrams contained letters ordered as in the target (e.g., BI BIRD RD; RD BIRD BI) than switched (e.g., IB BIRD DR; DR BIRD IB); whether flanking bigrams were ordered as in the target did not affect performance. To investigate whether flanking *open* bigrams facilitate lexical decisions, we investigated, in Experiment 1, Grainger et al.'s adjacent-letter flanker conditions; we essentially replicated their results. Experiment 2 included, additionally, four open-bigram conditions (i.e., BR BIRD ID; ID BIRD BR; RB BIRD DI; DI BIRD RB). For words, performance was better when flankers contained target-string letters than when they did not; when flankers contained target-string letters, better with adjacent-letter-bigram flankers than with open-bigram flankers; and better when flanking bigrams contained letters ordered as in the

target (e.g., BI BIRD RD; RD BIRD BI; BR BIRD ID; ID BIRD BR) than switched (e.g., IB BIRD DR; DR BIRD IB; RB BIRD DI; DI BIRD RB). Unlike in Experiment 1, performance was better with flanking-bigram letters were ordered as in the target than when not; this effect differed for adjacent-letter and open bigrams.

065 VARIABILITY AND LOCATING OF MOVEMENT ENDPOINT DISTRIBUTIONS: THE INFLUENCE OF INSTRUCTIONS FOR MOVEMENT SPEED AND ACCURACY

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An influential theory of motor control predicts that targeted hand movements should be aimed at the target center and that the range of movement endpoints should match the range permitted by the target (Meyer et al., 1988). Centering the distribution on the target center and expanding variability to the limits of the target boundaries allows for maximization of movement speed. Slifkin and Eder (in review) found that those predictions held over a range of small target widths. However, with further increases in target width, movement variability increasingly underestimated the variability permitted by the target and the center of the distribution increasingly underestimated the target center. In particular, the amount of unused space within the target region was highly predictive of the location of the distribution center. Here, we tested that relationship when variability was manipulated through task instructions that emphasized either movement accuracy, both movement accuracy and speed, or movement speed. Results indicate that the relationship between endpoint locations and unused space were equivalent for the group that equally prioritized speed and accuracy and the group that emphasized speed. A strong relationship was maintained for the group that emphasized accuracy, but the nature of the relationship differed. These results suggest that participants do not equally prioritize speed and accuracy when performing tasks where they are asked to maintain a balance.

066 HOMOLOGOUS PAIRING DURING BUDDING YEAST MEIOSIS

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Meiosis is a specialized nuclear division that occurs in eukaryotes and results in reduction of the chromosome set from a diploid to a haploid complement, as required for sexual reproduction. Homologous recombination during meiosis is required for reductional chromosome segregation. Meiotic recombination requires pairing of homologous chromosomes at the onset of the prophase of meiosis I. During prophase I, homologous chromosomes align next to each other followed by formation of the Synaptonemal Complex (SC), a protein

scaffold that holds these homologs together until the end of prophase. During the pachytene stage of prophase I, homologs exchange their genetic material, initiated by the formation of DSBs. In budding yeast, meiotic recombination is initiated by formation of a DSB in one of the duplex DNA, followed by 5' to 3' resection and strand exchange of the single stranded 3' overhang. Next, stable strand invasion intermediates are processed into double Holliday junctions which are processed into crossovers (CO) whereas other DSBs are processed into non-crossovers (NCO), i.e. recombinants that do not exhibit strand exchange. We have developed an assay that is predicted to detect pairing sites between homologous sequences during meiosis in living yeast cells undergoing meiosis. Capture and knowledge of homologous pairing sites could be very essential and useful in mapping the exchange sites, possible locations of gene sequences and localization of these pairing sites on chromosomes involved during formation of new genetic characteristics. Upon enriching of pairing sites, Next Generation Sequencing (NGS) techniques will be used to determine the sequences of pairing sites in a genome-wide manner.

067 PAIN AND RECOVERY OUTCOME PREDICTORS FOR PATIENTS WITH HEALTH DISPARITIES IN PHYSICAL THERAPY

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This was a prospective cohort of vulnerable patients with health disparities. Medically underserved patients suffer from painful conditions and have many barriers to accessing physical therapy services. The average number of clinic visits is 1.6 because of barriers to care. The purpose was to evaluate a recovery outcomes model for medically underserved adults and determine predictors of pain improvement and recovery after the first visit. Validated questions relating to treatment outcomes and patient satisfaction in musculoskeletal physical therapy were answered on the first visit. Medical chart data was used to identify functional comorbidities, chief complaint and goals. Bivariate and multivariate analyses were conducted to explain pain outcomes and full recovery. Seventy-two patients with a mean age of 49.8 years. 71% black, 44% male and an average of 4 functional comorbidities. The sample included patients with low back pain 38%, shoulder pain 23%, neck pain 10% and knee pain 10%. Sixty-eight percent of subjects had a goal of decreasing pain. Linear regression analysis of the pain free outcome model had an adjusted $R^2 = .76$ with the most significant predictor being full mobility ($p \leq .001$) and age ($p = .09$). Other pain model variables included sex, depression, race, and full recovery belief. A regression model of full recovery belief had an adjusted $R^2 = .398$ and identified full mobility as the most significant predictor. Data

indicates that full mobility is the best predictor of pain outcomes and total recovery beliefs in medically underserved patients after the first visit.

068 LESSONS LEARNED ABOUT AGING: PREPARING UNDERGRADUATE STUDENTS TO TEACH OLDER ADULTS WITH HEALTH DISPARITIES

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Intergenerational and cross cultural communication is a sought after skill for health professionals. Students may not be aware of older adult feelings and experiences. It is important for health sciences students to build communication skills with diverse groups of older adults. The purpose of this study is to evaluate the effect of a reflective teaching experience on college students' knowledge of aging and empathy. The Facts on Aging quiz and Kiersma-Chen Empathy (KCES) scale are shown to provide information on one's knowledge and understanding of aging and empathy levels. Students were recruited from the BSHS program at Cleveland State University. Students completed a pre and post-test consisting of the Facts on Aging quiz and KCES and were assigned to a community dwelling older adult living in low-income housing. Students interviewed the older adults by phone to learn more about their life and music preferences. Students then completed a post-phone reflection and downloaded music onto an MP3 player. Students taught older adults how to use the MP3 player with two teaching strategies and completed a reflection on their experience. Four students (mean age = 20 years; 75% female) participated in the study. Students were either Pre-Physical Therapy or Pre-Occupational Therapy and the average amount of college education was 2.5 years. All participants have previously worked with older adults and have identified having a close relationship with an older adult. Nonparametric test identify the KCES scores changed ($p < .06$) with all students showing improvement in empathy. These results identify the benefit of reflective experiential learning in changing student empathy for culturally diverse older adults. Student knowledge about aging did not change with this experiential learning.

069 EVALUATION OF THE VEGGIE U NUTRITIONAL HEALTH EDUCATION PROGRAM AS AN ADEQUATE COMPREHENSIVE HEALTH EDUCATION CURRIULUM

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Recent research has shown a direct relationship between health outcomes and education. This correlation demonstrates that students with better health have improved academic performance, and individuals who achieve higher levels of academic success have more positive health outcomes. Therefore, a comprehensive health education must be the priority of schools, families and communities. Comprehensive health education includes curricula that instruct students on a variety of health issues and encourages family and community involvement in student learning. The information and skills acquired from a comprehensive health education lead to better health decisions and increased health literacy. In order to measure a comprehensive health education, curricula should be aligned with the National Health Education Standards (NHES). The majority of states in the U.S. have adopted the NHES to create health education programs; however, Ohio has not adopted any standard with which to measure health education. Due to a lack of adequate health curricula available, many schools supplement their health education with third-party programs that may not be aligned to the NHES. This study analyzed a privately funded nutritional program that is already being implemented in Cleveland area schools for children in grades three through five. The aim of this study was to align the curriculum to the NHES using the Health Education Curriculum Analysis Tool (HECAT) to determine the quality of the curriculum as a comprehensive health education program. As the curriculum has not previously been aligned with the NHES, this study hypothesized that the curriculum will be lacking when compared to the NHES. Contrary to the hypothesis, several important health education skills were found in the curriculum, specifically aligning with NHES numbers 1, 3, 7, and 8. However, further modifications should be made to successfully meet the knowledge, skills, and skills practice expectations of the remaining National Health Education Standards.

070 CHARACTERIZATION OF LAKE ACACIA BY LOSS ON IGNITION CARBON AND DIATOM ASSEMBLAGE ANALYSIS

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Lake Acacia was created in early 1964. The characterization of lake habit and history was conducted to better understand urban lake systems and how the change over time. This was carried on by analyzing a benthic sediment core from Lake Acacia, located in Cleveland Metroparks Acacia Reservation, during the summer of 2013 as part of the Urban Lake Assessment. The core was 107cm in length and sectioned into 1cm samples in the field. This record spans approximately 49 years of deposition. Loss on ignition carbon (LOI) analysis of this core in the fall of 2014, yielded preliminary data regarding the productivity of the lake over time. The LOI data has been compiled to create profiles for organic carbon content. This histogram provides a snapshot of productivity over time for the lake and provides a basis for sample selection for further

analysis with diatom microfossils. Samples were selected based on vertical shifts in the organic carbon, indicating a possible change in productivity or possible nutrient inputs. Microscopic analysis for diatom assemblages has been completed for the 54 selected points in the core. Diatom assemblages have been analyzed using correspondence analysis (CA). In addition to CA, abundance profiles for diatom types, as well as species identified as significant, have been performed as a means to infer conditions within the lake system at various points.

071 CALORIE RESTRICTION DOWN REGULATES IGF-1 SIGNALING THROUGH CRYPTOCHROME-DEPENDENT REGULATION OF STAT5

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Decreased IGF-1 signaling plays an important role in mechanisms of calorie restriction (CR) - a lifespan-extending dietary paradigm. CR results in reduced phosphorylation of the transcriptional factor STAT5B through unknown mechanisms; in turn, reduced STAT5B activity causes down regulation of IGF-1 expression. Here we report that transcriptional regulators and key components of the circadian clock Cryptochromes (Crys) are essential for the CR-mediated down regulation of IGF-1. CR down regulated *Cry1* expression on the protein level in the liver and skeletal muscles of wild type mice. Plasma levels of IGF-1 and liver and skeletal muscles production of IGF-1 are significantly reduced in *Cry* deficient mice. In agreement with reduced IGF-1 signaling, *Cry*-deficient mice have reduced body size and changes in gene expression profile similar to other dwarf mice. Down regulation of IGF-1 upon *Cry1,2* deficiency correlates with reduced *Igf-1* mRNA expression, and reduced phosphorylation of the STAT5B transcriptional factor, which is similar with CR effects. At the same time, phosphorylation of the STAT5B upstream kinase JAK2 was not reduced, which places CRY activity downstream from JAK2. Finally, CR did not down regulate liver *Igf-1* expression and plasma IGF-1 levels in *Cry*-deficient mice. We propose that down regulation of CRYs contributes to impaired STAT5 phosphorylation and IGF-1 expression during CR. Thus, CRYs link the circadian clock and calorie restriction mechanisms regulating STAT5-dependent IGF-1 expression.

072 EFFECTS OF F9 GENE Val30Ile (GTT to ATT), Leu383Ile (CTT to ATT), AND Ala436Val (GCA to GTA) MUTATIONS ON *IN VITRO* TRANSLATION EFFICIENCY OF THE BLOOD COAGULATION FACTOR IX

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Hemophilia B is a blood clotting disorder caused by mutations in the *F9* gene, which encodes a serine protease in the blood coagulation system known as factor IX (FIX). Over 130 different single point mutations in *F9* gene (leading to amino acid substitutions in FIX protein) cause this disease. However, the effects of only a few have been analyzed to determine the exact mechanism(s) by which these mutations contribute to FIX deficiency. Such knowledge is however extremely important as it may help to find better ways to treat the disease.

Surprisingly, in a number of cases, particularly Val30Ile, Val228Leu, Ile344Leu, Leu383Ile, and Ala436Val, substitution of one residue with another possessing very similar physico-chemical properties (all the above mentioned residues have medium size hydrophobic side chains) lead to mild, moderate or even severe (as in the cases of Val30Ile, Leu383Ile and Ala436Val) disease states. Such replacements are isomorphic and would not be expected to substantially affect protein structure and hence protein activity. However, changes in the nucleotide composition of mRNA may affect RNA structure/stability and protein expression levels in particular also due to changes in codon usage. As a first step toward understanding of the molecular mechanisms by which Val30Ile, Leu383Ile and Ala436Val mutations alter FIX coagulant activity, we explored how these substitutions affect FIX mRNA translation rates using *in vitro* translation system. We found that Val30Ile and Ala436Val mutations, but not Leu383Ile reduce efficiency of FIX *in vitro* translation. An about 2-fold reduction in FIXAla436Val *in vitro* translation efficiency in comparison with WT protein correlate well with a reduction in codon usage frequency of Ala GCA (15.82) codon in comparison with Val GTA (7.08) codon.

073 URINARY 5-HIAA LEVELS IN BARTH SYNDROME PATIENTS

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Barth Syndrome is a rare X-linked disease with an estimated prevalence of 1/300,000–400,000 live births and principal clinical manifestations of dilated cardiomyopathy, neutropenia, growth abnormalities, and skeletal myopathy. BTHS is caused by mutations in the tafazzin gene (*TAZ*), that incodes for tafazzin- an acyltransferase which catalyses the remodeling of cardiolipin- a critical mitochondrial structural phospholipid. A global plasma metabolomics study of cohort Barth Syndrome vs. control patients revealed significant decrease in plasma serotonin in Barth Syndrome patients. Serotonin has been linked to cardiovascular functions and its presence and synthesis in mammalian heart has been

documented and was shown as survival factor in cardiomyocytes in an animal model of dilated cardiomyopathy. Determination of serotonin is very challenging since chemically it is sensitive to oxidation. 5-hydroxyindoleacetic acid (5-HIAA) is a major downstream metabolite of serotonin and can be measured as a serotonin proxy. We have developed a GC-MS method to measure levels of 5-HIAA in urine samples. 5-HIAA was extracted from urine by liquid-liquid extraction, followed by trimethylsilyl (TMS) derivatization. A calibration curve was established in the range of 0.25-50 mg/L. In this preliminary study, 8 urine samples from control patients and 10 urine samples from Barth Syndrome patients were analyzed. A mean 5-HIAA concentration of $2.051 \pm (1.520)$ mg/L was found in Barth patient samples compared to the mean of $1.184\text{mg/L} \pm (1.963)$ in control patients. Although standard deviation is high across groups, our finding is a first time evidence of biogenic amine abnormality in Barth Syndrome. Future studies will be designed to investigate the role of the serotonin pathway in relation to the underlying pathology in Barth Syndrome.

074 CHARACTERIZATION OF GOLD NANOPARTICLES USING LASER LIGHT SCATTERING SPECTROSCOPY

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Dynamic Light Scattering (DLS) Spectroscopy is a non-invasive technique that is easily applied for characterization of dilute solutions of monodisperse spherical particles. However, application of DLS to any other system for example characterization of anisotropic particles is a challenging endeavor. We have studied gold nano-spheres and gold cylinders of the same diameter with a non-invasive depolarized DLS (DDLs) technique and compared findings to SEM imaging results on the nanoparticles. We've analyzed different samples of gold nano-cylinders (with varying length but same diameter) using DDLs technique and compared those results to the DDLs findings on gold spheres. Different approaches have been used to acquire information for translational diffusion coefficient from VV polarization and rotational diffusion coefficient from VH polarization which yield dimension information based on various versions of Stokes-Einstein law. We have also carefully analyzed one specific sphere sample in different angles and different concentrations, with two different lasers. SEM image of all the samples were taken and all of the results were compared carefully taking the consideration of the statistical distribution of the particles into account. Our results indicate that the measured diameter of the particles are in a very close range of the SEM average distribution. However, they are both considerably different from the factory reported size. Possible reasons and outcomes of this discrepancy will be also discussed in detail.

075 ELUCIDATING THE REGULATION AND MECHANISM OF ACTION OF COH-3 AND COH-4 α -KLEISINS IN *C.elegans* MEIOSIS

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Cohesins are multi-subunit protein complexes that wrap around double stranded DNA to promote sister chromatid cohesion (SCC) that tethers replicated chromosomes during mitosis and meiosis. The trimeric core of cohesin is composed of two heterodimeric subunits of the structural maintenance of chromosomes (SMC) protein family and a non-SMC protein called the α -kleisin. In *C.elegans*, meiotic cohesins contain either REC-8, COH-3, or COH-4 as their α -kleisin subunit. Our published analysis has suggested that COH-3 and COH-4 (henceforth, COH-3/4) are functionally redundant. Unlike REC-8 cohesin, COH-3/4 cohesin becomes cohesive in a replication independent manner initiated by DNA double strand breaks. This break-induced cohesion depends on the cell cycle checkpoint kinases ATM, ATR, and CHK-2. To test the hypothesis that ATM/ATR and CHK kinase-dependent kleisin phosphorylation establishes break-induced SCC during worm meiosis, as has been demonstrated in vegetative yeast, we have generated worm strains expressing a transgene in which putative Chk and ATM/ATR phosphosites are mutated to alanine. These worms make healthy progeny, even when the transgene is in a *coh-4 coh-3* mutant background. Thus, there may be other targets for Chk and ATM/ATR kinases. We are therefore initiating unbiased studies to identify Chk kinase phosphosites in COH-3/4. During our studies, we discovered the first evidence of functional differences between COH-3 and COH-4. While *coh-3* and *coh-4* single mutants are fully viable and display no detectible phenotypes, *rec-8; coh-3* animals are much healthier than *rec-8; coh-4* double mutants or *rec-8; coh-4 coh-3* triple mutants expressing wild-type *coh-3* from a transgene. Further studies are underway to better understand the differences between *coh-3* and *coh-4*. Our studies described here have the potential to improve our understanding of the causes of miscarriages that primarily occur due to aberrant chromosome segregation as a result of impaired SCC.

076 CALORIE RESTRICTION REGULATES CIRCADIAN GENE EXPRESSION THROUGH BMAL1-DEPENDENT AND INDEPENDENT MECHANISMS

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Feeding behavior, metabolism and circadian clocks are interlinked. Studies have shown that time-restricted feeding during daytime in rodents affects circadian clock genes expression. Calorie restriction (CR) which is a type of time restricted feeding, affects metabolic pathways and increases longevity in many species. Thus, we decided to study the effect of 30% CR on circadian clock genes expression. We found that CR significantly affected the rhythms in the expression of circadian clock genes in mice on the mRNA and protein levels, suggesting that CR reprograms the clock both transcriptionally and post-transcriptionally. The effect of CR on gene expression was distinct from the effects of time-restricted feeding or fasting. Further, we checked the effect of 30% CR on clock genes expression in *Bmal1*^{-/-} mice liver and we observed that 30% CR affects the core clock genes expression differently in *Bmal1*^{-/-} compared to WT mice which suggests *Bmal1* dependent and independent mechanisms in CR. *Bmal1*^{-/-} mice undergo accelerated aging and have significantly reduced lifespan compared to their WT counterparts. 30% CR did not increase lifespan of *Bmal1*^{-/-} mice. Next, we analyzed the effect of 30%CR on insulin and IGF-1 levels in plasma of *Bmal1*^{-/-} and WT mice. CR also did not improve the insulin and IGF-1 levels in *Bmal1*^{-/-} mice that suggests defective insulin response in these animals. We propose that CR recruits biological clocks as a natural mechanism of metabolic optimization under conditions of limited energy resources.

077 AGE, GENDER AND DIET EFFECT ON CIRCADIAN CLOCK AND LONGEVITY - ASSOICATED GENE EXPRESSION

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Circadian clock is the internal molecular system responsible for the maintenance of rhythmic pattern in behavior, metabolism and physiology. The entrainment of circadian clock is carried out by external cues such as light/dark cycle and timed feeding. Impaired functioning of circadian clock machinery results in accelerated aging and reduced lifespan. Calorie Restriction (CR - reduction of total caloric intake per day without malnutrition) also affects metabolism and promotes increased lifespan. We have established that 30% CR affects circadian clock genes expression in young male mice compared to the animals on AL diet (AL control – unlimited food availability throughout the day). To investigate the effect of 30%CR on gender and age based differences in circadian clock genes expression we compared the mRNA expression levels across the day of several core circadian genes in livers of mice of different age and gender that were

on 30% CR and AL diet. Several clock genes showed increased oscillation upon 30% CR with the most pronounced effect in *Per1* gene expression in young (5 month old) female mice group. Young male mice showed similar effect, but with a smaller amplitude. In contrast, in older mice (1.5-2 years old, which were on 30%CR since 3 month of age) 30%CR did not significantly improve the oscillation in clock genes compared to AL group. This demonstrates that CR regimen affects circadian clock genes expression. Also our results suggest that there might be some adaptation to CR regimen that develops with age – either of behavioral or physiological origin.

078 SYNTHESIS OF POLYMERIC MICROGELS AND THEIR CHARACTERIZATION WITH LIGHT SCATTERING

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Polymeric microgels were synthesized by chemically crosslinking hydroxypropylcellulose (HPC) chains in aqueous solutions of sodium hydroxide at temperatures above the low critical solution temperature (LCST) of HPC. In order to create a narrower size distribution of HPC microgels, surfactant was added. It was found that the LCST of the solution moved from 40°C up to 80°C with an increase in surfactant concentration from 0 to 12 g/l. Formed microgels were characterized by dynamic light scattering (DLS). Microgel solutions synthesized resulted in reasonably monodispersed nanoparticles with R_h of 90-600 nm below the transition, and R_h of 40-250 nm above the transition. The effect of synthesis temperature and crosslinker concentration on microgel size, polydispersity, and swelling ratio were also studied.

079 DETERMINATION OF PLASMA CITRIC ACID CYCLE INTERMEDIATES BY GC-MS - APPLICATION FOR METABOLIC CONDITIONS THAT INVOLVE MITOCHONDRIAL DYSFUNCTION

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Tricarboxylic Acid (TCA) cycle also known as Citric Acid Cycle (CAC) or The Krebs Cycle, acts as an interface between glycolysis, lipid metabolism and amino acid metabolism. Pyruvate produced from glycolysis is oxidized to CO_2 and NADH produced through the cycle enters oxidative phosphorylation to yield ATP production. Alterations in the TCA cycle have been correlated with numerous pathologies such as cancer, cardiovascular diseases, metabolic syndrome and neurodegenerative disorders, where oxidative stress plays a key role. We had developed a GCMS method to measure levels of seven plasma TCA cycle intermediates simultaneously, using liquid-liquid extraction of metabolites

followed by trimethylsilyl derivatization. Carbonyl group of α -keto glutaric acid was protected by methoxymation prior to the derivatization step with trimethylsilylation procedure. For quantitative GC-MS method we used stable isotopes labeled internal standards and non-physiological tricarballic acid. Samples were analyzed by gas GC-MS in selective ion monitoring (SIM) mode. Our assay has been applied to measure levels of seven citric acid cycle intermediates in human plasma of control and non-alcoholic fatty liver disease patients (NAFLD). Abnormal levels of isocitrate were found in disease group reflect secondary mitochondrial dysfunction underlying NAFLD pathogenesis. The assay has a potential to become a fast screening diagnostic method to assess conditions that involve primarily and secondary mitochondrial dysfunction and impairment in energy metabolism.

080 FUNCTIONAL ANALYSIS OF DOMAINS OF *T. BRUCEI* RAP1 IN REGULATION OF VSG SILENCING AND SWITCHING

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Trypanosoma brucei is a pathogenic protozoan parasite that causes sleeping sickness in humans and nagana in cattle. *T. brucei* undergoes antigenic variation and regularly switches its major surface antigen, Variant Surface Glycoproteins (VSG), to evade the host's immune response. This is the main reason for persistent *T. brucei* infections in mammals. VSGs are exclusively expressed in a monoallelic manner from VSG expression sites (ESs), which are polycistronic transcription units located immediately upstream of the telomere repeats.

TbRAP1, an intrinsic component of the *T. brucei* telomere complex, interacts with *TbTRF*, the duplex telomere DNA binding factor in *T. brucei*. It is essential for monoallelic expression of VSG. However, the mechanism by which *TbRAP1* silences all VSGs except one is unclear. We have established a number of strains expressing various *TbRAP1* mutants in the conditional *TbRAP1* knockout background. Our preliminary data indicated that multiple functional domains of *TbRAP1* is essential for VSG silencing.

081 INCREASING AWARENESS OF OCCUPATIONAL THERAPY IN PRESERVICE TEACHERS

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The purpose of this research is to help educate preservice teachers in various specialties about the importance of occupational therapy (OT) and equip them with the tools and skills needed to educate students with varying disabilities in the general education classroom. OTs are valuable resources for teachers in helping to provide guidance and support for students with or without disabilities to function successfully within the school setting. OTs have a unique role in school environments, allowing them to utilize prevention, promotion and intervention strategies in the student's natural environment to address the needs and well-being of the student. A module including a narrated PowerPoint was developed to explain the role of OT in schools and was deployed via an online survey software program called Qualtrics to test increased awareness within preservice teachers of an OT's role in school systems. There were 31 preservice teaching students at the launch of the survey. However, 20 participants completed the survey, with 12 participants in the control group and 8 in the experimental group. This study was a randomized control trial (RCT) design with participants blinded to a control or experimental group. However, a small sample size significantly limited the generalizability of the findings. The mean score of increased awareness from pre to posttest was slightly higher in the experimental group than in the control group by a difference of 1.692 points. The mean score increased by 3.625 points in the experimental group from pre to posttest, and increased by 1.8333 points in the control group on a 20 point scale. The module was not found statistically significant at influencing awareness, but the overall survey from pre to posttest revealed to have an impact on increased awareness. This study is a good pilot study for further research in the area.

082 ACCULTURATION MODERATES THE EFFECTS OF SUPPRESSION ON DEPRESSION AMONG ARABS

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Emotion regulation(ER) deficits in the form of frequent use of maladaptive ER responses hold a central place in the risk of psychological disorders. Suppression is a maladaptive ER response linked to the risk for internalizing disorders. While maladaptive in Western cultures, there is emerging evidence suggesting suppression as being adaptive in non-Western cultures. Purpose of this study was to examine whether emotional suppression is a risk factor for internalizing problems among Arabs. We hypothesized that, compared to their Western peers, individuals of Arab backgrounds will: (1) report greater levels of emotion suppression, which (2) will be related to lesser extent to depression and anxiety symptoms. Further, we hypothesized that (3) these cultural differences would moderate by the Arab sample's level of acculturation. 140 participants ($M_{age} = 25.83$, $SD = 9.01$; $n = 41$ Arabs) were

recruited from Arab-affiliated organizations in US and online resources. Participants anonymously completed online measures of Arab identity, emotion regulation and depression symptoms. Contrary to expectation, Western and Arab participants did not differ in their levels of emotional suppression. Further, the effects of suppression were similar in both groups. That is, greater use of emotional suppression predicted elevated depression symptoms ($\beta = .33$, $p < .05$). However, moderation analyses revealed that the effects of suppression on depression symptoms among Arabs were influenced by their degree of acculturation: suppression was unrelated to depression symptoms for Arabs with traditional values. Conversely, a kin to their Western counterparts, suppression robustly predicted elevated depression symptoms among Arabs with nontraditional values. These findings suggest the need to consider context when determining the adaptive or maladaptive value of a given ER response, and the need to consider culture as one important context.

083 EMOTION RECOGNITION IN OLD AGE: VISUAL FIXATION AND COGNITIVE CORRELATES

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The ability to recognize emotions in others is integral for adaptive and successful social interaction, important for adults of all ages. However, research suggests general age-related decline in being able to recognize certain types of facial affect, namely anger, fear, and sadness. Several possibilities have been addressed previously, including examinations of age differences in visual scan patterns to certain facial features and age-related differences in general cognitive abilities. The current analysis examined these possibilities. A group of 20 young and 22 older adults completed an emotion recognition task on a series of happy, sad, anger, fear, and disgust faces. An eye tracker recorded eye movements to determine whether attention toward specific facial features influenced recognition performance. Here, analyses focused on individuals' time spent fixating on eye regions of the face, particularly for emotions that tend to best be conveyed by eye information. A cognitive battery that assessed frontal lobe functioning was also administered. Overall, younger and older adults did not significantly differ in their recognition for any of the five emotions. In terms of scan patterns toward the faces, fixation toward eye regions was significantly associated with recognition; however, this was only the case for older adults: greater eye region fixation was related with better recognition for happy, anger, and fear. In terms of cognitive indicators associated with recognition, frontal lobe functioning was significantly associated with fear recognition for older adults. Thus, partial correlation analysis was conducted to control for the effect of frontal lobe functioning on the fixation-fear recognition relationship. This analysis led to a reduced association between fixation and fear recognition. These implications suggest perhaps refining our understanding of age trajectories in facial emotion recognition.

084 CHARACTERIZATION OF DIHYDROOROTASE FROM METHANOCOCCUS JANNASCHII

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Dihydroorotase (DHOase) catalyzes the reversible cyclization of N-carbamoyl-L-aspartate to form L-dihydroorotate in the third step of *de novo* pyrimidine biosynthesis. It is a Zinc metalloenzyme and a member of the aminohydrolase superfamily. There are two classes of the enzyme. Class I, typically ~45 kDa, is found in higher organisms, bacteria and yeast. Class II, typically ~38 kDa, is found in bacteria and fungi. Some organisms have multiple DHOase sequences.

The *M. jannaschii pyrC* gene coding for DHOase was subcloned and expressed in *E. coli*. Protein purification consisted of ammonium sulfate precipitation, heat treatment at 85° C, cation exchange and hydrophobic interaction chromatography. The protein was confirmed in the SDS gel using Liquid Chromatography-Mass Spectrometry (Proteomics Laboratory, Lerner Research Institute, Cleveland, OH). Size Exclusion Chromatography-Laser Light Scattering (Keck Biotechnology Laboratory, Yale University, New Haven, CT) indicated that the protein is a monomer in solution with a molecular weight of 47 kDa. The enzyme exhibited Michaelis-Menten kinetics in the degradative direction at pH 8.3 and at 25° C with $K_m = 0.4$ mM and maximal velocity 0.40 mmoles/(hr.mg). A model constructed with the I-TASSER server suggested that the binding site contains only one Zn ion per monomer coordinated by the conserved His56, His58 and Asp302. Asp146 is further away and does not coordinate with the Zn ion. According to the mass spectrometry analysis, the protein does not contain a carboxylated lysine.

085 BIOCHEMICAL CHARACTERIZATION OF IPSC-DERIVED CARDIOMYOCYTES AS A MODEL OF BARTH SYNDROME

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Barth Syndrome (BTHS) is an X-linked genetic disorder associated with cardiomyopathy, neutropenia, growth delay, muscle weakness, and sudden cardiac death. BTHS is caused by mutations in the tafazzin gene (*TAZ*), which encodes for Tafazzin - an acyltransferase that catalyzes remodeling of Cardiolipin - thus causing severe mitochondrial dysfunction. These studies will provide additional insight into the mechanisms underlying BTHS, as well as other forms of

cardiomyopathy, while allowing for evaluation of prospective therapeutic interventions. This proposal takes advantage of the ability of induced pluripotent stem cells (iPSCs) to produce differentiated cardiomyocytes (iPS-CM) which retain the genotype of the donor from which they were derived. Cardiomyocytes derived from iPSCs recapitulate the genotype that produces the complex metabolic condition in the heart tissue of affected individuals and exhibit many of the characteristics of *in vivo* cardiac myocytes, including syncytial and contractile activities, ion channels, receptors, and transporters. As a first phase of our project we have designed a study to characterize the biochemical abnormalities in both genetically-engineered and patient-derived iPS-CM. The second phase of the study will involve isolation of fibroblasts from skin biopsies of BTHS and control patients and subsequent reprogramming to iPSCs, followed by differentiation into cardiomyocytes. In-vitro differentiation of cardiomyocytes is characterized by a sheath of beating cells as well as the appropriate protein expression of cardiac markers. The metabolome of cells will be characterized via gas chromatography-mass spectrometry (GC-MS) and liquid chromatography tandem mass spectrometry (LC-MS/MS). Compounds to be analyzed include amino acids, acylcarnitines, citric acid cycle intermediates, redox metabolites, organic acids, phospholipids, and ceramides. We hypothesize that the iPS-CM model of Barth syndrome reflects TAZ-implicated biochemical abnormalities and offers the opportunity to reveal insight into the underlying pathophysiology of this complex disease, as well as novel therapeutic targets in relation to underlying pathology.

086 NOVEL ROLE FOR MYOD AS A SENSOR OF DNA DAMAGE

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Apoptosis (programmed cell death) is induced at the same time as differentiation (specialization) in skeletal myoblasts as well as in other systems. In skeletal myoblasts, these two processes are both initiated by culture in differentiation media (DM: absence of growth factors) and result in mutually exclusive physiological endpoints. However, the simultaneous regulation of these two processes is not understood. While the muscle regulatory transcription factor MyoD is known to control the process of differentiation in skeletal myoblasts, our lab has recently discovered that MyoD is also controlling the apoptotic process in response to culture in DM by direct up-regulation of the pro-apoptotic Bcl2 family member PUMA. We have also discovered that, similarly, through direct up-regulation of PUMA, MyoD plays a role in the apoptotic process initiated by the DNA-damaging agent, etoposide. Our hypothesis is that a novel role for MyoD as a sensor of DNA

damage could correlate both of these findings. As a first step in testing this hypothesis, we have determined that culture in DM leads to the activation of key checkpoint kinases, (Chk1, p38 and C-Abl), and the transcription factor, p53; each known to function in response to DNA damage. Our next step will be to assess the activation of these proteins in the absence of MyoD as well as the effect of pharmacological inhibitors of these proteins on the differentiation and apoptosis of skeletal myoblasts.

087 IMPLICIT ASSOCIATION TESTS TO DETECT EARLY SIGNS OF EATING DISORDER TENDENCIES

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Anorexia, Bulimia, and Binge Eating Disorders represent a group of highly prevalent Eating Disorders (ED) that affect nearly 20 million women and 10 million men in the US. The high prevalence of ED is matched only by functional impairment and associated personal cost for treatment of over \$100,000 a year, amounting between \$500 and \$2000 a day. Given the high prevalence and high personal and societal costs there is a pressing need to identify early signs of these disorders in order to enable early prevention and intervention efforts. However, due to stigma associated with ED, individuals who may be at risk or in the early stages of EDs tend to under-report their thin idealization and ED symptoms on self-report measures. Further, the self-report methods that are usually used to measure these risk factors rely on respondents' self-knowledge, which is often limited with respect to the nature and degree of ED problems. Thus, current methods for measuring early ED risk factors and behaviors are insufficient to detect early, pre-clinical signs of the disorders. The present study aimed to overcome the above noted gaps in the literature on ED risk by evaluating the utility of novel implicit association tests that measure thin idealization and aversion to high caloric foods that circumvent respondents tendencies to minimize their symptoms/behaviors and limited self-knowledge.

Participants included women who were undergraduate students at CSU (pre-clinical sample), and women who were previously diagnosed and treated for an ED (clinical sample). All participants anonymously reported their height and weight and completed measures of eating disorder symptoms, and implicit association tests that measured their tendencies to value the thin body type and negative views on high caloric foods. Findings and clinical implications are discussed.

088 WELLNESS 360: SUMMER CAMP FOR A HEALTHY LIFESTYLE AND OUTLOOK PROGRAM DEVELOPMENT PLAN

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Adolescent obesity is a growing concern in today's society. The issue has been approached with singularly focused goals including caloric restrictions, exercise regimes, healthier school lunches, and revisions to food pyramid education. Yet the problem persists. It is a multi-faceted issue and requires a multi-faceted approach if adolescents' behaviors are to change. Occupational therapists are uniquely qualified to deal with the issue of obesity as they view clients holistically, addressing psychosocial, spiritual, and physical components that affect occupational performance and influence well-being. Wellness 360, an occupation-based program, was developed to address the voids in programming that exist. To assess the needs of such a program, a nine-question online survey was developed and approved by the IRB. Responses from 47 parents indicated that those living in city/urban communities were more concerned regarding the problem of childhood obesity and that participants living in rural communities believed that a wellness program would be more helpful than those individuals living in other areas. These findings suggest that both parents of rural and urban adolescents have concerns about obesity. Wellness 360 will provide adolescents with tools to independently make healthy lifestyle choices through a 5-week program of interactive occupation-oriented groups. The program will address five target areas: education, sleep and rest, social participation and leisure, instrumental activities of daily living (IADLs), and mental health. Outcomes will be evaluated by assessing change in confidence and knowledge in the five target areas.

089 INTERACTION OF CIRCADIAN CLOCKS, FEEDING REGIMENS AND METABOLISM

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Circadian clocks are evolutionarily conserved molecular timekeeping systems that generate rhythms in physiology and behavior in almost all living organisms and synchronize them with external environment. There are multiple circadian clocks within living organisms. Light entrained circadian clock involves transcriptional-translational feedback loop which regulates locomotor activity and metabolic processes and coordinates them with daily rhythms. Food entrainable oscillator (FEO) clock also generates near 24 hour circadian rhythmicity by driving food anticipatory behavior in mice. Mice entrained on 12:12hr light-dark cycle have been shown in previous studies to generate circadian rhythms in food anticipatory behavior, suggesting that this clock runs on light independent but food dependent cues. Availability of nutrients

regulate metabolic pathways, which promotes cell growth and proliferation. One of the key energy and nutrient sensing signal in the cell is mammalian target of rapamycin complex 1 (mTORC1). Deprivation of nutrients directly inhibit mTORC1 activity. Regulation of mTORC1 activity by growth factors, amino acids, glucose and stress has been extensively investigated in vitro, but less is known about in vivo regulation. Our lab recently demonstrated that NAMO (Nutrient Anticipation Metabolic Oscillator), a novel type of circadian clock, distinct from light entrained circadian clock, generates rhythms in mTOR activity in vivo, but the mechanisms of regulation remain unknown. How these internal clocks interact, whether their functions overlap or are independent of each other is the subject of our investigation. In modern society, humans tend to consume either 1 meal, 2 meals or 3 meals a day, but it is not known which meal paradigm is beneficial to health. Hence we plan to investigate the effect of 2 meals a day with 12 hr interval on circadian rhythms in behavior, gene expression and metabolism

090 AN OBJECTIVE LOOK AT THE RELATIONSHIP BETWEEN BORDERLINE PERSONALITY DISORDER SYMPTOMS AND AFFECT DURING SOCIAL INTERACTIONS IN DAILY LIFE

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Borderline Personality Disorder (BPD) is marked by intense periods of dysphoria (negative affect, NA) that often emerge in the context of interpersonal interactions. Empirical works suggest that those with BPD recall their social interactions more negatively in their daily lives than healthy peers, and experience more distress during negative interpersonal interactions in the lab. Recent findings also suggest that those with BPD experience lower levels of pleasant emotions (positive affect, PA) than healthy individuals. However, most studies that examine affect in BPD during social exchanges have relied on subjective reports of emotional states, which are susceptible to biased reporting styles that are often observed among those with BPD. Indeed, the two studies that measured verbal behavior to infer affective states of those with BPD during social interaction support the discrepancies between participants' subjective reports and their affect ascertained from coded audio recordings. However, even these studies relied on observer ratings of NA and PA, which require subjective decisions on the intensity of these emotional states. The present study aimed to more objectively measure the relationship between BPD and affective tone during social interactions by analyzing unobtrusively measured verbal behaviors as they occurred in participants' daily lives.

Participants completed measures of BPD in the lab and were there then followed for the contiguous 7 days during which momentary ratings of NA and PA were measured 5 times daily via participants' cell phones. Thirty-second ambient audio recordings were also collected every 12 minutes during

this period. Audio recordings of participants' social interactions were transcribed, and participants' speech content analyzed to derive objective measures of PA and NA from their positive and negative emotional utterances. Analyses examined the relationship between BPD symptoms and subjective and objective measures of NA and PA. Results and clinical implications are discussed.

091 INVASIVE SPECIES FACILITATION IN RAIN GARDENS, BIORETENTION, AND BIOSWALES IN GREATER CLEVELAND

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Stormwater management features such as bioretention systems and rain gardens provide valuable ecosystem services. They are ecologically engineered to counteract surrounding urban land use practices. However, new stormwater management features may also create an environment conducive to invasive plant species. Invasive plants can affect ecosystem services, and have devastating economic impacts. This study was conducted to determine connections between surrounding land use and maintenance practices in stormwater management features throughout Greater Cleveland and the presence of invasive plant species. Initial site visits were conducted for 164 bioretention, bioswales, and rain gardens in Greater Cleveland. They were analyzed for physical characteristics, surrounding land use, and overall function, including level of erosion and exposed soils. An initial survey recorded all plants present, including invasive species, and a later revisit was made to each site to perform a final plant survey. A mean number of nineteen total plant species per site were found and seven species of invasive plants in total. Four variables for maintenance were analyzed for proxies of overall condition. 35% of sites were in good condition, 34% in very good, 25% in fair, 5% in excellent, and 1% in poor. A multivariate conical correspondence analysis comparing plant species data to environmental variables was conducted. Bare dirt as a bottom substrate and presence of buildings were closely related with *Phragmites australis* and *Cirsium arvense*, the two most dominant invasive species. Total plant species are opposite the dominant invasive species on the cross axis, which suggests the variables have opposite drivers. Preliminary results suggest that bare dirt as a bottom substrate is correlated with lower percent cover, and therefore lower plant diversity. Presence of invasive species were also correlated with concerns for maintenance and function.

092 OCCUPATIONAL THERAPY: CALM MOMENTS CARDS

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The purpose of the *Calm Moments Cards* pilot project is to evaluate the effectiveness of occupational therapy developed strategies described on the *Calm Moments Cards* used for stress reduction and anxiety caused by situational stressors throughout the school day. A one group (n=116) mixed methods design using a pre-test/post-test survey and qualitative analysis of written reflections was used to explore the meaning and outcomes of the *Calm Moments Cards Program*. The results are currently being analyzed using SPSS and qualitative analysis of written reflection.

093 STIMULUS CHOICE OF THE AFRICAN CLAWED FROG, *XENOPUS LAEVIS*, WHEN PRESENTED WITH TWO STIMULI

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This study examines responses of African Clawed Frogs to simultaneous presentation of two stimuli. Frogs were tested in a round arena with water 4 cm deep. Four clear Plexiglas rods, moved by computer-controlled stepper motors, were concealed in a screen suspended above the water. Two rods carried a 1 cm long black cylindrical marking beginning 0.5 cm above the tip. One or two rods were dipped briefly into the water to generate lateral line stimuli and, when a rod carried a marking, both visual and lateral line stimuli; rods lowered just above the surface presented a visual stimulus. Overall, reactions and no reactions were evenly distributed--52% and 48%, respectively. For single stimuli, turn angle depended linearly on stimulus angle (e.g., Turn angle = $1.79 + 0.66 \times$ Stimulus angle; $p_{\text{slope}} < 0.0001$; $R^2_{\text{adj}} = 81\%$). Two simultaneous stimuli did not elicit more or fewer responses than did one stimulus ($X^2 = 0.2$, $p=0.65$). The frogs' choice of stimulus depended primarily on stimulus proximity and angle, not stimulus type. When presented with two stimuli, the frog chose the nearer stimulus and the more rostral stimuli ($p < 0.0001$). Regardless of which stimulus the frog chose, its accuracy of turning was similar to that of turning to a single stimulus.

094 ARE SACRAL MARKERS ADEQUATE MEASURES OF CENTER OF MASS DURING MULTIDIRECTIONAL HARNESSED BALANCE TRAINING

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Background and purpose: Balance is crucial in order to prevent falls. One quantitative measure of balance is the center of mass (COM) in relation to the base of support (BOS). Accurately measuring COM at any given time with motion capture typically takes a large number of tracking markers.

However, it has been shown that a single sacral marker can accurately approximate COM during walking, a straight plane activity. The purpose of this study is to see if a sacral marker can also approximate COM in multidirectional movements.

Subjects: Six subjects over the age of 60 participated in this study.

Methods: Each participant completed the multidirectional harnessed balance training (MDH) protocol which requires moving in multiple planes while playing three Kinect video games: Target Kick, Table Tennis, and 20,000 Leaks with concurrent motion capture using the full body Helen Hayes marker set. COM and sacral marker positions were calculated using Cortex analysis software (Motion Analysis Corp.) A Pearson correlation was completed correlating sacral and COM positions for X, Y and Z axes.

Results: 87% of the analyzed trials had very strong correlations of over 0.8, with 65% of those above 0.95. An additional 7% had strong correlations over 0.6.

Conclusion and Discussion: A single sacral tracking marker accurately approximated the entire body's COM during 94% of the analyzed trials. The only trials that had a weak correlation (<0.6) were the vertical Z axis during the video game target kick within the harness. With the movement required during this game, we hypothesize that as the participants bent downward, the harness holding the sacral marker did not move with their COM, causing the low correlation.

095 THE EFFECTS OF MORTALITY SALIENCE AND ANALYTIC THINKING ON STRENGTH OF RELIGIOUS BELIEF

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The focus of the current study is to investigate whether religious participants reminded of death will increase their religious beliefs, even when prompted to engage in more analytic/critical style thinking. Research derived from terror management theory suggests that people rely on intuitive religious concepts in order to deal with the awareness of death. The present research built on that idea, as well as previous research suggesting that religious intuitions lead to religious belief if people rely on intuitive/quick processes but not if people engage in further critical analysis. Thus, the present work hypothesizes that religious participants reminded of death would increase the strength of their religious faith, unless they were prompted to engage in more deliberate, analytic/critical style thinking. To test this idea, Christian participants will be randomly assigned to be reminded of either mortality or a control topic, then they will either be prompted to engage in analytic/critical thinking or a neutral control condition, and then they will be asked to rate the strength of their religious belief. We expect that participants reminded of mortality will increase their religiosity in the neutral control condition but not in the analytical/critical thinking condition, consistent with the idea that existential

motivation for religious faith relies on intuitive processing and is potentially derailed by deeper, more analytic processing.

096 INVESTIGATING THE ROLE OF IMPLICIT ANXIETY IN THE EFFECT OF EXISTENTIAL FREEDOM REMINDERS AND NEUROTICISM ON AUTOCRATIC LEADERSHIP STYLE PREFERENCE

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Existential philosophers and psychologists have theorized that an excess of personal freedom can be a self-relevant burden that motivates emotionally stable (low-neurotic) people to displace that freedom onto others. For example, prior research shows that when people with low (but not high) levels of neuroticism are reminded of freedom, they increase their preference for more autocratic, less democratic leaders (2015). However, the role of the presumed mechanism underlying the effect—*anxiety*—remains unclear. Past work has investigated the role of explicit (consciously recognized and self-reported) anxiety, but has not found evidence that freedom reminders cause low neurotics to explicitly experience heightened anxiety. It remains possible that anxiety may indeed be the operative mechanism, yet remain outside conscious awareness and thus remain unavailable for self-report. This research study hopes to investigate the role of implicit anxiety (outside of conscious awareness) using the dot-probe task, which is a computerized cognitive task that assesses the performance-inhibiting and performance-enhancing influences of extraneous anxiety-related stimuli (probes) during a series of speeded dot-locating exercises. Thus, the study will measure neuroticism, manipulate the awareness of one's freedom, and then administer the dot-probe task and measure autocratic and democratic leadership style preference. It is expected that low neurotics reminded of freedom will be more sensitive to the anxiety-related stimuli during the dot-probe task—indicating heightened implicit anxiety—and would more strongly support more autocratic, less democratic leadership style.

097 ANTECEDENTS OF THE RELATIONSHIP BETWEEN ATTITUDES AND HIRING DISCRIMINATION ON THE BASIS OF GENDER NONCONFORMING APPEARANCE

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Discrimination against lesbian, gay, bisexual, and transgender individuals is legal in 31 states of the USA (Human Rights Campaign, 2016). A gender nonconforming individual is defined as “a person who does not conform to society's expectations of gender expression based on the gender binary, expectations of masculinity and femininity, or how they should identify their gender” (Gender Equity Resource Center,

2013). We plan to investigate the relationship between participants' precursory beliefs and attitudes and hiring discrimination towards gender nonconforming individuals. The National Transgender Discrimination Survey shows that 32% of gender nonconforming respondents experienced hiring discrimination (Grant et al., 2011). Participants will rate a series of resumes of which there will be one critical resume on which qualifications are kept constant, and only gender and masculinity/femininity/androgyny are manipulated by an associated photograph on a LinkedIn page. Participants will be randomly assigned to four groups; three groups will receive a critical resume with an associated image of a gender nonconforming individual; for the fourth group, the image associated to the critical resume will be a control. Prior to rating the resumes, participants will rate themselves on antecedent factors (e.g. religiosity, belief in traditional gender roles, and previous exposure to gender nonconforming individuals) plausibly related to hiring discrimination. We predict that hiring discrimination against gender nonconforming individuals is related to antecedents of attitudes toward gender-nonconforming individuals.

098 ANTISOCIAL PERSONALITY DISORDER SYMPTOMS PREDICT DEFICITS IN BIS/BAS ACTIVITY RESPONDING TO REWARD AND PUNISHMENT

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Antisocial personality disorder (APD) is characterized by impulsivity and risk taking behaviors. Impulsive behaviors that are associated with APD may be undergirded by deficits in the behavioral inhibition system (BIS), which is activated in the presence of aversive cues and inhibits approach behavior as a function of risk assessment. APD is also linked with hyperactivity of the behavioral activation system (BAS), which is linked to risk-taking behavior in response to reward cues (McNaughton, 2000). There is increasing evidence that BIS and BAS are influenced by autonomic nervous system activity, the sympathetic branch (SNS) of which is reflected in sweat activity on the hands (Arnett, et al., 2000). Indeed, past findings suggest that those with APD symptoms have lower SNS reactivity in response to punishing events than healthy controls (Peterson, et al., 2014). However, the few studies that examined SNS activation in APD focused on punishing cues, thereby presenting a limited view of the role that BIS and BAS have in the impulsive behaviors that hallmark APD. Thus, it is unclear whether risk taking behaviors in APD are due to deficits within the BIS, BAS, or both systems. This study aims to bridge this gap in the literature by examining the relationships between APD symptoms, BIS/BAS as indexed via self-report measures and SNS activation in response to monetary wins and losses during a computerized gambling task. I hypothesize that APD symptoms will predict: (1) reduced BIS activity as reflected on self-report measures and attenuated skin conductance responses (SCRs), which index SNS activity, after monetary losses, and (2) increased BAS as

reflected on self-report measures and increased SCRs after monetary wins.

099 REEXAMINATION OF LOGICAL PROSE PROCESS SCORES IN A HETEROGENEOUS SAMPLE OF PARTICIPANTS

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Will digit span test scores correlate with omission and/or commission errors in the Anna Thompson story recall test? The digit span test is a measure of attention, whereas the story recall test is a measure of long-term memory. In some adaptations, the story recall test is given in a single trial followed by a delay and recall. This would make the test a measure of attention and a poor measure of long-term memory. The story recall test becomes a long-term memory test when multiple trials are administered. Errors of omission and commission should decrease with multiple trials. It has been previously shown that word list tasks produce a logarithmic learning curve, with the first trial reflecting the effects of attention and concentration and the learning curve reflecting the laying down of new memories. In the proposed study, we will administer a short story several times and examine whether the learning curve is similar to that of word list learning. Both errors of omission and commission will be measured. It is hypothesized that performance on trial 1 will correlate with digit span, a measure of attention, and that the learning curve will be logarithmic. Participants will include 30 individuals age 18-25 and 30 individuals age 65 or older. We predict that correlations between the digit span test and the Anna Thompson story recall test will be less evident in the younger age group due to more intact attention.

100 THE INFLUENCE OF PHYSICAL FITNESS AND REAPPRAISAL COMPETENCY ON EMOTIONAL WELL-BEING

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A wealth of research suggests a positive link between physical fitness and emotional well-being, and one potential key component to this association could be through individuals' engagement with adaptive emotion regulation (i.e., cognitive reappraisal strategies). Thus, the goal of the present study is to assess the intervening role of cognitive reappraisal ability/success on the link between physical fitness and emotional well-being. Physical fitness will be operationalized through a simple analog to VO_{2max} , which accounts for both

objective (i.e., body mass and composition metrics) and subjective (self-reported activity level) fitness indicators. Cognitive reappraisal ability/success will be assessed using a lab-based regulation paradigm, whereby participants will be down regulating their affective reactions to negative film clips. Successful reappraisal will be examined through changes in self-report affective responses to film clips and physiological modulation (skin conductance and heart rate variability) when reappraising versus naturally viewing the clips. Emotional well-being will be examined through self-report indices of depressive and anxiety symptoms and generalized positive and negative affect. We predict that more physically fit individuals will demonstrate greater reappraisal success in comparison to less physically fit individuals. This will be indicated by decreased negative affective responses toward film clips viewed in the "reappraisal" versus "naturally view" condition (i.e., diminished self-reported negative evaluations of the films and diminished physiological arousal). Furthermore, both increased physical fitness and increased reappraisal success will be associated with greater emotional well-being: diminished generalized negative affect, depressive symptoms, anxiety symptoms, and increased generalized positive affect. Finally, we will test whether reappraisal success mediates or moderates the relationship between physical fitness and emotional well-being. The present study has potential for furthering our understanding as to the multiple factors influencing positive affective functioning in adulthood.

101 EXAMINATION OF PARALLEL FORM RELIABILITY AND CONSTRUCT VALIDITY OF TWO VERSIONS OF THE POREH NONVERBAL MEMORY TEST

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The goal of the study is to examine the parallel form reliability of two versions of the Poreh Nonverbal Memory Test (PNMT₁, PNMT₂, 2015). Additionally, we will investigate the construct validity of the PNMT₁ and PNMT₂ by administering them in conjunction with the administration of the Rey-Osterrieth Complex Figure (ROCF, Rey, 1942), a more traditional visuospatial memory test. The PNMT is a measure of nonverbal memory and learning. Although there are other measures of nonverbal memory currently in use, such as the ROCF, the advantage of the PNMT is that it can provide additional measures of learning and memory that the ROCF cannot. We will study 40 adult participants ages 18 to 90. Each participant will be randomly assigned to complete the forms of the PNMT in one of the two possible orders, with the ROCF in between. We anticipate finding that there will be a high correlation between the two versions of the PNMT and that both measures will moderately correlate with the ROCF. The parallel form reliability of the two versions of the PNMT will enable the use of these measures by clinicians and researchers for medical monitoring of various conditions associated with memory impairment.

102 RELATIONSHIP BETWEEN BORDERLINE PERSONALITY DISORDER SYMPTOMS AND SYMPATHETIC NERVOUS SYSTEM ACTIVATION DURING INTERPERSONAL AGGRESSION

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Borderline personality disorder (BPD) is characterized by emotion dysregulation during interpersonal conflict, which is influenced by sympathetic nervous system activation. Indeed, studies have shown that persons with BPD have increased sympathetic nervous system activity in response to interpersonally induced frustration (Weinberg, Klonsky, & Hajcak 2009), as well as during resting (Kou & Linehan 2009). However, notable limitations of prior work in the area include the use of stressors that are not personally relevant (e.g., sad film clips), and insufficient measurement of sympathetic nervous system (e.g., via heart rate variability). A more direct way to measure sympathetic nervous system activity that relates to interpersonal deficits in BPD may be via skin conductance responses (SCR) during times of interpersonal conflict. This study aims to investigate the relationship between borderline personality disorder symptoms and sympathetic nervous system activation during times of rest and in response to interpersonal conflict. I hypothesize that those with BPD symptoms will predict greater SCR during periods of interpersonal conflict compared to the resting baseline. Specifically, this study will examine SCR characteristics, including amplitude (strength), latency (the delay of the response), and frequency of the SCR among community adults and undergraduate students who are symptomatic for BPD. First, BPD symptoms will be measured via self-report (Personality Assessment Inventory-Borderline scale). Then skin conductance measurements will take place during a resting period while they breathe along with a wave on a screen at a rate of 12 breaths per minute (paced breathing task) and during “loss” trails of a competitive reaction time task in which the participant may be blasted with noise upon losing to a computer-generated confederate (interpersonal conflict), who, in a prior task rejected the participant in a computerized ball tossing game. The results may aid in understanding emotional dysregulation in BPD during periods of interpersonal conflict.

103 WILL HEARING MUSICAL INSTRUMENTS PLAYED IN DIFFERENT PITCHES AFFECT PARTICIPANTS’ GENDER RATINGS OF THE INSTRUMENTS?

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The purpose of the proposed study is to investigate the flexibility of mental representations of gender. We will examine the extent to which hearing an instrument in a

relatively high mean pitch or a relatively low mean pitch affects the gender ratings of musical instruments. Previous research has revealed that some musical instruments are consistently rated as male, other instruments are consistently rated as female, and other instruments have not been rated consistently as either male or female (hereafter referred to as neutral). These ratings have been stable across time, in various age groups, and across cultures. To date, no study has examined the flexibility of these mental representations. For the proposed study, nine musical instruments (three male, three neutral, three female) have been selected based on consistency of gender rating (or a lack thereof) in previous studies. Participants will listen to different sound clips over headphones, while rating the gender of the instrument along a continuum (Female—Neutral—Male). Each sound clip will feature one of these musical instruments playing three to five notes in a low, medium, or high pitch. It is expected that male instruments will be rated less male when heard in higher pitches, and female instruments will be rated less female when heard in lower pitches. We further predict that an interaction will emerge. We expect the effect of pitch to be even more pronounced in neutral instruments, since participants presumably have fewer other attributes on which to base their decisions. Investigating whether specific instances can change participants’ ratings of gender will inform theories of mental representation.

104 THE MODERATING ROLE OF ATTRIBUTIONAL STYLE IN THE SOCIAL INTEGRATION AND PSYCHOLOGICAL ADJUSTMENT OF FORMERLY INCARCERATED INDIVIDUALS

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A major issue facing the United States is the rising number of incarcerated individuals and their high rates of recidivism post-release. One of the main factors leading to these high recidivism rates is the difficulties that many ex-felons have with social reintegration and psychological adjustment after their release from incarceration. Stable housing, employment, and relationship with family all play an important role in successful social reintegration, however attaining these goals can be highly stressful. It is likely that the manner in which these individuals interpret stressful events affects the success of their social integration and psychological adjustment. Attributional style is a key factor in the interpretation of stress. A person who has a negative attributional style interprets the cause of stressful events as self-generated, enduring, and pervasive. Whereas someone with a positive attributional style views such events as externally-generated, temporary, and isolated. It has been shown that a negative attributional style in stressful situations is associated with depression and other negative outcomes. Thus, attributional style presumably plays

an important role in the successful social reintegration of a formerly incarcerated individual, with negative attributional style expected to associate with negative outcomes. However, there is a dearth of research on the relationship of attributional style of formerly incarcerated individuals to their adjustment post-release. We intend to study whether the relationship between a person's type of offenses, their incarcerations, and their social reintegration and psychological adjustment after release from incarceration is moderated by attributional style. We hypothesize that negative attributional style will exacerbate the negative effects of offense type and amount of time incarcerated on social reintegration as measured by capacity to find housing, employment, and re-engage with family, as well as psychological adjustment.

105 ATTRIBUTIONAL STYLES AND DEPRESSION RISK IN ARAB AMERICANS: A CROSS-CULTURAL PERSPECTIVE

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Attributional styles influence the interpretation of stressful life events with respect to their cause. Negative attributional styles (NAS) place the cause of stressful events as self-generated, enduring, and pervasive. Such negative causal attributions worsen the adverse effects of stress and are a strong risk factor for depression. However, research on NAS has been largely confined to European populations, raising the question as to whether NAS carry similar risks to people of other cultures. The few cross-cultural studies that examine this topic showed that NAS are a more pernicious risk factor for depression among individuals hailing from a collectivistic culture as compared to those of an individualistic culture. (Anderson, 1999). Arabs reflect a collectivistic cultural group that is rapidly growing in the United States and are at an elevated risk for depression. However, little is known on the functioning of NAS in this cultural group, as compared to their Western peers. This study aimed to examine whether: (1) individuals of Arab descent differ from non-Arabs with respect to their NAS, (2) NAS differentially influence the effects of life event stress to predict depression symptoms between the two cultural groups, and (3) acculturation to US culture reduces cross-cultural differences in the association between NAS and depression.

Arab (n=38) and non-Arab (n=32) participants completed NAS, life event stress, depressive symptoms, and acculturation surveys. Results showed that while the two groups did not differ in their stress levels or depression, Arabs displayed a more NAS. While NAS exacerbated the adverse effects of stress on depression symptoms for non-Arabs and Arabs who acculturated to the US values, NAS protected against stress for Arabs with traditional cultural values. Clinical implications are discussed.

106 ATTRIBUTIONAL STYLES AND DEPRESSION RISK IN ARAB AMERICANS: A REPLICATION AND EXTENSION TO DAILY LIFE

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Attributional styles influence the interpretation of stressful life events with respect to their cause. Negative attributional styles (NAS) place the cause of stressful events as self-generated, enduring, and pervasive. Such negative causal attributions worsen the adverse effects of stress and are a strong risk factor for depression. The few cross-cultural studies that examine this topic showed that NAS are a more pernicious risk factor for depression among individuals hailing from a collectivistic culture as compared to those of individualistic cultures (Anderson, 1999). However, Najjar, Gaynier, and Yaroslavsky (2015) found that among Arab-Americans relative to non-Arabs, and Arabs acculturated to US values, high levels of NAS served as a protective role for Arab-Americans who hold more traditional values. The present study sought to replicate the effects noted by Najjar et al. (2015) and to extend these associations to proximal associations between NAS, stress, and negative mood in the daily lives of Arab and non-Arab participants. We hypothesized that 1) the protective effects of NAS in the association between stress and depression symptoms will only be present for Arabs who hold traditional values, and 2) these effects will be reflected in the relationship between momentary stress and negative mood in the context of participants' daily lives.

Arab and non-Arab participants completed self-report measures of NAS, life event stress, depressive symptoms, and acculturation surveys, as well as a 7 day ecological momentary assessment protocol during which momentary ratings of stress and negative affect were measured 5 times daily via participants' cell phones. Results and implications for culturally competent assessment and treatment of depression risk will be discussed.

107 IS IT INTERPERSONAL? EXAMINING LINKS BETWEEN PARASYMPATHETIC NERVOUS SYSTEM ACTIVITY AND INTERPERSONAL EMOTION REGULATION IN THE LAB AND IN DAILY LIFE

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The parasympathetic branch of the autonomic nervous system (PNS) is believed to support social engagement and emotion regulation (ER). A growing literature links PNS activity during resting states to the use of effective (adaptive) ER, and the reduced use of ineffective (maladaptive) ER. A growing literature also suggests that blunted PNS reactivity in response to interpersonal sadness, alone and in combination with resting

state indices, are associated with the use of maladaptive ER responses. However, it remains unclear whether these findings are tied specifically to sadness in general, or specifically to sadness that involves an interpersonal context (e.g., loss). The study aimed to examine whether the relationship between atypical PNS activity (indexed via respiratory sinus arrhythmia, RSA) and ER is specific to interpersonal-themed negative mood induction in the lab and in daily life.

Data was collected from 61 undergraduate students who completed a self-report trait measure of adaptive and maladaptive interpersonal and non-interpersonal ER repertoires, as well as a psychophysiology protocol during which RSA was collected while participants rested, listened to a sad music clip, and viewed a sad film clip that depicts interpersonal loss. Forty-one participants then engaged in a 7 day ecological momentary assessment (EMA) protocol during which they completed 5 daily surveys on their current and peak negative mood states since their EMA last assessment, as well as their use of interpersonal emotion regulation responses during peak times of distress.

Contrary to expectation, atypical RSA reactivity to both the sad music and sad film predicted greater non-interpersonal maladaptive ER repertoires, rather than the use of parallel adaptive response. In a similar vein, atypical RSA patterns predicted the reduced use of adaptive non-interpersonal ER responses. Also contrary to expectation, neither individual RSA indices nor their patterns predicted the use of adaptive interpersonal responses over the EMA periods.

108 IS IT INTERPERSONAL? A TEST OF TWO PHYSIOLOGY DEPRESSION RISK MODELS

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The parasympathetic branch of the autonomic nervous system (PNS) is believed to support the experience of emotion, and its dysfunction has been linked to depression risk. Contemporary models of PNS' involvement in emotions posit divergent accounts: one posits that the link between emotions and the PNS in humans evolved to support social behavior (Porges, 2007), while the other proposes that the PNS is a part of an emotional feedback system with no interpersonal specificity (Thayer & Lane, 2009). As PNS activity normally decreases in response to sadness, an emotion that is dysregulated during depressed states, Porges' model would suggest that atypical PNS activity (insufficient decrease or augmentation) to sadness elicited by interpersonal stimuli may be particularly relevant for understanding depression risk, while Thayer & Lane would suggest that atypical PNS activity to interpersonal or non-interpersonal sadness inducing stimuli is equally important for understanding depression. Relatedly, a growing literature suggests that combining indices of PNS activity during resting and emotional states sheds incremental light on depression risk than PNS activity in either state. The present study tested the two models by

relating depression symptoms to PNS activity at rest, its reactivity in response to interpersonal and non-interpersonal sadness, and their combination.

Sixty-four community-dwelling adults (62% women, $M = 28.72$, $SD = 11.90$) completed measures of depression and a psychophysiology protocol during which PNS activity (indexed via respiratory sinus arrhythmia, RSA) was collected at resting, in response to sad music clip (non-interpersonal), and sad film clip (interpersonal). Reactivity was indexed by the differences between task and baseline levels. Combinations of resting RSA and RSA reactivity are called RSA patterns.

Consistent with expectation, atypical RSA patterns in response to sad film, but not sad music, predicted depression symptoms. These findings support Porges' model, and suggest that the role of PNS activity in interpersonal functioning is impaired in depression individuals.

109 SARCASM'S IMPACT ON GOAL ORIENTATION AND ITS RELATION TO FEEDBACK SEEKING BEHAVIORS

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Goal orientation is an individual's situational or dispositional goal preference in achievement settings. There are three types of goal orientation: learning goal orientation, prove performance goal orientation, and avoidance performance goal orientation. Learning goal orientation (LGO) is the desire to improve one's knowledge and to achieve personal enlightenment. Prove performance goal orientation (PPGO) is the desire to prove one's competence and be viewed favorably. Avoidance performance goal orientation (APGO) is the desire to avoid showing one's incompetence and avoiding to be viewed negatively. It has previously been proven that feedback seeking behaviors are positively related to Learning Goal Orientation, negatively related to Avoidance Performance Orientation, and not related to Prove Performance Goal Orientation. Managers in quick service restaurants have noticed that crew members are not seeking feedback. This study intends to investigate the impact of managers' use of sarcasm on the employees' goal orientation which would impact their feedback seeking behaviors. We had quick service restaurant employees take a survey that allowed us to measure their goal orientations, managers' sarcasm and their feedback seeking behaviors. We found a positive relationship between sarcasm and PPGO and APGO. We also found positive relationships between LGO and PPGO with feedback seeking behaviors. We were not able to find significant evidence that goal orientation mediates the relationship between managers' sarcasm and employee feedback seeking behaviors. These results do not show evidence that managers' sarcasm impacts their employees' feedback seeking behaviors. However, we do believe with an increased sample size the results may become clearer.

110 PERSEVERANCE AND ACADEMIC PERFORMANCE IN COLLEGE STUDENTS: ENVIRONMENTAL AND INDIVIDUAL FACTOR INFLUENCES

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Recent research interest in the construct of grit, defined as an individual's perseverance and goal attainment focus, has demonstrated a strong relationship with academic achievement. In some studies, the influence of perseverance on student grades surpassed the contributions of academic ability and personality variables. Now that the relationship between grit, or perseverance, and grades is well established, it is important to develop a better understanding of how grit develops. To that end, the purpose of this study was to investigate the relationship between urban college students' measured perseverance, grades, and histories. Perseverance was measured via the GRIT-S which consists of items related to perseverance and long-term goals. Grades were measured via self-report. Finally, student participants will complete a brief demographic and historical report with items related to educational experiences, family factors, such as SES, and individual identity, such as culture and self-efficacy. It was hypothesized that students with the lower positive previous educational experiences, as measured by the Protective Factor Survey, will demonstrate lower GRIT-S scores and grades. It was also hypothesized that students who report early life Protective Factors will have higher total GRIT-S scores than those students who report college level protective factors. Lastly it was hypothesized that there would be a difference in protective factor scores based on gender. A preliminary analysis of the data shows that students generally reported having more protective factors early in life than in college. From these and further anticipated results, we hope to recommend better ways to predict and improve a student success in college.

111 INVESTIGATING THE MECHANISM OF EXISTENTIAL FREEDOM'S EFFECT ON LEADERSHIP STYLE PREFERENCE IN LOW NEUROTICS

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Theory and research suggest that our existential freedom—the radical freedom to choose who to be and what to do with oneself—can be a self-relevant burden that motivates emotionally stable people to displace that freedom onto others. For example, prior work shows that freedom reminders motivated low neurotics to increase preference for more autocratic, less democratic leaders. But the role of the presumed mechanism underlying the effect (anxiety) remains unclear. The current study attempted to replicate and extend that work, experimentally investigated the role of anxiety by

also manipulating self-affirmation—which is known to reduce anxiety and reduce anxiety-motivated responses. Thus, the study measured neuroticism, manipulated the awareness of one's freedom, manipulated self-affirmation, and then measured autocratic and democratic leadership style preference. It was expected that low neurotics reminded of freedom would prefer a more autocratic, less democratic leadership style, unless they have engaged in self-affirmation. However, for various possible reasons discussed, the current study failed to replicate the prior work that showed that freedom reminders motivated low neurotics to increase preference for more autocratic, less democratic leaders.

112 USING MOUSETRACKING TO INVESTIGATE THE LOCUS OF THE CASE-TRANSITION EFFECT ON LEXICAL DECISION PERFORMANCE

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The purpose of this research is to further our knowledge about the processing of orthography. Because most lexical decision studies focus on response time, there is a lack of behavioral evidence about the underlying dynamics of processing lexical information. We measured hand movements to map the process of a lexical decision to obtain a deeper understanding of word processing. MouseTracking may reveal more information about cognitive processes involved in choice, in addition to information provided by speed and accuracy. This project consisted of two parts: The purpose of Experiment 1 was to replicate a study by Barca and Pezzulo (*Frontiers in Psychology*, 2012) that used MouseTracking to investigate lexical decision; in Experiment 2, we examined the effect of a particular orthographic manipulation on components lexical processing. In Experiment 1, participants made lexical decisions about high frequency words, low frequency words, pseudowords, and letter strings. As expected, and as shown by Barca and Pezzulo, mouse paths for high frequency words and letter strings from the starting point to the response were more direct than those for low frequency words and pseudowords. This suggests there was a higher attraction to the incorrect response option for low frequency words than high frequency words, and for pseudowords than letter strings. The purpose of Experiment 2 was to investigate the locus of the case transition effect on lexical decision. Various studies have shown that responses to words presented in homogeneous case (i.e., uppercase or lowercase) are faster than those in which case is mixed: MouseTracking might help explain this effect. Presented items were lowercase (e.g., travel), uppercase (e.g., TRAVEL), or included a case transition (upper-to-lower case-change [e.g., TRAVel], or lower-to-upper case-change [e.g., traVEL]). Of interest is the effect of orthographic form on components of the response as assessed by MouseTracking technology.

113 CASE TRANSITION FORMAT AND LEXICAL DECISION PERFORMANCE: IS THE INITIAL UPPERCASE ADVANTAGE GENERAL?

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MIXed-caSE ITEms are harder to read than homogeneous-case (UPPERCASE or lowercase) items; generally, lexical decisions are slower for mixed-case than homogeneous-case words. We investigated the relationship of performance to format: In one lexical decision experiment, we presented six-letter items in eight formats—uppercase; lowercase; initial uppercase; initial lowercase; final uppercase; final lowercase; first-half uppercase; and first-half lowercase (e.g., travel; TRAVEL; Travel; tRAVEL; traveL; TRAVEL; TRAVel; and traVEL). Responses to homogeneous-case words were faster than to mixed-case words; however, response times for initial-uppercase words did not differ from those for homogeneous-case words, and were faster than those for other mixed-case words. To investigate whether holistic properties contribute to the initial-uppercase advantage, in a second experiment, we presented four-letter stimulus items in 16 formats formed by crossing eight case-transition patterns (e.g., bird; BIRD; Bird; bIRD; BIrd; biRD; birD; BIRd) with two spacings (packed, e.g., bird, and spaced, e.g., b i r d).

114 THE EFFECT OF BETWEEN- AND WITHIN-ITEM FONT VARIATION ON LEXICAL DECISION PERFORMANCE

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The multistream model of word perception (Allen, Smith, Lien, Kaut, & Canfield, 2009) suggests that word identification generally involves whole-word information, but when the orthographic form of a letter string is not standard, processing occurs analytically and is slower. For example, within-item case transitions slow responses in lexical decision experiments; thus within-item font transitions may have a similar effect. Letters within a font are distinct yet related, and are constrained on several parameters to facilitate processing (Sanocki & Dyson, 2012). Font tuning allows commonalities to be utilized by the perceptual system when processing subsequent items (Walker, 2008); changes in font slow processing because the translation rules cannot be carried over. We conducted two experiments to investigate the effect of font variation on lexical decision performance. Experiment 1 addressed whether between-item font variation interferes with judgments of lexicality. Four blocks of 64 trials were presented. Two blocks contained homogenous font items, and in two blocks Arial Black and Garamond items were randomly intermixed. For response times to words, no main effect of block type was found. However, block type interacted with stimulus length and word frequency. Experiment 2 investigated the effect of within-item font transition on lexical

decision performance. Each of the four blocks contained 64 items, half of which were in homogeneous font and half of which contained a font transition. For response times to words, no main effect of font homogeneity was found. However, the relative slowness of responses to low vs. high frequency words, and the relative slowness of responses to 6- vs. 4-letter words, was larger for mixed-font than for homogeneous font items. Thus, a within-item font transition by itself does not slow performance. Future research will investigate whether there is an effect of font mixing when homogeneous and mixed font items are presented in separate blocks.

115 FIELD IDENTIFICATION OF THE SEX OF OHIO'S MIGRANT THRUSHES

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Data on the population structure of any wildlife population is crucial to effective monitoring and management. Three common thrush species – Veery (*Catharus fuscescens*), Gray-cheeked Thrush (*Catharus minimus*) and Hermit Thrush (*Catharus guttatus*) – appear sexually monomorphic and cannot be sexed in the field. However, molecular tools allow us to identify birds from feather samples. Contour (body) and tail feathers have been collected from hundreds of individuals of each species at the Black Swamp Bird Observatory (Ottawa Co., OH) banding station. DNA is extracted from these feathers, and amplified using the polymerase chain reaction (PCR). Gel electrophoresis is then used to visualize two conserved CHD (chromo-helicase-DNA-binding) genes that are located on the sex chromosomes of birds: CHD-Z and CHD-W. The CHD-Z gene is located on the Z chromosome and occurs in both male and female birds, while the CHD-W gene, found on the W chromosome, only occurs in females. Therefore, DNA samples from male birds appear as a single glowing band (CHD-Z gene) while samples from female birds appear as two glowing bands (CHD-Z gene and CHD-W gene). We can then compare the results of molecular sexing of wild-banded birds to the morphological features measured and recorded at bird banding stations (weight, wing chord, tail length, tarsus and bill length, etc.). We hope to establish criteria for bird banders to use to sex these three thrush species during the banding process. If successful, this protocol will allow for further research into differential migration timing as well as more effective population monitoring of these three thrush species both at the Black Swamp Bird Observatory and at any banding station in the Americas.

116 IN VITRO ANALYSIS OF DESIASE CAUSING SYNONYMOUS MUTATIONS IN BLOOD COAGULATION FACTOR IX

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Hemophilia B is a blood clotting disorder caused by mutations in the *F9* gene, which encodes a serine protease in the blood coagulation system known as factor IX (FIX). Mutations in *F9* may lead to severe (FIX coagulant activity (CA) <1% of normal), moderate (CA 1–5%) or mild (CA 5–30%) hemophilia B. Hemophilia B is usually caused by non-synonymous mutations (which change encoded amino acids), however it has been recently found that synonymous mutations (which do not change encoded amino acids) may also cause the disease. Synonymous mutations affect gene function mostly via perturbations of mRNA splicing and/or mRNA stability. However, recent studies suggest that synonymous mutations may also alter protein folding due to changes in translation rates.

It has been found that a mild form of hemophilia B is caused by synonymous GTG>GTA (Val107Val), CGA>AGA (Arg162Arg) and CAA>CAG (Gln237Gln) mutations. All affected individuals had antigen and anti-FIX antibody levels corresponding to mild hemophilia B. To understand molecular mechanisms that alter FIX coagulant activity due to changes in codon usage, we explored how these synonymous mutations affect the FIX translation rates using *in vitro* translation system. We found that single synonymous substitutions (above) may affect the global translation rates and the yield of the protein produced. We have observed a mild decrease in GTG>GTA (Val107Val) CAA>CAG variant (~25%) and Gln237Gln (CAA>CAG) variant (~7%) *in vitro* expression levels in comparison with WT and a mild increase in CGA>AGA (Arg162Arg) variant expression levels (~15%) in comparison with WT. The change in translation efficiency correlates well with changes in codon usage frequencies of the respective codons. This project adds to our understanding of the relationship between genotype and phenotype and the effects of synonymous SNPs on phenotype.

117 MOLECULAR DISTINCTIONS REGULATING THE TEMPORAL EXPRESSION OF MYOD-RESPONSIVE GENES

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Skeletal muscle cell death plays a role in numerous diseases and injuries such as Muscular Dystrophy, cancer and transplant surgeries. In skeletal myoblasts, cell death and differentiation are two mutually exclusive biological endpoints that are both induced by culture in differentiation media (DM) and regulated by the muscle specific transcription factor, MyoD, in a temporal fashion. Specifically, MyoD is known to increase the transcription of muscle differentiation genes, such as myogenin, by 12-24 hours following the induction of differentiation. Our lab has previously reported that MyoD is also required for the induction of the pro-apoptotic protein, PUMA, as early as 3 hours following the induction of differentiation. p38 MAP kinase is well-known to be required for the expression of muscle differentiation genes, such as myogenin. However, we have recently discovered that pharmacological inhibition of p38, while inhibiting the expression of myogenin, actually enhances the expression of PUMA. Using myoblasts in which MyoD expression has been silenced, we have confirmed that the elevation of PUMA expression in response to p38 inhibition requires the presence of MyoD. Thus, p38 signaling represents a molecular distinction between the expression of MyoD responsive genes after only three hours of culture in DM when compared to 24 hours of culture in DM. Experiments are underway to investigate this and other potential molecular distinctions regulating the temporal expression of MyoD responsive genes. Understanding the molecular mechanisms underlying these events can help us identify therapeutic targets capable of shifting the balance towards muscle differentiation.

118 THE EFFECT OF SYNONYMOUS CODON USAGE ON RECOMBINANT GAMMA-B CRYSTALLIN FOLDING DYNAMICS AND IN VIVO STABILITY

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The folding of a protein to its native conformation is an intricate process. Protein folding begins co-translationally and continues after the nascent chain has been released from the ribosome. The elongation rate along the mRNA is not uniform due to the non-uniform synonymous codon usage and the abundance of the respective cognate tRNAs. Synonymous codons can modulate protein production and folding, but the mechanism connecting codon usage to protein homeostasis is poorly understood. We have previously shown that Gamma-B crystallins produced from mRNAs with changed codon bias have the same amino acid sequence but attain different conformations, as indicated by altered *in vivo* stability and *in vitro* protease resistance. 2D NMR spectroscopic data suggested that structural differences between the two variants (wild-type/unoptimized (U) and bearing synonymous codon

substitutions (H)) are associated with different cysteine oxidation states (in the N-terminal domains) of the purified proteins. There are six cysteine residues in the N-terminal domain of gamma-B crystallin. Of these six Cys residues, only three (Cys¹⁸, Cys²², Cys⁷⁸) are within 4-5Å distance of each other and can form S-S bond. To understand how Cys oxidation state contributes to in vivo protein stability we mutated one Cys²² to His²² and Cys⁷⁸ to Ser⁷⁸ to eliminate the formation of the respective S-S bonds and tested whether these substitutions may differentially affect the stability of the protein variants (U and H). Our results show that in vivo stability of the two proteins is not affected by the mutations above. These data suggest that formation of the S-S bond in case of the H protein is secondary to its increased in vivo stability in comparison with the U variant.

119 SOCIAL COGNITION DEFICITS, PARASYMPATHETIC NERVOUS SYSTEM ACTIVITY, AND SOCIAL IMPAIRMENT

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Social cognition (SC) reflects the ability to recognize emotional cues and accurately judge mental states during social interactions. High SC is associated with sound mental health, while insufficiency or over abundant levels of SC is associated with mental illness and poor interpersonal functioning. Parasympathetic nervous system (PNS) responses have been found to support social interaction and are connected to social cognition (Porges, 2007). A growing literature proposes that context-appropriate PNS reactivity (indexed by respiratory sinus arrhythmia, RSA) predicts positive social engagement and psychological adjustment, while insufficient and excessive RSA withdrawal are linked to impaired interpersonal functioning. It is unknown whether the association is specific to RSA reactivity in the context of interpersonal sadness that purportedly elicits empathic responses or to sadness in general. This study aimed to test whether: (1) the relationship between SC and RSA reactivity changes as a function of interpersonal context, (2) this relationship is curvilinear, and (3) whether SC and RSA reactivity associations are associated with interpersonal impairment, as measured by symptoms of Asperger's Disorder.

Participants were 61 community adults who completed measures of Asperger's Disorder symptoms and social cognition, as well as a psychophysiology protocol during which RSA was collected during a resting baseline and reactivity to a sad music clip and sad film clip were collected. Reactivity was indexed by the differences between task and baseline levels.

Consistent with the extant literature, SC demonstrated a quadratic relationship with RSA reactivity to interpersonal and non-interpersonal sad mood inductions. Specifically, low levels of SC were associated with poor RSA withdrawal/augmentation levels, as were high levels of SC to

a lesser extent. In turn, RSA withdrawal to the sad film was related to lower Asperger's symptoms at trend level. Findings suggest that optimal levels of SC are needed for successful interpersonal functioning.

120 BORONIC ACID DERIVED LECTIN MIMETICS FOR STUDYING CELL SURFACE CARBOHYDRATE FUNCTION AND IMMUNOMODULATION APPLICATION

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Cell surface carbohydrates, existing as glycoproteins, glycolipids and proteoglycans, play key roles in many biological processes including cellular adhesion, cell signaling, cell communication, and immune responses. Therefore, carbohydrate recognition has come to the forefront of biological scientific research aiming to uncover the molecular mechanisms of many physiological and pathological processes and explore potential theranostic applications for various diseases. The molecular mechanism of carbohydrate recognition is still undetermined and lectins, the sugar binding proteins, have been conventionally used to determine the structure and function of carbohydrates and glycoconjugates. However, due to the arduous process of lectin isolation from nature, their numbers are still very limited compared to the diversity of carbohydrate structures. In addition, some lectins can be cross specific and bind multiple carbohydrate structures. Therefore, the exploration of new lectins and lectin mimetics is highly demanded. Boronic acid containing compounds have unique properties, similar to lectins, since they selectively form cyclic esters with diols of sugars in aqueous solution. Their ability to bind carbohydrates has proven useful in the design of artificial carbohydrate receptors, membrane transport agents, cell surface carbohydrate recognition ligands, and as protective agents in carbohydrate synthesis as well. We report herein, protein boronic acid conjugate-based lectin mimetics and their use in the study of the structure and function of cell surface carbohydrates and as immunomodulation agents to selectively activate immune cells for immune therapy applications.

121 RECOVERING AMERICA'S HERITAGE: THE NEXT STEP TO ECOLOGICAL RECOVERY IN THE CUYAHOGA RIVER

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The primary objective of this research project was to assess species richness and population abundance of various mussel species in the family Unionidae throughout the Middle and Upper parts of the Lower Cuyahoga River in order to better

understand the mussel assemblages throughout the entire Cuyahoga River. Previous to this project this particular region had not been extensively surveyed, and few records existed for the Middle Cuyahoga River. Therefore, records were contrasted to the species known to be present within the Upper Cuyahoga watershed utilizing knowledge obtained by our research team in the summer of 2012. Surveys for both the Upper and Middle Cuyahoga River were conducted mainly by visual survey where water levels were low and by using tactile techniques in deeper water. Throughout the survey of the Middle Cuyahoga, only 37 live animals were located across the 17 sites inspected: (*Lampsilis siliquoidea* = 28, *Pyganodon grandis* = 6 and *Ligumia nasuta* = 3). That 434 shells and valves were collected throughout our survey, and all but two are classified as long dead, attests that mussels had been more abundant, and that at least nine of the ten species present above Lake Rockwell had lived in the Middle Cuyahoga. When compared to the species richness and abundance of the Upper Cuyahoga River the Middle and Upper Lower Cuyahoga illustrate a drastic overall decline. Although failure to find a species does not document extirpation, we conclude that the number of species and the abundance of individuals currently present within the Middle Cuyahoga River is lower than historical unionid mussel populations within this area.

122 THE EFFECT OF SITE CHARACTERISTICS ON THE REPRODUCTIVE OUTPUT OF LESSER CELANDINE (*RANUNCULUS FICARIA*)

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Lesser celandine (*Ranunculus ficaria*), an ephemeral perennial invasive plant brought over from Europe, is becoming widespread throughout the north eastern United States. This herbaceous buttercup is able to create extensive dense mats early in the growing season that limit native species growth during a spring window critical for native species growth. There is cause for concern as its high production of bulbils and tubers, linked with its ephemeral growth pattern, allow lesser celandine to outcompete, disperse and establish more rapidly than its local competitors, threatening native communities and ecosystems. Elimination of native spring ephemerals results in decreased biodiversity. We examined lesser celandine abundance and reproductive output (seed, bulbil and tuber production rates) in plants collected from plots spanning a disturbance gradient away from a river. We hypothesize that reproductive output and lesser celandine abundance will be highest in moist floodplains at intermediate distances from rivers.

There was high variability observed between sample sites, with average bulbil production ranging from 0.2 to as high as 6.1 per stem and tuber production ranging from 1.1 to as high as 8.5 tubers per plant. Densities of lesser celandine were

found to be as high as 3100 plants/m² in some areas. Variations in soil characteristics (pH, moisture content and texture) could explain some of this variability and will be investigated in this coming growing season. No seed production was observed. Reproductive output and lesser celandine abundance were not significantly greater at intermediate distances from rivers, thus we cannot support our hypothesis. PAR had a significant linear relationship with plant biomass ($p < 0.05$). Light availability may play an important role in driving lesser celandine spread. This study was able to expand on the current limited understanding of lesser celandine, which can prove helpful in aiding effective management of its population size and spread.

123 PROFILES OF EMOTIONAL REACTIVITY: ASSESSING INDIVIDUAL DIFFERENCES IN PREFERRED AFFECTIVE SEQUENCES

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The ways that we choose to approach and engage with various emotional events have important consequences for our subjective well-being and general motivational pursuits. In some cases, this can include the decisions we make in terms of our current and longer-term affective goals (i.e., would you rather get that work project done first before going to the movies with a friend or vice versa?). Thus, the goal of the present study was to examine how individual differences in temporal sequencing for emotional information impacts reactivity profiles. Participants chose the order in which they viewed 7 pleasant and 7 unpleasant emotional film clips: 7 unpleasant followed by 7 pleasant, 7 pleasant followed by 7 unpleasant, or alternating between pleasant and unpleasant. Results revealed a significant interaction between presentation choice and fixation patterns toward unpleasant clips in predicting emotional reactivity (indexed through RSA augmentation and withdrawal). Increased fixation to negative aspects of the films predicted augmented RSA, while decreased fixation predicted RSA withdrawal, among individuals choosing to view all unpleasant followed by pleasant films. The opposite pattern emerged for participants choosing the alternating strategy. These results have interesting implications for better understanding the antecedents and consequences of preferential emotional information processing.

124 A NEW SERVICE LEARNING COURSE IN OCCUPATIONAL THERAPY

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Thirty-four percent of college level students with disabilities complete a 4-year degree in 8 years. Sixty-eight percent of college students with disabilities attend community college or vocational schools, while only 15% of college students with disabilities attend a university.

Service learning is a program that is mutually beneficial to members of the community and students who provide services. Occupational therapy is a health care profession concerned with promoting health and well-being through occupation. Occupational therapists work to maximize performance in occupations in which clients wish to engage.

In an occupational therapy service learning program, members of the community would receive high quality, client-centered occupational therapy services that are appropriate within the context of the environment to maximize occupational performance. Occupational therapy students, over the course of a service learning program, will enhance their skills as a future occupational therapy practitioners.

A service learning course was developed as our capstone research project. This course will create partnerships between CSU MOT Program students and students with disabilities, specifically those that are utilizing the assistive technology lab at CSU. Occupational therapy students in the course will work with the CSU Office of Disabilities to assess the need for services and provide individualized interventions to address educational goals established in collaboration with the students with disabilities. Students with disabilities will educate the MOT Program students about their particular disabilities and how they have learned to succeed in college. Provision of service to the community, exposure to community issues, and development of service-delivery skills will be emphasized. Assignments were designed to integrate service-learning experiences with the MOT Program curriculum and to encourage all participants to reflect on the learning that is taking place in the experience.

125 NON-CANONICAL ROLE FOR THE TRAIL RECEPTOR DR5/FADD/CASPASE PATHWAY IN THE REGULATION OF MYOD EXPRESSION AND SKELETAL MYOBLAST DIFFERENTIATION

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We have previously reported that 23A2 myoblasts stably expressing a dominant negative Death Receptor 5 (A2:dnDR5 myoblasts) exhibit decreased basal mRNA and protein expression of the master muscle regulatory transcription factor MyoD. This decrease at the mRNA level is not a consequence of altered stability. Binding of the transcription factor SRF to a non-canonical CARG box within the distal regulatory region (DRR) of the MyoD gene is required for basal MyoD expression. Herein, we report that A2:dnDR5 myoblasts

exhibit a decrease in the amount of SRF bound at this CARG box. Additionally, in A2:dnDR5 myoblasts, we observe a decrease in the phosphorylation indicative of activation of SRF as well as a decrease in the phosphorylation indicative of activation of the mitogen-activated protein kinase p38, which is known to activate SRF. Pharmacological inhibition of p38, or of caspase-3, in parental 23A2 myoblasts mimics the decreased activation of SRF and p38, the decreased binding of SRF to the MyoD CARG box, and the decreased levels of MyoD mRNA and protein detected in the A2:dnDR5 myoblasts. Taken together, these results suggest that basal signaling through DR5 to caspase 3 leads to the activation of p38 and subsequently SRF to maintain basal expression of MyoD.

126 CHEMICALLY MODIFIED NO SENSORS WITH ENHANCED CAPABILITY TO DETECT LOW LEVELS OF NO: WITH APPLICATION TOWARDS CLINICAL CONDITIONS RELATED TO DECREASED NO LEVELS

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Carbon Fiber Microelectrodes (CFME) when modified electrochemically can be used to detect low levels of Nitric Oxide (NO) concentration. The CFMEs used in this study were prepared using carbon fibers with a 7 micron diameter tip. The exposed surface of the fiber tip was electrochemically modified with ruthenium oxide and Poly (3,4-ethylenedioxythiophene) (PEDOT). By chemically modifying these electrodes, the sensitivity and selectivity of the CFMEs to NO improves, resulting in improved signal to noise ratio when compared to unmodified surface. The CFMEs are treated to these modifications using layer-by-layer electrodeposition. The synergistic effect of the electrocatalytic activity of ruthenium oxide and the enhanced surface area for catalytic activity provided by the polymer greatly enhanced the analytical performance of our sensors in terms of sensitivity, selectivity and stability. The objective of this project is to prepare CFMEs that are able to consistently detect low levels of NO with negligible interference from other analytes. Future work will be preparing these sensors to measure NO levels with the goal to measure nitric oxide at the level of single or collective cultured cells.

127 THE EFFECTIVENESS OF THE CLEVELAND CLINIC PAIN PROGRAM IN QUALITY OF LIFE OF ADOLESCENTS WITH CHRONIC PAIN

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Adolescents can suffer from various chronic pain disorders. The pain can range from a migraine, to severe burning sensations, to extreme sensitivity to touch. The pain can be so disabling that an adolescent suffering from such a disorder cannot participate in normal, age-appropriate activities, such as school, social events or sports (Pain Rehabilitation Program, 2014). Adolescents with chronic pain disorders want to feel better, function as a typical adolescent, and lead normal lives. One intervention demonstrating promise for adolescents who have chronic pain is participation in a multidisciplinary pain program (Simons, Sieberg, Pielech, Conroy, & Logan, 2013). A multidisciplinary pain program can address many factors, such as physical and psychological well-being. Disciplines that may be involved are physical therapy, occupational therapy, and psychological treatments when treating adolescents with pain. The Cleveland Clinic pain program in Cleveland, Ohio is recognizing how certain functions are affected in these adolescents. Current research has demonstrated an effect on the level of daily functioning and quality of life in this population of adolescents. Therefore, the proposed research will examine the adolescents in a longitudinal cohort study across their stay at the Cleveland Clinic pain program and assess how the program affects their levels of functioning in academic function and social participation, as well as their levels of anxiety and depression. The researchers hope to discover the significance the program has on adolescents suffering from chronic pain.

128 THE EFFECTS OF AN INCREASED HAY TO GRAIN RATIO DIET ON CAPTIVE MASAI GIRAFFE BEHAVIOR, METABOLIC INDICATORS, AND FECAL MICROFLORA COMMUNITY STRUCTURE

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We hypothesized that switching to a diet that provides a higher hay to grain ratio offered to the four Masai giraffe (*Giraffa camelopardalis tippelskirchi*) at the Cleveland Metroparks Zoo would reduce oral stereotypies and increase time spent performing feeding behaviors, stabilize or increase serum calcium to phosphorus ratio, decrease serum insulin to glucose ratio, and alter fecal microbiome community structure. The diet change consisted of transitioning the male from a 50:50 hay to grain ratio and the females from a 60:40 hay to grain ratio to a 90:10 ratio in even increments over eight weeks. A ration balancer replaced the original grain

formulation to ensure proper mineral and nutrient balance of the overall diet. Behavioral data, saliva, serum and fecal samples were collected during the eight weeks preceding and following the diet change. Behavioral data were collected approximately daily using scan sampling. Serum was collected biweekly for insulin:glucose and calcium:phosphorus ratio analysis. Fecal samples were collected weekly to examine changes in microflora community structure. After the diet change, giraffe spent significantly more time feeding and significantly less time performing tongue and mouth stereotypies, people-directed, and alert behaviors. The giraffe also experienced a significant decrease in serum insulin and insulin to glucose ratio. The diet manipulation did not result in a change in the serum calcium to phosphorus ratio, which remained >1.3:1 throughout the study. A significant shift in fecal microflora community structure was observed with effects from treatment and individual animal; further studies are needed to elucidate the nature of the change in fecal microbial community structure. We believe these changes represent an overall improvement of the health from feeding a higher proportion of forage in the diet, and the reduced stereotypic behaviors may also indicate an improvement in the welfare of these animals.

129 CHARACTERIZATION OF A HUMAN ANTIMICROBIAL PROTEIN IN HEAD AND NECK CANCER BY MASS SPECTROMETRY-BASED PROTEOMICS

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Oral squamous cell carcinoma (OSCC) comprises approximately 3-5% of all the malignancies in the USA, corresponding to 10,000 deaths each year. Early detection plays a critical role in cancer diagnosis, treatment, and patient survival.

Recent studies revealed that human beta defensin-3 (hBD-3), an antimicrobial peptide is overwhelmingly produced by premalignant cells in carcinoma *in situ* (CIS) suggesting cross-talk between hBD-3 and resident stromal cells. Because the expression of hBD-3 in the cancer cell lines and patients are significantly higher in comparison to those in the normal controls, this peptide is currently being investigated as a biomarker for screening OSCC using enzyme-linked immunosorbent assay (ELISA) with body fluids, including saliva samples. Surprisingly, the Western blotting showed that the molecule which rendered positive ELISA in the cancer patient samples has a much larger molecular mass compared

to that of hBD-3 control. Currently, the cause of the molecular mass increase and chemical structure remain unknown.

In this work, we used liquid chromatography in conjunction with quadrupole time-of-flight mass spectrometry (LC-QTOF-MS) to decipher and characterize the synthetic hBD-3 peptide as a prerequisite for the unknown protein molecule in the disease state. Proteomic analyses on the intact molecule extracted from patient saliva and its tryptic digest will be performed. Data obtained will be used for deconvolution and identification of the unknown protein using commercial software and databases. This work is expected to reveal the structural relation of the unknown protein and hBD-3 peptide. The detailed experimental progress will be discussed in this presentation.

130 DNA FILMS AS PEROXYNITRITE SENSING PLATFORMS

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Peroxynitrite (ONOO⁻) is a strong oxidizing and nitrating agent, and its formation has been correlated with many pathological conditions. It is generated *in-vivo* through the diffusion-controlled reaction between nitric oxide and superoxide. Peroxynitrite has been linked to nitration of protein and DNA as well as to DNA strand breaks. The accurate measurement of peroxynitrite concentration has been a challenge since this analyte is very unstable and reacts with many cellular targets. Development of analytical techniques capable of rapid and sensitive detection of this fast-reacting and damaging agent is an important research target to determine the chemical damage by this oxidant at the tissue level and at the cellular level.

In this work, we develop DNA films as a sensitive sensing platforms to detect and quantify ONOO⁻ DNA damage. We have used two methods for DNA immobilization on the electrodes surfaces: (1) electrochemical grafting and (2) layer-by-layer (LBL) deposition methods. In the first method, we generate carboxylic acid groups on the electrode surface via electrochemical reduction of trans-4cinnamic acid diazonium tetrafluoroborate, followed by coupling of pre-activated carboxylic groups with amino terminated oligonucleotide. In the LBL deposition method, we construct films of alternate layers of positively charged poly(diallyl dimethyl ammonium) and the target DNA as a negatively charged counterpart on the surface of the graphite electrode. To this end, we have used chronocoulometry, cyclic voltammetry, and square wave voltammetry to monitor the effect of the mismatch on the sensitivity of exposure to peroxynitrite through defined electrocatalytic processes mediated by the grafted oligonucleotides. We will compare and contrast the response of the two DNA platforms and discuss ways we can use them as sensing tools for peroxynitrite in biological setting.

131 PINPOINT THE INTERACTION INTERFACE BETWEEN TbTRF AND TbRAP1

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The protozoan parasite *Trypanosoma brucei* causes fatal African trypanosomiasis in humans and nagana in cattle. This parasite evades its mammalian host immune response by antigenic variation, where it regularly switches its major surface antigen, variant surface glycoprotein (VSG). VSGs are expressed from VSG expression sites (ESs) located immediately upstream of the telomere, the nucleoprotein complex at the ends of linear chromosomes. Although *T. brucei* has multiple ESs, at any moment, only one ES is fully transcribed, and only one type of VSG is expressed on the cell surface. The active VSG gene can be replaced by a silent one through reciprocal gene crossover or gene conversion, or can be silenced while a different ES becomes expressed simultaneously. We have previously shown that TbRAP1, a telomere protein, is crucial for VSG monoallelic expression and suppresses VSG switching. However, the means of recruiting TbRAP1 to the telomere is not well known. TbRAP1 interacts with TbTRF that binds the duplex telomeric DNA. Therefore, we hypothesize that the TbTRF-TbRAP1 interaction is important to recruit TbRAP1 to the telomere. Our previous yeast 2-hybrid analysis suggests that amino acids 270-385 of TbRAP1 interacts with the TRF homology (TRFH) domain of TbTRF. However, the key residues in TbRAP1 and TbTRFH that are essential for this interaction are unknown. This study attempts to pinpoint the residues that are important for TbTRF-TbRAP1 interaction, which will allow us to test our hypothesis subsequently using a mutational analysis.

132 PAH DEGRADATION IN SOIL USING CELERY AND CARROT TISSUE

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Polycyclic Aromatic Hydrocarbons (PAH's) are environmental organic pollutants that are the result of incomplete combustion or petroleum processing. Various plants help in biodegradation of PAH's but by what process degradation is taking place is still not clear. In this research, we used celery and carrot root tissue to stimulate biodegradation of PAHs in soil that was contaminated with 1000 ppm PAHs. The two different PAHs studied, using gas-chromatography mass spectrometry (GC-MS), were anthracene and 1-2 benzo anthracene. The results showed a

decrease in the PAH concentration after a 20 day exposure to celery and carrot tissue.

133 DETERMINATION OF THE PRESENCE OF DIETHYL PHTHALATE IN FRAGRANCES

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Diethyl phthalate (DEP) can be found in many modern cosmetics. DEP is known to be hazardous, and yet is an ingredient in fragrances that many people wear on a daily basis. The purpose of this experiment was to test three different fragrances for the presence of DEP. Standards were made using DEP and dichloromethane. Liquid-liquid extraction was used to extract the phthalate from the fragrances. GC-MS was used to identify the presence of DEP. According to a library spectra search, DEP was not present in any of the samples. If this is true, then the fragrances tested should not cause the harm that DEP is known to cause.

134 ASSOCIATION BETWEEN TRICLOSAN IN ANTI-BACTERIAL PRODUCTS AND BISPHENOL A IN THERMAL RECEIPT PAPER

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Triclosan and BPA (Bisphenol A) are believed to interact with each other causing BPA to leach out of plastic products. The main purpose behind this study is to assess how it is that Triclosan and BPA interact with each other in isolated mediums. HPLC (High Performance Liquid Chromatography) instrumentation was used to generate a BPA calibration curve as well to validate extraction methods. Coefficients noteworthy to mention include the correlation coefficient pertaining to the line of the BPA calibration curve at 0.998. Results for this study include a rejection to our extraction method as well as a proposition of a formation of a complex between Triclosan and BPA through a condensation reaction [2] in vitro.

135 OPERATION STEM

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In August 2013, CSU's Mathematics Department began implementing the NSF-funded program Operation STEM which targets freshmen pursuing STEM majors with support services to facilitate student success. Our main goal is to address the known "chokepoint" of students completing required mathematics courses. We focused on students who came to CSU needing to take college algebra and trigonometry before taking calculus. OpSTEM provides students with a 2-week Summer Institute, community of peers, STEM Peer Teachers (SPTs) individualized attention, mandatory 150 minutes/week of SPT instructional learning sessions, and Project Based Learning (PBL) in the Precalculus and Calculus courses, and Summer "Calculus for Free."

136 IMMUNE-ENHANCING ACTIVITIES OF POLYSACCHARIDES PURIFIED FROM AGARICUS BRASILIENSIS

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Agaricus blazei Murill (ABM) is an edible and medicinal mushroom that has traditionally been used as a supplement in China to treat various diseases, ranging from physical and emotional stress, diabetes, high cholesterol, osteoporosis, peptic ulcer and indigestion, to chronic hepatitis and cancer. However, the functional ingredients in ABM are largely unknown. Recently we isolated a polysaccharide from ABM and named them as TJ2. Interestingly the polysaccharide displayed distinctive bio-functions in the treatment of macrophages. Our results revealed that TJ2 stimulated the proliferation and phagocytosis of Raw 264.7 cells, a mouse macrophage cell line, through activating the ERK and I κ B/NF κ B pathways. Furthermore, TJ2 was able to significantly induce the expression of proinflammatory genes such as IL-6, IL-1 α , TNF- and Cox-2. The preliminary results warrant further investigating its functions in the immune system.

137 CRITICAL CROSSROADS: EXPLORING DIFFERENT DIAGNOSTIC METHODS AND HOW THEY AFFECT THE OUTCOMES OF CHILDREN WHO ARE PRELINGUALLY DEAF AND AUTISTIC

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As the number of children diagnosed with autism spectrum disorders continues to increase, more of these children are affected by other disabilities that further complicate the diagnosis and treatment of both. This is particularly relevant for the growing population of children who are prelingually deafened, as this makes it far more difficult for both parents and professionals to evaluate if the child presents traditional markers of autism. Because the communication deficits associated with autism are so similar to those of prelingual deafness, professionals are often unable to make a second diagnosis. In order to improve the outcomes of these children, we must create a streamlined screening process that combines evaluation of developmental milestones with individualized testing, leading to earlier diagnosis. Following review of existing literature, I have created a survey to help form a stronger understanding of this dual diagnosis. This study will evaluate different cases where children were found to be both prelingually deaf and autistic, the timelines for both diagnoses, how they were diagnosed, and the outcomes of these individuals. This will hopefully provide further insight to how speech pathologists can better evaluate children who are prelingually deaf for autism spectrum disorders.

138 CROWDSOURCING A PLETHODONTID PREDATOR-PREY SIMULATION

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Color polymorphism is the occurrence of two or more color morphs within a species. The Eastern red-backed salamander (*Plethodon cinereus*) exhibits two major color morphs, a more abundant variation with a reddish stripe across the dorsal surface, and an unstriped or lead morph without a stripe and slate gray or black body color. Several theories exist regarding the maintenance of the polymorphism within *P. cinereus*, however, the results and mechanisms are unclear. One theory postulates that the polymorphism is a form of crypsis which aids in deterring visual predators. Unfortunately, predation is difficult to observe in a natural setting, so all current evidence is indirect (e.g. frequency of broken tails). Further, visual predation seems unlikely in this case, because the salamanders are active on the forest floor surface typically at night. For these reasons we have decided to use this opportunity to establish a baseline data set with a trainable, cognizant visual predator, humans. This experiment aims to collect a data set with human visual predators and describe the rates at which participants successfully find and “prey” on each color morph. Participants will attempt to locate as many individual salamanders as possible within a time limit from several photographs of the natural habitat of *P. cinereus* with varying frequencies of color morphs and a random distribution of individual salamander number, size and position.

139 POSSIBLE PRESENCE OF BISPHENOL A IN MEDICAL TUBING USED FOR THE ADMINISTRATION OF MEDICAL DRUGS AND OTHER ORGANIC MATERIALS

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It has been shown that medical equipment that contains plastic can leave distinct traces of Bisphenol A in humans due to the plastics in which they are made of. Bisphenol A, more commonly known as BPA, is a chemical that has very high estrogenic activity and can be polymerized producing polycarbonate plastic. Bisphenol A has been linked to many diseases, as it alters the programming of gene expression that is important for development and functioning in adult organs (1). Since Bisphenol A is harmful, it is important to identify if there is actual leaching of BPA from medical tubing. Results from HPLC analysis suggest that BPA from medical tubing does leach into the fluids that pass through the tubing.

140 THE EFFECTS OF MORTALITY SALIENCE AND ANALYTIC THINKING IN THE ENDORSEMENT OF DESIRE FOR, AND BELIEF IN, SUPERNATURAL CONCEPTS

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The focus of the current study is to investigate whether religious and non-religious participants reminded of death will increase their endorsement of religious concepts, as a function of whether they are asked to indicate their desire for supernatural things to exist or their belief that supernatural things exist. Research derived from terror management theory suggests that people rely on intuitive religious concepts in order to deal with the awareness of death. The present research built on that idea, as well as previous research suggesting that religious intuitions lead to religious belief if people rely on intuitive/quick processes but not if people are prompted to engage in further critical analysis. Thus, the present work hypothesizes that, on the one hand, religious participants reminded of death would increase the strength of their desire for supernatural existence and their belief in supernatural existence; on the other hand, however, non-religious participants reminded of death are expected to increase the strength of only their *desire* for supernatural existence (because inquiries about desire does not necessarily engage a

more deliberate, analytic style response) but not their belief in supernatural existence (because the belief domain engages a more deliberate, analytic style regulated response). To test this idea, samples of Christian and atheist participants will be randomly assigned to be reminded of either mortality or a control topic, then they will be asked to rate the strength of their desire for, and belief in, the existence of supernatural concepts. We expect that Christian participants reminded of death would increase the strength of their desire for and belief in supernatural existence, whereas atheist participants reminded of death are expected to increase the strength of only their *desire* for, but not their belief in, supernatural existence. Theoretical implications will be discussed.