001  MECHANICAL MODEL FOR ONE-LEGGED STANDING: METASTABILITY

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In collaboration with P. Sing (Dept. Physical Therapy, University of Scranton), 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: the COP undergoes many small jumps that are interrupted by large jumps. This is analogous to metastable dynamics familiar from metastable dynamics. The 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. We discuss direction for future investigation.

002  SYNCHRONIZATION OF HUYGENS’ CLOCKS: AN ELEMENTARY TREATMENT

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Huygens proposed a general model to explain the synchronization of two oscillators. We describe synchronization of two pendulums mounted on a cart. The cart moves along the horizontal: the motion is damped. We show that the principle of conservation of momentum can be used to describe an escapement mechanism. Simple graphical methods are used to show that the motion of the two pendulums can be described in terms of a symmetric and anti-symmetric ‘mode.’ We quantify the damping of the pendulums and show that the two modes are described by two different damping constants. We discuss that this property explains why only the anti-symmetric mode “survives” for long time; i.e., the two pendulums are synchronized. We discuss direction for future investigation.

003  RAMAN IMAGING AND POLARIZATION SPECTROSCOPY OF DRAW-INDUCED ORDER IN POLY-L-LACTIC ACID

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Poly-L-lactide (PLLA) is a biocompatible, biodegradable, semi-crystalline and optically active polymer that is widely used as an implant and artificial cell scaffold material. The degree of crystalline character of PLLA influences its electromechanical properties such as elastic modulus and piezoelectric character. From its amorphous state, PLLA can be made more crystalline by drawing the polymer at a temperature above the glass transition, but below its crystallization temperature. Cold-drawing the PLLA to higher draw ratios increases it piezoelectricity and rigidity, two important considerations in the development of improved implants and biodegradable matrices. In the work presented here, a non-destructive and non-contact optical method for characterizing tailored PLLA substrates using Raman imaging and Raman polarization microscopy is described. The method utilizes a novel chemometric method to generate image contrast based on the degree of crystalline character. The image results enable a preliminary understanding of differences in bond orientations across the spatial extents of the sample and differentiated sample regions that are more crystalline from those that are more amorphous. A complete description of the optical method is presented along with a theoretical description of the chemometric technique.
EXPLORATION OF OCCUPATIONAL THERAPY SERVICES TO PROMOTE OCCUPATIONAL PERFORMANCE, PERFORMANCE SATISFACTION, AND QUALITY OF LIFE IN UNIVERSITY FRESHMAN: A PILOT STUDY

Occupational Therapy Program, School of Health Sciences, Cleveland State University

Mental health issues contribute to an estimated 64 percent of university dropouts among young adults (National Alliance of Mental Illness, 2012). Interventions implemented by various disciplines may not completely meet the needs of these students during the transition from high school to university roles (O'Keeffe, 2013). This pilot study examined the effectiveness of Occupational Therapy (OT) services on occupational performance, performance satisfaction, and quality of life (QOL) for first time college freshmen. OT services consisted of a weekly group meeting, up to one hour, over the course of five weeks. Topics for the weeks were: leisure, rest and sleep, work, financial budgeting, and social participation. Significant statistical results were obtained for the effectiveness of OT services on occupational performance and performance satisfaction, p < .05. However, no significant results were obtained when assessing QOL, p > .05. Further research is recommended using this OT group approach with larger and more diverse groups.

USING PRECHTL’S ASSESSMENT OF GENERAL MOVEMENTS TO DETERMINE LONG-TERM NEUROBEHAVIORAL SEQUELAE IN A NEONATE WITH CONGENITAL PNEUMONIA

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Prechtl’s Assessment of General Movements (GMs) was utilized to determine the integrity of the nervous system and potential for long-term neurobehavioral sequelae in a neonate diagnosed with congenital pneumonia. Newborns with congenital pneumonia may present with signs and symptoms including poor feeding and irritability, physiological complications including respiratory compromise and hypoxemia that can potentially result in central nervous system injury. Prechtl’s Assessment of General Movements is a non-invasive, observational assessment captured through video recording for neonates’ 28 weeks gestation through 5 months of age. Previous studies have demonstrated that Prechtl’s Assessment of General Movements has a higher predictive power compared to traditional, standardized neurological examinations in identifying neurological deficits with alternative assessments potentially resulting in delayed diagnosis or misdiagnosis of neurobehavioral impairments.

From term to eight weeks, observation of GMs can be utilized to determine the presence of writhing movements. The clinician categorizes the quality of movements observed as normal, poor repertoire, cramped synchronized or chaotic. From nine to twenty weeks post-term, GMs are observed for presence of fidgety movements. The clinician categorizes the quality of fidgety movements as normal, abnormal or absent. Categorizations that are not normal indicate that the neonate may be risk for neurodevelopmental complications.

RUTHENIUM-MODIFIED SENSITIVE NO SENSORS: QUANTIFYING NITRIC OXIDE IN THE PATHOBIOLOGY OF CYSTIC FIBROSIS

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This is a preliminary work towards preparing a device capable to measure nitric oxide levels in a cystic fibrosis cell line model. It has been found that exhaled NO levels remain unchanged or reduced in cystic fibrosis patients unlike other inflammatory lung diseases like asthma where it increases. However, it is not clear whether the lower NO levels in cystic fibrosis correlate with low production of this metabolite in the bronchial epithelium. We will present preliminary results of our ruthenium oxide modified combined electrodes, and how they can be applied to the study of cystic fibrosis at the cellular level.

In this work, we explore the performance of combined reference/working electrodes modified with ruthenium oxide and Poly(3,4-ethylenedioxythiophene) (PEDOT) in the detection of nitric oxide with the goal to measure nitric oxide at the level of single or collective cultured cells. 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. With the incorporation of a layer by layer method of electrodeposition, we attained a sensitivity of ~17 pA/nM towards NO and a detection limit in the vicinity of 500 pM. In order to improve the selectivity of our sensors, we coated the surface with naftion and lowered the applied potential. We attained ~86% and ~81% decrease in response to nitrite and ascorbic acid respectively after naftion coating.

007 METALLOPORPHRINS – DECORATED GRAPHENE FOR ENHANCED QUANTIFICATION OF PEROXYNITRITE

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Recent clinical research indicates that the cytotoxicity role of peroxynitrite (ONOO\textsuperscript{−}) plays an essential role in several cardiovascular dysfunctions and other diseases triggered by oxidative stress. Peroxynitrite (PON) is a strong oxidizing agent produced from the diffusion-controlled reaction between nitric oxide radical (\textbullet NO) and superoxide anion-radical (\textbullet O_2\textsuperscript{−}). PON 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.

Previously, we have shown that hemin and hemin-modified graphene can be used as catalytic platforms for electrochemical detection and 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.

008 STUDYING REVERSIBLE VOLUME PHASE TRANSITION OF POLYSACCHARIDE MICROGELS

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Temperature sensitive polysaccharide microgels and parent amphiphilic polymer solution were studied in parallel with Dynamic (DLS) and Static Light Scattering (SLS) spectroscopies. The microgels showed a reversible volume phase transition which was accompanied by a significant change in microgel volume/composition and depended on the rate of temperature change. Coupling DLS and SLS techniques on microgels and polymer solutions allowed to deduce microgel size, structure, molecular weight and a relative change in microgel water content during the volume phase transition. It also allowed comparing controlled dewetting transition in microgels with corresponding phase transition in parent polymer solution. Flory-Huggins Mean Field Theory was used to model the volume phase transition in microgels.
OLDER ADULT SEXUALITY: A CLINICAL PERSPECTIVE

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As the population of the United States advances in age, knowledge about sexuality in middle to late life is becoming increasingly important. Education at the collegiate level has the potential to provide future healthcare professionals the foundation to become informed on the issues regarding sexuality and aging, in order to comfortably and openly address the subject matter to future clients. A comprehensive needs assessment directed five Master of Occupational Therapy Students at Cleveland State University (CSU) to create a 16-week online elective course entitled “Older Adult Sexuality: A Clinical Perspective”. The course is designed to serve the needs of both undergraduate and graduate students, and has the potential to become an elective course for the CSU Certificate for Gerontological Studies. Informative weekly PowerPoints supplement the required readings, formative assessment discussion posts, and educational videos. Course topics include: cross-cultural and media perspectives, knowledge and attitudes toward sexuality and aging, sexuality in long-term care, coping with chronic illness and disability, sexually transmitted diseases, specific female and male issues, lesbian-gay-bisexual-transgender (LGBT) concerns, emergent issues, and adaptive strategies. Students electing to take this course will have the opportunity to apply their knowledge learned in the community by completing a structured older adult interview as a form of summative assessment. All graduate students will complete a research paper in addition to the other assignments. Finally, the midterm and final examination will serve as a course evaluator to determine how well the information was presented and the students learned.

EVALUATING THE PRO-MUTAGENIC REPLICATION OF 8-OXOGUANINE

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Oxidative stress produces reactive oxygen species that can damage DNA. The consequences of this can be devastating as the formed DNA lesions are mutagenic and their misreplication cause diseases such as Parkinson’s disease and cancer. 8-oxoguanine (8-OG) is one such lesion that could initiate mutagenesis due to its miscoding nature. Oxidation to the C-8 position of guanine changes its equilibrium from the normal anti conformation to the syn conformation. This simple conformational change results in the misinsertion of dATP opposite the lesion rather than dCTP. To better understand the mutagenic replication of 8-OG, we performed a thorough kinetic analyses for the incorporation of natural and modified nucleotide analogs opposite this miscoding DNA lesion using a high-fidelity DNA polymerase. Mechanistic studies Using modified purines as substrates, our mechanistic work demonstrate that alterations to functional groups associated with hydrogen bonding interactions cause significant decreases in the overall efficiency for their utilization. Surprisingly, the lower efficiencies result from large reductions in the rate constant for insertion rather than from negative effects on nucleotide binding. In fact, all modified nucleotides tested here display higher binding affinities against 8-OG compared to natural nucleotide substrates (dCTP and dATP). These results suggest that substrate binding is influenced by the hydrophobic nature of the incoming nucleotide while the chemistry step is controlled by the formation of correct hydrogen-bonding interactions between the incoming nucleotide and templating nucleobase. Collectively, these studies help explain the pro-mutagenic nature of 8-OG. Future studies are aimed at designing additional nucleotides that can monitor the cellular replication of 8-OG as well to develop inhibitors to block its misreplication.

THE EFFECTS OF PSYCHOTROPIC MEDICATIONS ON DYSPHAGIA IN OLDER ADULTS

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This literature review, completed to fulfill the requirements for an undergraduate Honors project, examined how the use of psychotropic pharmacotherapy in adults aged 65 and older may be related to the presence of active dysphagia (i.e., difficulty swallowing) in medicated patients. The purpose of the study was to determine whether the current medical research indicates
that use of psychotropic medications prescribed to alleviate anxiety, depression, and psychosis may induce or exacerbate swallowing difficulty in a population already predisposed to dysphagia due to aging and/or other disorders common. This review characterized three classes of psychotropic medications (antianxiety, antidepressant, and antipsychotic) that may cause or exacerbate dysphagia and explored the drugs’ types, actions, main effects, and interaction effects. Findings of this review confirm that psychotropic medications may induce or exacerbate dysphagia as a complication of the drug’s intended effect or as a side effect. This study is relevant for the field of speech-language pathology in that speech-language pathologists (SLPs) are the primary service provider on the medical team that treats dysphagia. However, the speech-language pathology literature provides very little discussion of the effects of psychotropic medication on dysphagia. This review brings information from the medical literature to light for SLPs. Implications for SLPs’ practical diagnosis and treatment of dysphagia in patients who have been prescribed psychotropic medications are presented. The authors acknowledge the Louis Stokes Cleveland Veterans Administration Medical Center for providing the CSU Honors student with the opportunity to shadow an SLP, CSU alumna Sarah Miller, during the summer of 2014 and thereby observe the diagnosis and treatment of dysphagia in patients who have been prescribed psychotropic medications.

012 “IF I CAN EASE ONE LIFE THE ACHING”: A CULTURAL APPROACH TO VOLUNTEERING IN HOSPICE CARE

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The definition of culture includes many considerations beyond perceptions of race, ethnicity, or socioeconomic status. Culture can simply be defined as a series of experiences shared by members of a community. In this sense, caregivers, patients, and families involved in the hospice care community certainly share a culture, which is varied and vibrant. This culture, though infrequently discussed, incorporates aspects of celebration, reflection, and legacy. As a three-year volunteer with the Hospice of the Western Reserve, headquartered in Cleveland, Ohio, the first author has drawn from her experiences to create a guidebook for prospective volunteers. Hospice care facilities rely heavily on volunteers to provide effective service, and, most importantly, to maintain a peaceful environment for hospice patients during their final hours. Volunteers need to meet hospice expectations for interacting with patients, families, health care staff, and other volunteers. The guidebook, adapted herein to a poster presentation format, focuses on a culturally sensitive approach to hospice care and takes into account varied racial, ethnic, linguistic, and religious considerations, along with the aforementioned unique culture of hospice care. The guidebook explores how volunteers can learn about different cultures’ beliefs about death and offers suggestions for how volunteers can cope with their own emotional taxation. The first author, who completed this guide to fulfill the requirements for an undergraduate Honors project, will enter medical school in the fall of 2015. This guidebook and poster serve as learning tools for any prospective health care professionals who may enter a hospice care setting.

013 SPEECH SOUND PRODUCTION DEFICITS IN CHILDREN WITH VISUAL IMPAIRMENT: A PRELIMINARY INVESTIGATION OF THE NATURE AND PREVALENCE OF CO-OCcurring CONDITIONS

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Children’s speech sound production is dependent upon cognitive-linguistic and perceptual processes. In contrast to the well-researched effects of auditory impairment on children’s speech sound production, there is considerably less information on speech sound production deficits in children with vision impairment (VI). Some past research indicates that insufficient visual input contributes to children’s risk for speech sound production deficits. In the U.S., 0.6% of youth under age 18 have VI (blindness in one or both eyes or vision uncorrectable by glasses). This represents 448,000 youth. One in every 20 preschoolers has VI. The present study explored the frequency of occurrence of speech sound production deficits in school age children with VI. A survey of VI professionals provided estimates of the percentage of their students with VI who have coexisting speech sound production deficits. The rationale for using a survey methodology was that VI professionals have a unique vantage point for identifying what is known about the development of children with VI. This survey is an indirect measure that can yield some initial evidence and begin the groundwork for more detailed direct investigations of speech sound production in children with VI. Survey questions probed the characteristics of the students, including the severity of
VI, age of onset of VI, cognitive abilities, and the severity of speech sound production deficits that necessitate speech-language therapy. Statistical analyses of the responses show that the percentage of students with VI who receive speech sound production interventions (71%) was higher than expected when compared to the typical percentage of school age youth who receive speech-language interventions (estimated by the NIDCD at 8.9%). There is a need for future study of the coexistence of VI and speech sound production deficits.

014 EXCESSIVE REASSURANCE SEEKING PREDICTS DEPRESSION VIA STRESS GENERATION

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Seeking reassurance excessively unintentionally generates negative life events and causes rejection by social supports who become frustrated from being asked to excessively provide reassurance. Though prior research tentatively supports stress generation and reduced social support as mechanisms for depressogenic effects of excessive reassurance seeking (ERS), most studies examine these mechanisms independently of one-another. Further, they do not consider that reduced social support may exacerbate interpersonal stress. To overcome this, our study tests two models wherein: 1) ERS predicts stress generation and social support erosion as independent contributors to depression risk (Model 1) and 2) social support erosion exacerbates the adverse effects of stress generation from ERS behavior (Model 2). Participants (n=364) completed measures of ERS (DIRI), depression (BDI-II), social support (SSQ), and interpersonal negative life events (NLEQ) in a single session (T1). A subsample of these subjects (n=104) were administered the same questionnaires 4 weeks later (T2). Change in mediators and depression were calculated via differences scores between T1 and T2 variables (ΔNLEQ, ΔSSQ, ΔBDI). Model 1 was partially supported: ERS significantly predicted increased interpersonal stress, both concurrently and over time, which then predicted concurrent depression symptoms and their maintenance. Contrary to expectation, while social support predicted lower depressive symptoms, ERS predicted social support only at trend levels, and was unrelated to social support over time. Model 2 was tentatively supported: high levels of social support attenuated the effects of interpersonal stress on depression at trend levels, but not over time. These findings suggest that ERS effects on depression risk are partially explained by increased interpersonal stress. Tentative support was found for social support erosion by ERS to aggravate depressogenic effects of interpersonal stress. Results suggest that ERS predicts a cascade of processes that increase the depression risk. Therefore, ERS may be a viable target of depression prevention efforts.

015 SELF-ASSOCIATION OF LIPID-FREE APOLIPOPROTEIN A-I AND THE FORMATION OF HIGH DENSITY LIPOPROTEIN

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Apolipoprotein A-I (apoA-I), the main protein constituent of high density lipoprotein (HDL), forms a dimeric antiparallel structure that both confers nascent HDL stability and provides a scaffold for the lipid phase. We performed kinetic analyses of monomeric and oligomeric apoA-I employing both hydrogen-deuterium exchange mass spectrometry (HDX-MS) and functional lipidation assays. At low concentrations lipid-free apoA-I is monomeric based on equilibrium PAGE, dynamic light scattering, and cross-linking studies. Despite this, the protein displays in multiple discrete yet reproducible regions bimodal HDX kinetics indicating the presence of intra-molecular protein – protein interactions (hairpin loops). Kinetic HDX studies further reveal that at higher concentrations, lipid-free apoA-I self-associates and dimerizes through a ten amino acid C-terminus domain (E223-A232). This is suggested by the appearance of new intermolecular interactions surfacing at higher apoA-I concentrations concurrent with the multimeric apoA-I forms. Surprisingly, apoA-I self-association through E223-A232, an equilibrium process, significantly slowed down the rate of apoA-I lipidation. Our studies indicate that HDL genesis starts with lipidation of apoA-I monomers followed by apoA-I dimerization in an antiparallel fashion on the lipid surface.
High density lipoprotein (HDL—"good cholesterol"), the main carrier of excess cholesterol from periphery tissue to liver, has been found prone to oxidative modification. Recent studies demonstrated that highly oxidized forms of HDL, either as poor lipidated or mature particle are atherogenic and pro-inflammatory. Protein carbamylation, a major posttranslational modification of HDL, has been demonstrated to predict an increased cardiovascular risk. The aim of this research project is to identify oxidatively damaged domains of HDL responsible for NF-κB activation, a transcription factor that regulates cellular activity in stress/injury. To localize the carbamylated lysines that trigger NF-κB activation, apolipoprotein A1 (the major protein component of HDL) deletion mutants were expressed, and will be analyzed by VCAM assay. Earlier research showed that plasma enzyme myeloperoxidase (MPO) binds to HDL in plasma, and our preliminary results demonstrate that poor lipidated apoA1 and reconstituted nascent HDL (nHDL) modified by the MPO/H2O2/SCN- system (H2O2: hydrogen peroxide, SCN-: thiocyanate ion) are pro-inflammatory. The long term goal of this project is to understand, at the molecular level, the mechanistic link between HDL carbamylation and the pro-inflammatory response it generates by activating the NF-κB transcription factor involved in regulating pathways of the immune response.

PROTECTIVE EFFECTS OF SELF-HANDICAPPING FOR ANXIOUS INDIVIDUALS

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Self-handicapping is an avoidance-based response attempting to attribute one’s potential failure to an external source. This response has short-term protective effects, as it has been linked to transient reductions in cognitive risk factors for depression and enhanced self-esteem when facing failure (Rhodwalt & Hill, 1995). The aims of this study are to 1) examine whether self-handicapping has protective effects during an evaluative task, and 2) explore whether these benefits would be higher for anxious individuals. Data was collected from 158 subjects (86.5% female, M_{Age} = 23.63, SD = 6.01) who completed an experimental protocol under high evaluation threat. Subjects completed measures of anxiety (Beck Anxiety Inventory), state negative and positive affect (NA & PA) (Positive and Negative Affect Scale), and claimed handicaps, prior to participating in an evaluative task with pre-determined success (96th %ile) and failure (20th %ile) feedback. Subjects then completed the affect measure to determine change in NA and PA as a function of feedback. Results showed PA reduction in the failure relative to success conditions (β = .14, p < .05), but no change in NA ratings, suggesting feedback manipulation was successful. Results failed to support our first hypothesis. Self-handicapping did not predict change in either affects alone, or in the context of the failure feedback conditions. Results from a linear regression supported the second hypothesis: relative to their low anxiety peers, subjects with high anxiety retained their PA across the experimental protocol, irrespective of feedback condition (β = .14, p < .05). Post-task NA was solely predicted by baseline NA levels. In contrast to low self-handicapping peers, anxious, high self-handicapping subjects were able to maintain their initial level of positive affect after receiving failure feedback. Thus, self-handicapping may be beneficial in maintaining anxious subject’s basal positive affect after receiving failure feedback on an evaluative task.

DOES SOCIAL COGNITION MEDIATE EFFECTS OF PSYCHOLOGICAL ABUSE ON SELF-COMPASSION?

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Abuse has been linked with deficits in social cognitive and self-compassion skills (Vettese et al. 2011). Social cognition is the ability to process information from social situations and apply this information to diverse situations when empathic
understanding is needed. Self-compassion is the ability to apply empathy and understand one’s self. Hypothetically, abuse-related deficits in social cognition should be linked with reduced self-compassion; this relationship has not been examined. The present study investigates whether the adverse effects of abuse on self-compassion are mediated via social cognition deficits. The study included N=423 undergraduate students who completed a measure of maternal and paternal psychological abuse (Psychological and Physical Maltreatment Scale, PPMS), self-compassion (Self Compassion Scale, SCS), and social cognition (Reflective Function Questionnaire, RFQ) s. The results failed to show that effects of early abuse histories on self-compassion are mediated by social cognition deficits. While maternal and paternal abuse predicted reduced self-compassion levels (β = .09 – .12, ps< .07-.05), they did not predict social cognition levels. However, our results showed a robust relationship between social cognition and self-compassion (β = .15-.17, ps <.01).These results suggest that an individual with a better understanding of their own and others’ motivations may be better able to accept their own and others’ failings. Given the growing evidence that self-compassion is associated with emotion regulation deficits, depression and borderline personality disorder, our findings suggest that early assessment and intervention of social cognitive deficits may help with future interventions.

019 QUANTIFICATION OF CARBOXYlic ACID METABOLITES IN CLINICAL SAMPLES FROM PATIENTS WITH CARDIOVASCULAR DISEASE

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Cardiovascular disease (CVD) is the leading cause of death around the world. A novel biomarker for early identification of individuals at risk for future cardiovascular events is still critical to allow for early effective therapy and to provide insights into disease processes. A non-targeted Gas Chromatography/Mass spectrometry-based analysis was performed to screen for plasma small-molecule metabolites that predict risk for CVD. Among these metabolites, several mono-, di-, and tri-carboxylic acids presented a significant prediction for CVD risk. In this project we are developing a targeted reliable high performance liquid chromatography-tandem mass spectrometry (LC-MS/MS) method for the quantitation of these carboxylic acids (CAs) in order to replicate the CAs analysis and demonstrate their clinical utility. To enhance the detection sensitivity (i.e. improve the chromatographic retention and peak shape) the CAs are derivatized with butanolic HCl at 65°C for 30 min. The mono-, di-, and tri-butyl ester derivatives are being separated using a C18 reversed phase column. The positive-ion electrospray ionization and the multiple monitoring reaction method (MRM) are used to quantify the CAs.

020 THE S100A8/A9 PROTEIN COMPLEX SELECTIVELY NITROSYLATE GLYCERALDEHYDE 3-PHOSPHATE DEHYDROGENASE

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Selective nitrosylation of glyceraldehyde 3-phosphate dehydrogenase (GAPDH) at Cys-247 affects gene regulation through the interferon-gamma (IFN-γ) activated inhibitor of translation (GAIT) complex. Oxidized low-density lipoprotein (LDLox) and INF-γ induces assembly of the nitrosylase complex composed of inducible nitric oxide synthase (iNOS), S100A8, and S100A9 proteins. Intracellular GAPDH has been shown to exist as a mixture of monomer, dimer, and tetramer in cell lysate. Because the crystal structure of the S100A8/A9/GAPDH complex is not known, researchers at Cleveland Clinic used the ‘‘artificial protease’’ cleavage mapping [Fe(III) (s)-1-(p-bromoacetamidobenzyl) EDTA (FeBABE)] to identify domains of GAPDH (α1 and α3) that may interact with S100A8. Within this project, our goal is to produce molecular models for the complex of GAPDH monomer, dimer and tetramer with S100A8/A9 proteins by using protein-protein docking calculations (with the program PatchDock). The molecular models selected for these complexes were further refined with the program FireDock. The candidate molecular models were analyzed by measuring the shortest distance from GAPDH in each of the three FeBABE linking site residues of S100A8, shown by experiment to produce significant cleavage (Ile22, D32, D52). The known cleavage radius (~12Å) and length of FeBABE (~14Å) were used to
approximate the maximum distance at which interaction could occur. Proposed models of the S100A8/A9/GAPDH complex presented herein were selected as the best candidates from each category based on this criteria and overall consistency with the FeBABE cleavage experimental data. Our analysis concludes that molecular models of GAPDH tetramer and monomer with S100A8/A9 lead to cleavage patterns that agree with the experimental data.

021  
ABUSE AND SOCIAL COGNITION PREDICT BORDERLINE SYMPTOMS VIA EMOTION REGULATION

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Borderline personality disorder (BPD) is a chronic mental illness characterized by emotional instability, impulsivity, emotion regulation deficits, and difficulty maintaining interpersonal relationships. The interpersonal difficulties associated with BPD have been linked to social cognition deficits, or impairment in the ability to accurately assess others’ behaviors, expressions, and intentions during social encounters (Sharp et. al, 2011). A growing literature links early invalidating and abusive environments with risk for BPD (Livesly, 2008), social cognition deficits, and emotion regulation problems (Fonagy & Bateman, 2008). However, no study to date has articulated the associations between these risk factors and BPD in a single model. The present study tests two possible models of BPD risk: 1) early abuse histories confer risk for BPD contemporaneously via social cognition impairment and emotion dysregulation and 2) social cognition deficits indirectly exacerbate BPD risk via emotion dysregulation. Data were collected from 423 participants in a single session in which they completed measures assessing abuse in childhood (Psychological and Physical Maltreatment Scale), emotion regulation difficulties (Difficulty in Emotion Regulation Scale), social cognition deficits (Reflective Functioning Questionnaire) and BPD symptoms (Personality Assessment Inventory, Borderline Personality Disorder subscale). Findings suggest BPD severity is exacerbated by social cognitive deficits via emotion regulation difficulties. Surprisingly, while abuse predicted emotion regulation difficulties and BPD symptoms, it was unrelated to social cognitive deficits. These findings suggest that social cognition may be an important target for intervention for BPD treatment, in addition to emotion regulation deficits, given the strong indirect relationship between social cognition and BPD symptoms via emotion regulation efforts. A poor understanding of interpersonal situations may enervate one’s ability to successfully deploy effective emotion regulation responses.

022  
EXAMINING WHETHER INSTRUCTIONS HELP MONOLINGUALS PERFORM LIKE BILINGUALS IN CONFLICT MONITORING TASKS

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Bilinguals outperform monolinguals in tasks that involve conflict monitoring. We recently proposed that expertise was at the root of this advantage. Bilinguals effectively manage two or more languages simultaneously, and thus are experts at dealing with conflict. Interestingly, this expertise results in bilinguals outperforming monolinguals in both linguistic and non-linguistic tasks. In the Stroop task (a measure of how well people deal with conflict), bilinguals take longer to begin responding but then respond more efficiently than monolinguals. This expertise pattern has been found in other areas. In the present experiment, we used the mouse-tracking paradigm to measure participants’ responses over time in the Stroop (linguistic) and the Flanker (non-linguistic) task. Participants were asked to move the computer mouse and click on the correct response. The “strategy” group consisted of monolingual participants who were told that the best performers in this task take 50 ms longer to begin responding, while also being cautioned that taking longer than 500 ms to initiate a mouse movement would result in a warning and the trial would be considered incorrect. The goal of the present experiment is to examine if the bilingual advantage can be replicated in monolinguals by telling them how to perform. The expertise (as opposed to a strategy) proposal would be supported if monolinguals cannot replicate the bilingual pattern of performance despite being given explicit instructions on how to do so. Consequently, such results would support the argument that the bilingual advantage is an implicit mechanism that emerges after practice dealing with conflict (rather than a conscious strategy).
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.

ABIRATERONE METABOLISM IN CASTRATION RESISTANTCE PROSTATE CANCER

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Prostate cancer is the second leading cause of cancer-related death in American men. Prostate cancer progression depends on androgen receptor (AR) presence and function. Testosterone (T) and 5α-dihydrotestosterone (DHT) are the endogenous ligands for the AR and thus are the main androgens fueling the growth of malignant cells. For localized disease, a variety of treatment approaches are available: surgery, chemotherapy, radiation therapy, and hormone therapy. In later stages, androgen deprivation therapy (ADT), either by medical or surgical castration, is the choice for treatment. However, in most advanced cases, the cancer initially responds to treatment, but after time, treatment resistance develops. This stage is known as castration-resistant prostate cancer (CRPC). Abiraterone acetate (AA) prolongs survival in CRPC by blocking CYP17A1, an enzyme required for androgen synthesis, but resistance invariably occurs. We hypothesize that abiraterone (abi) is endogenously converted by the enzyme 3β-hydroxysteroid dehydrogenase/isomerase (3βHSD) to a novel metabolite Δ4 abiraterone (D4A). In vitro studies using various prostate cancer cell lines shows that 3βHSD triggers abi to D4A conversion. Further studies on cell lines show that D4A is more potent than abi in blocking CYP17A1; it also inhibits other enzymes essential for DHT synthesis. Furthermore D4A works as antagonist to AR. We developed a liquid chromatography/tandem mass spectrometry (LC-MS/MS) method to detect abi and its metabolite. Analysis of serum from mice and patients treated with AA showed that abi is converted to the novel metabolite D4A.
THE EFFECTS OF INTER-TALKER VARIABILITY DURING ONLINE SPOKEN TABOO WORD RECOGNITION

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In the current experiment, we examined the effects of inter-talker variability on listeners’ perception of spoken taboo words. Previous spoken word recognition research using the long-term repetition-priming paradigm, in which listeners respond to two separate blocks of spoken words, found performance costs for stimuli mismatching in talker identity. That is, when words were repeated across the two blocks and the identity of the talker remained the same (e.g., male to male) reaction times (RTs) were faster relative to when the repeated words were spoken by two different talkers (e.g., male to female). Such performance costs, or talker effects, followed a time course, occurring only when processing was relatively slow. More recent research has found that explicit and implicit attention towards the talker led to talker effects, even during relatively fast processing. In our previous work, we found that talker effects emerged when female listeners heard both neutral and taboo words, despite relatively fast processing. The purpose of the current study was to examine whether talker effects would be found using a blocked design in which female listeners heard nonwords and either neutral or taboo words (but not both). We analyzed participants’ mean accuracy rates and RTs to responses in an easy lexical decision task. We found no evidence of talker effects when listeners heard only neutral or only taboo words. These results suggest that taboo words only grab (or sufficiently sustain) listeners’ attention when they are mixed with neutral words. The results of the current study have important implications for theoretical models of spoken word recognition.

BREAKING THE PAIN CHAIN: 2014 ARTHRITIS FOUNDATION STUDY PAIN MANAGEMENT PROGRAMS FOR THE ARTHRITIS FOUNDATION, GREAT LAKES REGION, OF OHIO

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Arthritis is an ever-growing medical concern in the United States. It is the leading cause of disability in U.S. adults today (Mallison, Fischer, Rogers, Ehrlich-Jones, & Chang, 2009). The National Arthritis Foundation has designed educational programs to promote functional fitness and improve the ability to perform activities of daily living (ADLs) among individuals with arthritis. This study examined the effects of a pain management program implemented by the Great Lakes Region Arthritis Foundation.

A self-report questionnaire was completed by 93 participants to determine if they have used the Health Organizer to record anything about their health history or daily activities, if they used any resource brochures or handouts from the Breaking the Pain Chain class, and if they implement certain practices or skills for managing their arthritis after taking this class. The respondents also reported levels of confidence in managing fatigue, physical discomfort or pain, emotional distress, other symptoms or health problems, doing different tasks, or doing things other than just taking medications. The results of this study suggest that 91.6% of participants have reported an improved quality of life upon participating in the Breaking The Pain Chain program. Over 80% of participants reported they experienced a better understanding of pain upon completing the program. This research suggests that the Breaking The Pain Chain program was perceived by the participants as beneficial in educating and providing resources to individuals with arthritis in the Great Lakes Region.

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 effect of pharmacological inhibitors of these proteins on the differentiation and apoptosis of skeletal myoblasts.

028 DISORDERED EATING AND SELF-HANDICAPPPING TENDENCIES

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Individuals who are struggling with eating disorders have tendencies to engage in avoidance coping when distressed (Ball & Lee, 2002), particularly in responses to threats to self-esteem (Wallis & Hetherington, 2004). Thought suppression and self-handicapping are both forms of avoidant coping (Baumeister & Scher, 1989; Wegner, Schneider, Knutson, McMahon, 1991). Thought suppression pertains to distorting one’s consciousness to repress unwanted notions, while self-handicapping is an ego-protective strategy that is used to project one’s potential failures on to external causes (Wegner et. al, 1991; Leary & Shepperd, 1986). While thought suppression has been shown to mediate the effects of stress on eating disorder problems (Lavender, Anderson, Gratz, 2012), there is a surprising dearth in the literature on the relationship between self-handicapping and disordered eating. The present study investigates whether 1) self-handicapping predicts eating disorder symptoms incremental to thought suppression, and 2) self-handicapping mediates the effects of distress on eating disorder symptoms. We tested these hypotheses in cross-section sample of N=280 undergraduate students. Participants completed measures of negative affect (PANAS), thought suppression (WBSI), self-handicapping (SHS), and disordered eating (EDI-26). We found support for the first hypotheses: 1) tendencies to self-handicap predicted eating disorder problems incremental to thought suppression and 2) self-handicapping mediated the effects of negative affect on eating disorder problems incremental to thought. The indirect effect of negative affect on eating disorder problems via self-handicapping was more robust than the parallel indirect effect via thought suppression. Indeed, self-handicapping emerged as a stronger predictor of disordered eating than thought suppression, another avoidant coping response. These findings imply that individuals with eating disorders may be more prone to use ego-protective coping strategies, relative to other forms of avoidant coping. Our results suggest that self-handicapping behaviors may be an important target of treatment efforts.

029 ROLE OF RNASE L IN KIDNEY

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Renal diseases have been continuing to be a prevalent problem. Current data indicate that 1% of patients admitted to the hospital are diagnosed initially with acute kidney injury (AKI), while about 2-5% of hospitalized patients develop AKI secondarily. It has been reported that epidermal growth factor (EGF)/EGFR activation contributes to the development and progression of renal diseases such as obstructive nephropathy, diabetic nephropathy, hypertensive nephropathy, and glomerulonephritis through mechanisms involved in induction of tubular atrophy, overproduction of inflammatory factors, and/or promotion of glomerular and vascular injury. In this study, we showed that 2-5A dependent RNase L (RNase L), one of the key enzymes playing an important role in the molecular mechanisms of interferon functions against microbial infection and cell proliferation, mediated EGF/EGFR activation. Interestingly, we found that the kidney size of aged RNase L deficient mice was significantly smaller than that in wild type mice under the same condition. Histological staining revealed that there were remarkably a higher number of vacuoles in the kidney of RNase L deficient mice than that in wild type mice although the biological significance of the observation is largely unknown. Proteomic analyses of urine protein excretion discovered
that lack of RNase L exclusively blocked EGF excretion. Further investigation of the molecular mechanism showed that RNase L regulated the shedding of EGF precursor through inhibiting some specific proteases responsible for the event. Our findings provide new insight into the pathogenesis of renal diseases and RNase L may be considered as a target molecule for therapeutic treatment of the diseases.

030 A ROLE FOR THE MUSCLE REGULATORY TRANSCRIPTION FACTOR MYOD IN THE REGULATION OF KEY MEDIATORS OF CAP-DEPENDENT TRANSLATION
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The muscle regulatory transcription factor MyoD has been long recognized for its significant role in myoblast specification and differentiation. During differentiation, in addition to inducing the expression of muscle specific structural proteins, MyoD affects cell cycle arrest via increased expression of the cyclin-dependent kinase inhibitor p21. The processes of differentiation and apoptosis are coordinately regulated in many cell types throughout development. Our lab has previously reported that MyoD also plays a role in the induction of differentiation-associated apoptosis via increased expression of the pro-apoptotic BH3-only protein PUMA (p53 up-regulated modulator of apoptosis). Interestingly, another well-characterized transcription factor p53, in response to DNA damage, also has the dual capacity to induce either growth arrest or apoptosis in many cell types. Additionally, p53 has recently been reported to inhibit Cap-dependent translation by decreasing the expression of p70 S6 Kinase as well as increasing the expression of 4E-BP, an inhibitor of the Cap binding protein 4E. Accordingly, herein we are testing the hypothesis that MyoD also plays a role in the regulation of Cap-dependent translation. Our data indicate that MyoD expression has no effect on the expression of p70 S6 Kinase but rather plays a role in preventing the inhibitor phosphorylation of eIF2α and in suppressing the expression of 4E-BP. Thus, in contrast to p53, MyoD plays a role in facilitating Cap-dependent translation. This is consistent with the role of MyoD in reprogramming the transcriptome necessitating a global switch in the translational program.

031 L13a-DEPENDENT TRANSLATIONAL CONTROL IN MACROPHAGES LIMITS THE PATHOGENESIS OF COLITIS
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Sustained inflammation from the infiltrated immune cells plays a pivotal role in the pathogenesis of ulcerative colitis. Using murine model we have identified a critical extra-ribosomal function of ribosomal protein L13a in macrophages in the resolution of inflammation. We also found that this function relies on L13a-dependent translational silencing of a cohort of inflammatory proteins e.g. chemokines and chemokine receptors. However, the role of this protein as molecular cues to control the severity of colitis is not known. Here, we tested whether L13a-dependent translational control in macrophages could serve as an endogenous defense against colitis. By administering dextran sodium sulfate we have induced experimental colitis in macrophage-specific L13a knockout (KO) mice and control mice. The severity of colitis was evaluated in these mice. Rapid weight loss, severe rectal bleeding, shortening of colon and significantly reduced survival rate was observed in the KO mice. Histopathological analysis of the colon from KO mice showed severe disruption of epithelial crypts with immune cell infiltrates. Elevated levels of several inflammatory cytokines and chemokines and abrogation of their translational silencing was observed in the colons of the KO mice. Higher serum levels of several pro-inflammatory cytokines and the release of gut bacteria and endotoxin in the blood stream of KO mice were detected, suggesting amplification of the inflammatory response to septicemia. Macrophage-specific depletion of L13a increases the severity of colitis, revealing the role of this protein in the endogenous protection mechanism against this disease.
032 PROFILING SIALYLATION STATUS DURING MONOCYTES DIFFERENTIATION AND POLARIZATION

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Sialic acids (SAs), a family of 9-carbon containing acidic monosaccharides, often terminate the glycan structures of cell surfaces and are involved in many biological functions including early fetal development, cellular recognition and adhesion, and its utilization by microbes. While it is clear that cell surface SAs are highly involved in the immune system, the sialylation status related to individual immune cells and their activation status and functions are still unknown. In this study, we combined a newly developed LC-MS/MS method, along with flow cytometry and confocal microscopy to profile the changing pattern of SAs during THP-1 monocytes differentiation and polarization. After PMA treatment, free SA in the culture medium increased from 4.18±0.01 ng/ml to 11.57±0.78 ng/mL, α-2,3 SAs on the cell surface decreased 35%, and α-2,6 SAs decreased 25%. These results were confirmed by sialidase activity assay, which showed the activity of major sialidase (Neu1) increased by more than a factor of 2. Cellular SAs increased from 718±6 ng/mL to (1.59±0.5)×10³ ng/mL. This change was verified by confocal microscopy, which showed the increase of both α-2,3 and α-2,6 SAs inside the cells. Moreover, after M1 and M2 polarization, cellular SA decreased 26% in M1 macrophages and increased 13% in M2 macrophages compared with only PMA treatment. Overall, this study provides for the first time a global investigation of the cellular sialylation status of monocytes and differentiated and polarized macrophages. It has potential significance in understanding the pathology and diagnosis of disorders involving SAs and the immune system.

033 LONG-TERM WESTERN DIET FEEDING INDUCES METABOLIC DISORDERS AND ENDOTHELIAL DYSFUNCTION IN MALE RATS

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Introduction: Western diet (WD), rich in saturated fat and sugars, has become a risk factor for obesity, metabolic syndrome and cardiovascular diseases, however, its effect on endothelial function remains unclear. Recent evidence has shown a crosstalk between Rho kinase (ROCK) and cardiovascular system. Activation of ROCK is implicated in the regulation of nitric oxide pathway and possibly participating in the pathogenesis of endothelial dysfunction. We aimed to investigate the molecular mechanisms underlying WD-induced endothelial dysfunction, and to explore the contribution of ROCK activation in this process.

Methods: Male Sprague-Dawley rats were fed standard diet (SD) or WD containing 20% lard and 30% fructose, for 42 weeks. Immunoblotting was used for assessment of fibrosis-related proteins and nitrotyrosine, as an oxidative stress marker in thoracic aortic tissues. The expression of endothelial nitric oxide synthase (eNOS), ROCK-1 and -2 in aortic tissues were analyzed by immunoblotting.

Results: There were no significant differences in body weight, body length or body mass index between SD-fed rats and WD-fed rats. However, WD-fed rats showed a dramatic increase in fasting blood glucose levels, serum total cholesterol and triglycerides levels, associated with a marked hypertension and glucose intolerance, compared with SD-fed rats. Moreover, a significantly higher content of nitrotyrosine was found in aortic tissues of WD-fed rats than SD-fed rats. WD induced arterial remodeling, characterized by increased expression of collagen I, III and matrix metalloproteinase-1. In addition, there was a significant decline in the expression of eNOS, along with up-regulation of ROCK-1 and -2 expressions, in aortic tissue of WD-fed rats, compared with SD-fed rats.

Conclusion: Our findings suggest that WD can induce oxidative stress, arterial remodeling and endothelial dysfunction through interplay between metabolic and hemodynamic derangements. Activation of ROCK pathway seems to play a critical role in mediating endothelial dysfunction, and may represent a promising therapeutic target.
THE THERAPEUTIC POTENTIAL OF QUERCETIN AND TRAIL ON MAPK MUTANT MALIGNANT MELANOMAS

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The major etiology of malignant melanomas is the point mutation-mediated activation of oncopgenes in the MAPK pathway, specifically NRAS and BRAF. Here we analyze the naturally occurring flavonoid quercetin as a potential melanoma therapeutic. Found in a wide variety of sources from onions and apples to red wine, quercetin can inhibit the growth and induce apoptosis in a wide variety of tumor types. We will evaluate the ability of quercetin to induce apoptosis and inhibit growth of four malignant melanoma cell lines which harbor mutations in the MAPK pathway, namely A375 and WM164 (BRAF mutant), SK-Mel-2 (NRAS mutant) and MeWo (BRAF WT, NRAS WT). Cytotoxic assays utilizing trypan blue staining determined that all four cell lines were sensitive to quercetin in a dose-dependent manner, all with an IC50 value of ~20 μM, A375 being the most sensitive followed by MeWo, WM164 and SK-Mel-2. Annexin V/PI staining followed by flow cytometry and western blot analysis for PARP cleavage showed that quercetin induces apoptosis in all cell lines with A375 and WM164 being the most sensitive, compared to MeWo and SK-Mel-2 which only underwent slight apoptosis at the highest concentration of quercetin. The blots were probed for different antibodies, and they show that quercetin is able to augment the proapoptotic effects of TRAIL marked by enhanced levels of fragmented PARP compared to either single agent. These preliminary data demonstrate that quercetin is a good candidate for cotreatment with TRAIL as it displays cytotoxic and cytostatic characteristics. However, further research is needed to reveal quercetin’s mechanism of action on MAPK mutant melanomas and its ability to sensitize TRAIL-resistant melanomas through down-regulation of antiapoptotic proteins.

GROWTH INHIBITION EFFECTS OF QUERCETIN ALONE AND IN COMBINATION WITH TRAIL ON BREAST CANCER CELL LINES MCF-7 AND BT-20

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Breast cancer affects many individuals, and this study focuses specifically on the hormone-dependent breast cancer cell line MCF-7 and the triple negative breast cancer cell line BT-20. Tumor necrosis factor (TNF)-related apoptosis-inducing ligand (TRAIL) has been explored as a potential cancer therapy. Recombinant human TRAIL (rhTRAIL) has been shown to be a potential anti-cancer agent because it can target and induce apoptosis (programmed cell death) in cancer cells without harming normal cells. However, both MCF-7 and BT-20 breast cancer cell lines have shown resistance to TRAIL. Quercetin (Q) is a naturally occurring flavonol found in different fruits, vegetables, and tea; it has been shown to have anti-proliferative effects on different cancer cells. The purpose of this study is to determine the growth inhibition effects of Q alone and in combination with TRAIL on MCF-7 and BT-20 breast cancer cells. Sulforhodamine-B (SRB) colorimetric assays were utilized to observe the growth inhibition effects on both breast cancer cell lines treated with increasing concentrations of TRAIL alone and in combination with increasing concentrations of Q. The results show that the co-treatments lead to both cell lines becoming more sensitive to TRAIL resulting in enhanced inhibition of cell growth for both cell lines compared to treatments with only TRAIL. In addition, Western blotting was done on MCF-7 and BT-20 cell lysates with single agent treatments and co-treatments of Q and TRAIL. The blots were probed for different antibodies, and they show that the combined treatment of TRAIL and Q produced more PARP fragmentation along with enhanced activation of caspases 3, 7, and 8 than single agent treatments. Overall, this data show that co-treatments with Q and TRAIL lead to enhanced inhibition of cell growth in both breast cancer cell lines.
EXAMINING WHETHER OR NOT AN INSTRUMENT CHANGE AFFECTS PARTICIPANTS’ ABILITY TO RECOGNIZE SONGS

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In the proposed study, we will examine whether or not the types of representations underlying music processing and spoken word recognition are similar. Previously, talker effects (an advantage for recognizing a repeated word spoken by the same talker relative to two different talkers) have been found when processing is relatively slow (M’Lennan & Luce, 2005). We are attempting to extend this work to music perception by examining whether or not we can obtain instrument effects (an advantage for recognizing a repeated song played by the same instrument relative to two different instruments). When songs are repeated across two separate blocks of trials, and the instrument remains the same (e.g., harp to harp), we predict that participants’ RTs to identify sound clips as either “intact” or “distorted” versions of the song will be faster compared to when the same song is repeated with a different instrument (e.g., trumpet to harp). Previous research has shown that there are similarities between language and music (Patel, 2003; Lim & Goh, 2012; McMullen & Saffran 2004). Therefore, if we obtain instrument effects in the proposed study, such results would support the notion that the representations underlying language processing are analogous to the representations underlying music processing.

TMCO1 IS A NOVEL MARKER IN CANCER METASTASIS

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Transmembrane and coiled-coil domains 1 (TMCO1) 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. However, its physiological functions, particularly in cancer biology, are largely unknown. In this study, we have found that knock down of TMCO1 in HeLa cells, a human cervical cancer cell line, and U2OS cells, an osteosarcoma cell line, remarkably inhibited their migratory capability; TMCO1 was highly expressed in the cells of the invasive front of high grade lung cancer and metastatic cancer cells in the clinical specimens, and lung cancer cells at the metastatic bone site in our animal model; Immunohistostaining revealed that TMCO1 was co-localized with microtubules and was able to be co-sedimentated with microtubules in the presence of paclitaxel and GTP; and deficiency of TMCO1 in cells dramatically increased acetylation of tubulin. Further investigation demonstrated that TMCO1 impacted microtubule dynamics, which is closely correlated with cancer metastasis, TBA drug response and therapeutic prognosis. Our findings provide new mechanistic insights into cancer metastasis and demonstrate that TMCO1 can be as a novel prognostic marker in cancer therapy.

ATTENTIONAL BIAS TO BODY-RELATED WORDS IN YOUNGER AND MIDDLE AGE FEMALES WITH AN EATING DISORDER

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Research using a modified Stroop task has demonstrated women with an eating disorder are slower than controls to color name words related to body shape. In a Stroop task, words are presented in various colors, and the task is to name the color, not read the words. When the words are body-related (thighs), individuals with an eating disorder have difficulty inhibiting these words, and thus performing the task. Almost exclusively this research uses younger females; yet, disordered eating persists into midlife and is clearly important as it relates to adult functioning. The present study extends the research to include middle age adults and uses computer mouse tracking to investigate the effect in real-time. It was predicted that the effects would be greater for middle age females with an eating disorder due to age-related body changes and disorder duration. Participants were 31 younger (Mean age = 23) and 20 middle age (Mean age = 50) females with an eating disorder and 31 younger (Mean age = 22) and 33 middle age (Mean age = 53) females without an eating disorder (control group). All
participants performed a Stroop task using three types of words - fat, thin, and neutral. Computer mouse tracking was used to reveal attentional processing throughout each trial. Response time (RT) and area under the curve (AUC) inform efficiency of processing. As expected, participants with an eating disorder had longer RTs. Middle age females were slower than young females; and middle age females with an eating disorder had the slowest processing of all. Furthermore, longer RTs did not result in larger AUCs. Results reveal patterns of information processing in younger and middle age females with an eating disorder. Theoretical and practical implications of these results are discussed.

TISSUE INTERROGATOR: ADVANCED TISSUE CULTURE PLATFORM TECHNOLOGY

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The Tissue Interrogator is a novel two-sided epithelial flow chamber technology platform for which a provisional patent has been filed (Attorney Docket No.: 27433.04066, US Provisional Patent Appln. No. 61/907,833 ‘MICROPERFUSION TISSUE INTERROGATOR’).

The Tissue Interrogator will solve the problem of obtaining authentic physiologically relevant results from cultured tissue. The Tissue Interrogator will significantly reduce drug development time; field-portable devices can be used to detect biochemical agents on site with extreme sensitivity, and epithelial tissue research in general will be transformed. This platform technology is envisioned to be suitable for analyses of live cells using either electrochemically or optically based (microscopy) sensors.

The Tissue Interrogator is an ideal platform to perform absorption, excretion, permeability and toxicological assays (“pharmacokinetics”) of candidate compounds, currently performed using Boyden chambers. We present results from our ongoing development effort.

SITE-SELECTIVE INCORPORATION OF AZIDE FUNCTIONALITY INTO RECOMBINANT PROTEIN FOR ITS BIO-ORTHOGONAL MODIFICATION

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Modification of protein is a very important and necessary approach for studying protein structure and function, and the mechanisms of biological pathways that the protein is involved in. Introducing unique functional group into protein is an attractive approach for site-selective protein modification applications. In this report, we systematically investigated four site-selective strategies to introduce azide functionality into recombinant thrombomodulin (TM456), via direct recombinant expression with unnatural amino acid, chemical, and enzymatic modification for its bio-orthogonal modification application. First, a straightforward recombinant method to express TM456 with azido near C-terminus by replacing methionine with azidohomoalanine from methionine auxotroph E. coli cell was investigated. Next, a sortase-mediated ligation (SML) method to incorporate azide molecule into the C-terminus of recombinant TM456 was demonstrated. The third is to add azide functionality to the N-terminal amine of recombinant TM456 via amidation chemistry, and the fourth is tyrosine selective three-component Mannich reaction to introduce azide functionality to recombinant TM456. Overall, SML of recombinant protein affords the highest overall yield for incorporating azide functionality into recombinant TM456 since the key protein expression step uses natural amino acids. Also, single site modification facilitates the highest TM456 activity.

SYNTHESIS AND EVALUATION OF NON-NUCLEOSIDE DNA METHYLTRANSFERASE INHIBITORS AS ANTI-CANCER AGENTS

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Epigenetic modifications such as gene regulation, development and tumorigenesis require a family of enzymes known as DNA methyltransferases (DNMTs). Among the other two, DNMT1 has been a target in developing cancer therapies since it is the most abundant enzyme that functions to establish and maintain DNA methylation. DNMT inhibitors (DNMTi) disrupt DNA methylation process by promoting expression of tumor suppressor genes which lead to cancer cell apoptosis. Currently, FDA approved nucleoside DNMTi, azacytidine and decitabine, are used in myelodysplastic syndrome, however, they exhibit shortcomings such as cytotoxicity, instability, short half-lives and poor efficacy. In contrast to nucleoside DNMTi, non-nucleoside DNMTi are considered to have decreased direct toxicity to DNA and this may provide a safer epigenetic treatment and serve as a novel strategy for treatment of cancer. Previously, a non-nucleoside compound 413, was identified as a potent DNMT inhibitor in multiple myeloma cells. In this study, DNMTi 413 was used as a lead compound to synthesize a library of 24 compounds. The new DNMTi 413 candidates were screened against non-small cell lung cancer (NSCLC) H292 cell line. Cell viability and activity of the candidates were evaluated via MTT assay. Several of these compounds showed better inhibitory activity compared to the lead compound 413. This study provides the structural basis for further synthesis and development of even more potent DNMTi as therapeutic agents against cancer.

042 CUYAHOGA COUNTY URBAN LAKE ASSESSMENT: MICROCYSTIN PRESENCE AND LAND COVER/LAND USE

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To better understand the functional role of water bodies in urban and suburban regions, we conducted a county-wide assessment of lakes, reservoirs, and retention ponds in Cuyahoga County, OH in summer 2013. Physical characteristics, surrounding land use, waterfowl presence, shoreline vegetation, water chemistry, microcystin, and surface sediments for diatom analysis were sampled at forty sites following protocols developed for the 2012 US National Lake Assessment (NLA) and the Ohio EPA Inland Lake Water Quality Monitoring Program. Surveys were conducted to determine lake management practices i.e. fertilizer use, dredging, and method of algal control. Percent impervious surface was determined using geospatial analysis of land cover for each watershed. Most shoreline vegetation was dominated by grass. Our results indicate 40-50% of the sample sites had poor shoreline habitat, comparable to 41% of man-made lakes found in the 2007 NLA. Visual algal assessment indicated moderate to extensive algae in 34% and detectable algae in 57% of the lakes. The cyanobacteria Microcystis was visible at 50% of the sites, while only three lakes had microcystin toxin concentrations above World Health Organization drinking water guidelines (1ug/l) when sampled. Microcystin concentrations were positively correlated with % impervious surface when sites were separated into two categories. Group 1 sites were predominantly more rural with higher toxin concentrations, while Group 2 samples were more urban and had lower toxin levels. Lower toxin concentrations at urban sites may be due to dilution by greater stormwater runoff.

043 THE EFFECTS OF THIN IDEAL MEDIA ON BODY DISSATISFACTION, DEPRESSION, AND ANXIETY IN YOUNGER AND MIDDLE AGE FEMALES

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According to social comparison theory (Festinger, 1954), individuals are driven to evaluate themselves by searching out standards to which they can compare. By comparing themselves to others, individuals begin to define themselves based on such comparisons. Research has demonstrated that this social comparison is related to higher levels of body dissatisfaction (Myers & Crowther, 2009). Women who are exposed to thin images experience greater body dissatisfaction and depressed mood than women exposed to images that contained no pictures of people. The purpose of the current study was to investigate the effect of viewing pictures of thin models on self-report body dissatisfaction, depression, and anxiety for younger and middle age females. We predicted that exposure would be related to levels of body dissatisfaction, depression,
and anxiety. We further predicted that the effect would be larger for the younger females, in line with social comparison theory. Thirty-one younger (Mean age = 20) and 29 middle age (Mean age = 50) females were recruited from the Cleveland State University community. Participants were shown pictures of 15 swimsuit models for 10 seconds each. After each picture, participants rated the pictures on a 10-point scale: 1) “How much do you like this swimsuit?” 2) “How likely is it that you would wear a similar swimsuit?” 3) “How does your body compare with the swimsuit model’s?” After viewing the pictures, participants were asked to complete a written questionnaire collecting demographic information, the Eating Disorder Inventory (EDI), the Beck’s Depression Inventory (BDI), the State and Trait Anxiety Inventory (STAI). Results revealed multiple correlations between mean pictures ratings and EDI, BDI, and STAI scores. Furthermore, the results indicate that exposure to thin ideal media may have a greater effect on younger adults compared to middle age adults.

044 INVESTIGATION OF STUDENT PERCEPTIONS OF AN EDUCATIONAL MODEL INVOLVING VOLUNTEER PATIENTS IN THE CLASSROOM

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Physical therapy education is a crucial time for students to gain not only didactic knowledge, but also confidence in the clinical skills of the profession. Research has been done in a number of health professions as to the effectiveness of different models of education in students mastering different competencies, especially related to patient interactions. In physical therapy specifically, patient centered care and clinical decision making are crucial and multi-faceted skill sets which are difficult to address through didactic and traditional classroom educational models because they lack the opportunity for students to interact with and learn to adapt to the variety of patient presentations they will encounter in the clinic. The neurology portion of the DPT program at CSU employs an alternative educational model that involves students working with pro-bono patients in the classroom each week in a structured and supervised format. In this study, we explored the impact of this alternative educational model on the students’ perceptions of their confidence in areas related to patient centered care and clinical decision making at the beginning and the end of the neurology semester. Pre- and post-surveys consisted of both likert question/items and open ended questions. Paired t-tests were performed to identify changes pre- to post-semester and common themes in the open ended items were identified. Students shared common experiences of difficulty with using certain assessment tools, overcoming communication barriers, and accommodating for patient limitations. Overall, students gained confidence in their evaluation, treatment, and communication skills through interaction with the patients and increasing their knowledge of the nature of strokes.

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

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Statement of the Problem: Little is known about the lived experiences and decision-making processes of individuals with tetraplegia who have chosen to pursue Functional Electrical Stimulation (FES) applications. In order to promote shared decision-making within the realm of SCI rehabilitation interventions, care providers must develop multi-criteria decision technologies that include factors that are important to patients.

Purpose: The purpose of this study is to explore factors that influenced the decision-making of patients with tetraplegia who chose to pursue implantation of an FES application(s), the decision making process, and how their lived experiences influenced their past and future decision-making.

Methodology: The research employs a case study design. Six to eight participants will be recruited via letter distributed by the Cleveland FES Center. Methods include individual interview, observation, and photo-elicitation (Cresswell, 2013). Data collection is in progress. Data analysis includes creating an occupational profile for each participant, identifying meaning units, categories, and thematic analysis for each participant, and then completing a similar analysis across case studies.

Findings: Preliminary findings will be presented for one case.

Discussion: The findings will be discussed as they relate to the literature.

Conclusion. The findings of this study will help inform the health care team about the lived experiences of individuals with tetraplegia who have an FES application and factors that influence patient decision-making. They also can be used to
improve the design of multi-criteria decision technologies and educational information about FES applications for individuals with SCI who are considering FES application.

046 ELEVATED LEVEL OF HYPOXIA INDUCIBLE FACTOR 1α 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 1α (HIF1α) and HIF2α 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 HIF1α levels which may further promote cyst growth. We hypothesize that increased level of HIF1α can promote switch of renal epithelial function from an absorptive to a secretory phenotype due to the loss of epithelial tight integrity and altered active ion transport.

HIF1α level was pharmacologically elevated by cobalt chloride (CoCl₂) in monolayers of cortical collecting duct cell line (mCCD 1296 (d)) grown onto suspended permeable membranes in the presence or absence of fluid flow. In our electrophysiological analysis, transepithelial electrical resistance (TEER) and voltage values were recorded using an Endohm chamber connected to a voltmeter. Higher TEER values reflect reduced paracellular permeability indicating tight junction integrity which was verified by permeability assay using FITC-conjugated dextran molecules. Short circuit current (Isc) was calculated using Ohm’s law (I= V/R) to compare active ion transport. MTT assay was used in order to make sure CoCl₂ treated and untreated groups maintained same level of cellular viability. Elevated level of HIF1α by CoCl₂ caused loss of tight junction integrity as found by loss of TEER and increased permeability of dextran molecules. Increased HIF1α resulted in decrease in active sodium transport which was determined from ameloride sensitive Isc. Thus, this study may provide an understanding how HIF1α or hypoxia may cause loss of normal epithelial function leading to cyst progression.

047 ANALYSIS OF TURNING BEHAVIOR IN THE AFRICAN CLAWED TOAD: COMPARISON OF TOADS WITH DIFFERENT LEG CONFIGURATIONS

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African clawed toads (Xenopus laevis), which remain entirely aquatic as adults, turn rapidly and accurately towards the origin of surface waves created by prey. In laboratory colonies, toads sometimes develop abnormally extended leg configurations. Here, we compare basic features of turning in normal toads and those with extended legs; we focus on the initial direction of body movement and its relation to leg action and hip, knee and ankle movements, characterized respectively as pushing/pulling or extension/flexion/passive return. We also measured the duration and angular velocity of rotation. Stimulus direction determines which of two alternative patterns are performed. Rostral stimuli elicit immediate forward body movement as one or both legs extend and push the body forward. For normal toads, lateral and caudal stimuli elicit rotations beginning with backward movement of the body as one or both hips flex, knees may extend, and legs pull forward. These turns then continue with a sweeping push by the contralateral leg, resulting from hip and ankle extension and variable knee flexion. Toads with extended legs use both patterns, but appear to favor forward pushes for both rostral angles and more lateral angles. They do back up and rotate for caudal angles, but these turns appear less efficient. Reaching their final heading may require additional kicks that provide further course correction. Rotation speeds also seem slightly slower, taking size into account. In conclusion, the comparison illustrates the efficiency of the rotation of the normal toads.

048 MOTIVATION FOR HIGH SCHOOL STUDENTS

Saja Abid
In recent years, the high school dropout rates have greatly increased in the Northeast Ohio region. It has been shown that fifty percent of the students that have completed high school discontinue their education before completing their fourth year in their universities. One significant factor many students are facing is the lack of motivation. Encouraging students to set goals and accomplish these goals, can help an individual want to strive for success. In order to help this issue, I have started a conference at John Hay High School, for Cleveland Metropolitan School District students. This conference will encourage students to go on to college by educating them on how to become competitive applicants through workshops and seminars. We also share personal college experiences and provide examples of what can help to stand out when applying for internships and/or scholarships.

049 VALIDATING THE POREH NONVERBAL MEMORY TEST THROUGH THE BIBER FIGURE LEARNING TEST

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The assessment of nonverbal memory plays an important role in the diagnosis of a number of neurological diseases and disorders including Parkinson’s disease, Temporal Lobe Epilepsy and Tourette syndrome (Gawrys et al., 2008; Lespinet, Bresson, N’Kaoua, Rougier & Claverie, 2002; Lavoie, Thibault, Stip & O’Connor, 2007). Many of the nonverbal memory tests currently used have been found to have a number inherent issues that can invalidate results. Some of the inherent issues include the inclusion of planning and grapho-motor skills (Vogel, Stokholm & Jørgensen, 2012; Kociuba, 2011). This is problematic because a condition such as apraxia, agraphia, or impaired planning skills can lead a clinician to believe that the individual being assessed has nonverbal deficits when this may not really be the case. The proposed study will examine performance on a new measure of nonverbal memory called the Poreh Nonverbal Memory Test (PNMT). The Poreh Nonverbal Memory Test is computer administered test of visuospatial memory and nonverbal learning which addresses many of the issues inherent in other nonverbal tests by eliminating the need for grapho-motor skills and minimizing the need for planning. Performance on the Poreh Nonverbal Memory Test will be compared to performance on the Biber Figure Learning Test – Extended Edition, one of the few other measures of nonverbal learning currently in existence. Due to the fact that both tests measure the same, constructs performance on the Poreh Nonverbal Memory Test is expected to correlate highly with performance on the Biber Figure Learning Test-Extended.

050 THE UTILIZATION OF THE ELECTRONIC HEALTH RECORD IN UNDERGRADUATE NURSING EDUCATION

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Innovations in healthcare are constantly emerging, but perhaps one of the best-known and most recognized recent advancements in the field that affects providers of all disciplines is the Electronic Health Record (EHR). In the field of nursing in particular, the EHR is already established as a medium for documentation of assessment, diagnosis, planning, implementation, and evaluation of patient progress, however there still exist numerous limitations and discrepancies when it comes to utilizing the system to its fullest potential and distinguishing nursing care from the interdisciplinary care team, especially for undergraduate nursing students.

By evaluating and comparing the data provided through a literature review of its impact, the use of the EHR in the field of nursing and in the education of student nurses is examined, with both the success yet underutilization of the system as a learning resource being identified. Additionally, as a School of Nursing that incorporates the EHR uniquely early into its curriculum in an interactive and real-world manner, the nursing resource lab manager of Cleveland State University’s School of Nursing is referenced in to order to highlight the importance of the EHR as a learning tool and as an introduction to clinical nursing practice.
As a result, conclusions were made regarding the EHR’s success as a method for learning as a student nurse and as a medium for providing, documenting, and monitoring patients’ nursing care in addition to noting the known limitations with which the system is currently faced, both at the undergraduate instructional level and therefore nurses presently practicing today. Findings relating to the success of the introduction of the EHR to undergraduate students even before they begin nursing practice can perhaps prompt current nursing programs across the country to adopt a similar curriculum that incorporates the system.

051 CIRCADIAN RHYTHMS IN mTOR-AUTOPHagy FEEDBACK LOOP

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The mammalian target of rapamycin complex1 (mTORC1) is a key component regulating cell proliferation, cell growth, ribosomal biogenesis and other anabolic processes and thereby also suppresses catabolic processes like autophagy. It's a serine/threonine kinase which senses the energy status of the cell and therefore take cues from AMPK and AKT. Autophagy is a survival strategy adopted by the cell in adverse condition such as nutrients deprivation. It's a catabolic process regulated by many upstream proteins like mTORC1 and C/EBPβ via different pathways. In mammals during the nutrient rich condition mTORC1 phosphorylates ULK1/2 complex and ATG13 and forms a complex binding to ULK1/2 and therefore inhibiting autophagy. During starvation the activity of mTORC1 is inhibited and it dissociates form the ULK1/2. ULK1/2 in turn becomes active and phosphorylates ATG13 and induces autophagy. The mTORC1 is been shown to be expressed in circadian manner in various studies. Its reported that the rhythms of mTORC1 is maintained upon even long standing starvation implicating the role of amino acid released during the process of autophagy in the maintenance of these rhythms in the cell culture experiments. It’s been reported that autophagy has diurnal rhythms in mouse liver, heart, kidneys and skeletal muscles. The question is still open for debate if autophagy regulates the rhythm of mTORC1 or vice versa. Our aim is to understand the mechanism behind the rhythmicity of mTORC1 upon long standing fasting with perspective of autophagy in vivo and to whether or not autophagy has rhythmicity upon long standing fasting in vivo.

052 PREVENTION AND AWARENESS OF HEART DISORDERS FOR ADOLESCENT ATHLETES

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Prevention and awareness is key to solving the problem of recognizing heart disorders in adolescent athletes. Though relatively rare, a cardiac event that strikes a young person at athletic practice or play is often deadly. This project is an attempt to educate young athletes, parents, coaches, and anyone involved in adolescent sports on the issue of prevention. About 100 young people die every year playing organized sports, and cardiac arrest is the cause in half the cases, according to the National Athletic Trainers' Association (NATA). American Heart Association studies show that young black athletes have a greater incidence of cardiovascular death than whites. A Dutch study in the Journal of American Cardiology found that 68 percent of cardiac arrest cases during sports play were boys. The need for awareness and prevention is relevant, especially for inner city kids that do not have knowledge of the issue.

053 BIOLOGICAL CLOCK MEDIATED REGULATION OF MTOR ACTIVITY UPON CALORIE RESTRICTION

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Caloric restriction (CR) is a robust intervention, which increases longevity across different species including mammals. CR leads to inhibition of mechanistic target of rapamycin (mTOR) signaling in many species, however, significant discrepancy in data obtained in mammals calls for additional studies. The TOR signaling pathway is conserved nutrient sensing pathway involved in various cellular processes and metabolism. There are two complexes of TOR in mammals: TOR complex1 and TOR complex2. Our laboratory have shown that circadian clock is involved in regulating the oscillation of TOR during the day. We hypothesize that regulation of TOR by internal biological clock may affect the outcome of CR. In order to study
circadian clock mechanisms in CR we assay the effect of 30% CR in mice on mTORC1 and mTORC2 activity across the circadian cycle. To dissect the effects of feeding time and calorie intake we also assay mTORC1 and mTORC2 activity in the liver and skeletal muscle of young ad libitum (these animals have access to food throughout the day), time restricted (these animals received food once per day) and fasted mice. We found that, in contrast to the existing paradigm, CR did not significantly suppress daily average in mTORC1 signaling; however, CR dramatically affected its daily rhythms, increasing the amplitude. CR suppressed mTORC2 and CR effect on mTORC1 and mTORC2 activities was significantly different from the effects of TR feeding and fasting, suggesting that observed effects is result of metabolic adaption to CR rather than affect of periodic feeding or sharp reduction in caloric intake. We also found significant changes in the expression of genes for components of mTORC1 and mTORC2 upon CR, which might explain the observed effects on rhythms in mTOR signaling. We plan to investigate the effect of CR on TORC1 and TORC2 knockout mice.

054 ANOREXIA NERVOSA AND ITS PSYCHOLOGICAL EFFECTS

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There are two subtypes of Anorexia Nervosa; binge-eating/purging and restrictive. Both are a result of intense fear of weight gain and a lack of realization about the dangers associated. Although there are other factors which contribute to these disorders, the most prevalent are those of the sociocultural factors. That is, the social pressures and expectations placed on people to be or look a certain way in society. However, these factors affect certain people and cause intense problems for their victims because of the psychological factors he or she possesses. Therefore, if someone is highly critical of themselves, or is a “perfectionist”, than the influence of society will affect them at a greater rate. Consequently, to obtain these unreachable goals, victims will go to extremes such as starvation or the use of compensatory mechanisms to maintain unhealthy body weight. For those who use Anorexia as a means of achieving “perfection” there are many psychological, as well as physical issues which arise. Food is not seen as a source of enjoyment or satisfaction, but rather as an evil they obsess over. Their lives become consumed with the thought of “what can I eat”, “how much will it affect my weight”, “how many calories are in it”, and so on. However, through education and communication we can combat these ideas which society bombards us with on a daily basis. Starting this education at younger ages will allow us to fight the narrow-minded and harsh views of what men and women’s bodies are supposed to look like. Also, it will educate people on what to do if someone does have the disorder of Anorexia. We can put a stop to the lies which claim beauty comes in one size, and to the illness Anorexia Nervosa in general.

055 ROLE OF CIRCADIAN CLOCK PROTEIN CRYPTOCHROME IN DWARFISM AND CALORIE RESTRICTION MECHANISM


Circadian clock is an internal time keeping system, which controls circadian rhythms in behavior, physiology and metabolism allowing the organism to anticipate daily changes in the environment. Our laboratory studies a connection between the circadian clock and aging. Cryptochromes are core components of the clock and in agreement with that Cryptochrome deficient mice shows significant disturbance in circadian clock functions. Cryptochromes regulate transcription of circadian core clock protein of but exact functions of these proteins are unknown. We found that Cryptochrome deficient mice have reduced body weight and proportionally reduced organ size. We also found that they have reduced food intake. According to the existing paradigm IGF1 is the major determinant of reduced body size (dwarfism) and reduced food intake (caloric restriction) are associated with decreased IGF1 level. We found that Cryptochrome knockout mice have reduced level of plasma IGF1 and IGF signaling. We also observed that cryptochromes deficient mice resemblance to calorie restricted mice. Thus cryptochromes are involved in calorie restriction mediated down regulation of IGF1 and dwarfism mechanism. To study the role of circadian clock protein cryptochrome in dwarfism and calorie restriction mechanisms we are investigating if cryptochromes are involved in regulation of IGF1 and IGF signaling.

056 IMPACT OF PATIENT PERCEPTIONS ON QUALITY OF HEALTHCARE IN CLEVELAND
Patient perceptions of physicians have a strong impact on if they adhere to prescriptions, and on how comfortable they feel sharing highly personal medical information (Trowbridge, 2013). Both adherence to treatment and full disclosure of important medical information are necessary for a patient to receive thorough care. Patients also tend to enter a healthcare facility with a confirmation bias, or preconceptions as to the role of a healthcare professional (Bar-Tal, 2013); thus, the acknowledgement or substantiation of these biases enhances a patient’s crucial trust in their healthcare. This can greatly affect the outcome of patient and healthcare professional interactions. This study will focus on the specific biases and perceptions of the Cleveland community, so that a targeted approach for addressing these biases can be created. In order to discover these perceptions, I will utilize mixed methods and collect both quantitative and qualitative data in a written and online survey. The qualitative data will be collected with open-ended questions asking about the individual’s specific perceptions of healthcare and for descriptions of specific experiences in healthcare, and the quantitative data will be demographic information such as age, race, and gender that will be used to correct for potential confounds from uneven distribution of these groups. It will also be collected with Likert scales (Likert, 1932) and 1-10 satisfaction scales used to determine the patient’s satisfaction with their listed experiences.

**057 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 (Δvf) generated using an orbital shaker (os) lead to increased cell density, thought to result from proliferation (prol) transduced through the primary sensory cilia, mechanosensory organelles. Since mature kidney epithelial cells (KEC) of all types exist in non-dividing states, this proliferation must result from cell cycle re-entry. I hypothesized that MCCDC’s subjected to Δvf de-differentiate into mesenchymal kidney cells before re-entering and continuing through the cell cycle, subsequently dividing.

To investigate this hypothesis, MCCDC’s bathed in pcd were allowed to differentiate for at least 10 days while kept under conditions of no fluid flow (vf = 0; control). In order to expose cells to Δvf, other MCCDC’s were then subjected to fluid flow (vf = max) for 30, 60, 120, or 240 min using an os. At the end of these time periods, cells were harvested, nuclei were DAPI stained for cell counting, and RNA/protein extracted. qRT-PCR/Western blot analyses are being used to determine concentrations of several mRNA transcripts/proteins considered markers of KEC prol/differentiation. Immunostaining 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 primary cilia outgrowth. Prol markers include phospho-Akt (protein)/phospho-mTOR (protein)/phospho-ERK1&2 (protein)/cdk1 (mRNA)/c-Myc (mRNA). If MCCDC’s de-differentiate and divide in response to Δvf, 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.

**058 PHYSICIANS’ NEED FOR NEW TECHNOLOGY IN THEIR SPECIALTY OR HOSPITAL**

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Physicians’ may not have access to the technology they need to make a correct diagnosis. Lack of technology can create a lack of information for the patient’s family in understanding why a patient is not healthy. It is important for physicians to learn more about new technology being used in other specialties and how that technology can help them. Technology can also help aid in collaboration with other healthcare workers. Technology like electronic health records, permits health care workers to communicate with one another. Surveying doctors is one of the most useful tools to understand their use of
technology. This survey will be able to help the medical community understand what technology physicians rely on most, how it impacts patient care, how it helps in interacting with other health care workers, how much it assists them in diagnosing and preventing misdiagnosis, as well as, if there may be other forms of technology they wish the hospital offered.

059 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 contained CTT deletions/extension and/or substitution of the C-terminal Arg with the negatively charged Glu. 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^Met ternary complex and for responding properly to an AUG codon in the P-site during scanning. We hypothesize that uS9/yRps16 plays an important function in maintaining the gatekeeper role of eiF1 in AUG selection. Interestingly, mutant yeast strains were also characterized by a decrease in both +1 and -1 programmed translational frameshifting, suggesting enhanced translation fidelity.

060 CONSEQUENCE OF CONTINUED SPEECH AND HEARING SERVICES AGAINST CLINIC COSTS

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Accumulating costs can deter potential clients from seeking benefits from speech and hearing services in clinics. Specifically in an urban setting, families may not realize the greater impact of forgoing services after initial visits to a speech and hearing clinic. Research is being compiled in order to easily and effectively explain why therapy and services provided at the clinic are necessary and perhaps worth sacrifice. The research will also explain how clients, the clinic, and speech language pathologists (SLP) and audiologists can work together to reduce initial prices at a clinic. While much of the research can be applied to areas outside of Cleveland State University’s speech and hearing clinic, a majority of the research was conducted at said establishment and may be reflected in the presentation. Research was conducted by referencing college text books, credible websites, and interviewing members of Cleveland State University’s speech and hearing clinic. The goal of this research is to be able to leave behind information for clients in the Cleveland and other urban settings who may on the fence about continuing services due to cost.

061 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 the accent have on the perception of foreign-accented speech. In the proposed study, we aim to explore the inverse of this relationship. We hypothesize that degree of cognitive load will affect participants’ accent ratings. The purpose of the proposed research is to evaluate two competing possibilities. According to a
difficulty-based account, increases in cognitive load may lead to increased accent ratings. However, according to an alternative resource-based account, accent ratings will approach chance as cognitive load increases, as there will be fewer resources available to devote to the accent-rating task (and thus participants will perform this task less well). Previous studies have found that there is a preference for native-accented speech (e.g., students preferred teachers with native accents over teachers with foreign accents). Therefore, the proposed work is expected to have important practical implications in university settings, among others (e.g., healthcare).

062 IMPACT OF GM FOODS IN URBAN ENVIRONMENTS AND COMMUNITIES

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Genetically modified food (GM Foods) are products of genetically altered food through genetic engineering. This process happens by altering the genes of plants, animals, and other organisms. The combination of genes from different organisms then cause the resulting organism to be genetically modified. Genetically modified foods can enhance nutrition in food, control pesticide, and provide shorter period to grow plants. For this reason, many food companies have started to modify food to increase profits and sales. Genetically modified foods are popular in the US markets and stores, though this kind of food is believed to have some negative effects on human health. For example, modifying food allergies by adding proteins that were not indigenous to the original plant or animal can cause allergies in the human body. The main goal of this project is to educate the public about genetically modified foods and their effects on human health.

063 TBTIF2 AND TBTRF SUPPRESS VSG SWITCHING THROUGH COMMON AND INDEPENDENT MECHANISMS

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Trypanosoma brucei causes fatal human African trypanosomiasis. T. brucei stays in extracellular spaces in its mammalian host and is constantly exposed to the host immune surveillance. To evade elimination from the host immune response, T. brucei undergoes antigenic variation and regularly switches its major surface antigen, VSG. Antigenic variation is a key pathogenesis mechanism enabling T. brucei to establish long-term infections. There are more than 2,500 VSG genes and pseudogenes in the T. brucei genome, but VSG is exclusively expressed from polycistronic VSG expression sites (ESs) located immediately upstream of the telomeric repeats. VSG switching can occur in an in situ fashion with the coupled silencing of the originally active ES and expression of an originally silent ES. VSG switching can also occur through DNA recombination-mediated events, such as gene conversion and crossover (telomere exchange). We have identified TbTRF as a duplex telomere DNA binding protein and TbTIF2 as a TbTRF-interacting factor. Recently we found that TbTIF2 suppresses VSG switching by maintaining the subtelomere integrity, while the telomere DNA binding activity of TbTRF is also required for suppression of VSG switching. Interestingly, we now find that TbTIF2 is required for the maintenance of the TbTRF cellular protein level, suggesting that TbTRF and TbTIF2 may function in the same pathway in suppression of VSG switching. However, depletion of TbTRF does not lead to increased DNA double strand break (DSB) amount at the subtelomeric regions as depletion of TbTIF2 does, indicating that TbTIF2 and TbTRF have both overlapping and independent roles in VSG switching regulation.

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

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The characterization of lake habit and history was conducted by analyzing a benthic sediment core from Lake Acacia. Lake Acacia, located in Cleveland MetroParks Acacia Reservation, was cored 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 60 years of deposition. Lake Acacia was created between the early 1950’s and 196 based on preliminary assessment of historic topographic maps of the area. Loss on ignition carbon (LOI) analysis of this core, commencing 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 water content and organic carbon content. These histograms provide a snapshot of productivity over time for the lake and provide 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. Diatom community composition will be related to the pattern of productivity, in order determine water quality changes in Lake Acacia over time. This study will be paired with GIS analysis of land use throughout the history of Lake Acacia to determine if water quality changes are correlated to changes in land use.

065 CHARACTERIZATION OF TAILORED PLLA SUBSTRATES USING RAMAN POLARIZATION SPECTROSCOPY AND RAMAN HYPERSPECTRAL IMAGING

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Poly-L-lactide (PLLA) is a biocompatible, biodegradable, semi-crystalline and optically active polymer that is widely used as an implant and artificial cell scaffold material. The degree of crystalline character of PLLA influences its electromechanical properties such as elastic modulus and piezoelectric character. From its amorphous state, PLLA can be made more crystalline by drawing the polymer at a temperature above the glass transition, but below its crystallization temperature. Cold-drawing the PLLA to higher draw ratios increases its piezoelectricity and rigidity, two important considerations in the development of improved implants and biodegradable matrices. In the work presented here, a non-destructive and non-contact optical method for characterizing tailored PLLA substrates using Raman imaging and Raman polarization microscopy is described. The method utilizes a novel chemometric method to generate image contrast based on the degree of crystalline character. The image results enable a preliminary understanding of differences in bond orientations across the spatial extents of the sample and differentiated sample regions that are more crystalline from those that are more amorphous. A complete description of the optical method is presented along with a theoretical description of the chemometric technique.

066 MOLECULAR DEFECTS IN PROEXOSITES OF PROTHROMBIN MOLECULE RESULTS IN ABNORMAL THROMBIN GENERATION

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Prothrombinase is an enzymatic complex between factor Va (fVa) and factor Xa (fXa) assembled on a membrane surface in the presence of divalent metal ions. Although fXa is capable of activating Pro. However, the incorporation of fVa into prothrombinase results in a 300,000-fold increase in the catalytic efficiency of fXa for thrombin generation. Recently, we have shown that the concentration of fVa locally at the place of vascular injury dictates the pathway of Pro activation and that fXa has fVa-dependent interactive site on Pro within amino acid region 478-482. In addition, several specific basic amino acid residues within Pro have been shown to interact with fXa in a fVa-dependent manner (proexosite I). Thus, in order to elucidate the contribution of amino acid residues from both proexosite I and 478-482 in Pro activation, we constructed several recombinant Pro (rPro) molecules. The first rPro was mutated with two point alanine mutations at ArgΔ478 →Ala and LysΔ385 →Ala known herein as rProW2. Next, rPro molecule containing the two previous mutations and the deletion of amino acid residues 478-482 (rProΔ478-482/W2) was also constructed. All rPro molecules were stably transfected in BHK-21 cells, and were purified to homogeneity. The last step of the procedure utilized a Fast Performance Liquid Chromatography instrument equipped with a strong anionic exchanger that employed the use of a step-wise calcium gradient to isolate fully carboxylated rPro. The rPro molecules were analyzed for their ability to be activated by both fXa-alone or the prothrombinase complex by SDS-PAGE. Gel electrophoresis revealed fXa-alone exhibited slightly impaired catalytic activity toward rProW2 and rProΔ478-482/W2, whereas prothrombinase activity towards both rPro molecules was severely impaired. Our results also provide further explanation for a natural mutation in proexosite I (ArgΔ382→Cys) that was reported in the literature. Patients harboring this mutation are prone to be severe bleeders.
067  CALORIE RESTRICTION EFFECTS ON CIRCADIAN CLOCK AND LONGEVITY-ASSOCIATED GENES EXPRESSION

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Organisms ranging from unicellular to complex multicellular are shown to exhibit behavioral and physiological rhythms (circadian rhythms) that persist with the period of approximately 24 hours. These rhythms are generated by the internal system known as the circadian clock. The clock is entrained by external cues such as light and feeding regimen. We recently found that disruption of circadian clock leads to premature aging and reduced lifespan. Dietary restriction, mainly, calorie restriction (CR) is a well-known paradigm that delays aging and increases longevity in diverse species. Interestingly, we observed that calorie restriction did not have any effect on lifespan of animals with disrupted clock. We hypothesized that calorie restriction may have an effect on the circadian clock and longevity associated genes expression. To investigate this we checked the mRNA and protein expression of several clock genes in liver of calorie restricted animals and compared it with several control animals including ad-libitum (AL), time-restricted feeding (TR) and Fasting. We found that several clock genes exhibit high amplitude oscillation upon 30% CR while it significantly reduced the protein levels of CRY1. We also observed gene specific and time specific effect on longevity candidate genes expression. These results suggest that CR affects circadian clock and in turn clock may play a role in CR mediated beneficial effects. Therefore, we will further study the mechanism of CR effect on circadian clock function.

068  SLEEP AS OCCUPATION

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Occupational therapy (OT) provides holistic interventions with the goal to achieve, maintain, and promote a healthy lifestyle for each person. One main aspect of a healthy lifestyle is sleep, making up one third of our lives (National Institutes of Health, 2003). Many people will agree that sleep is important, but sleep is still not a priority in many people’s lives. The Centers for Disease Control and Prevention (CDC) writes, “Sleep is not a luxury- it is necessity- and should be thought of as a ‘vital sign’ of good health” (2013). OT does not have a large role in promoting sleep yet, but provides an important perspective and services to look at sleep more globally as a significant part of each person’s lifestyle. The changes and adaptations that people make to achieve a healthy pattern of sleep need to focus not just on the time and activities directly associated with sleep, but will consider the totality of a person’s lifestyle, including the environment, to give sleep the importance it deserves in a person’s health.

069  LARGE ECOSYSTEM CHANGES IN LAKE ERIE INFERRED FROM A MULTI-ELEMENT SEDIMENT RECORD BACK TO ~1800

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Records of major and trace elements in lake sediments can be used to indicate changes in ecological, climatic, and environmental conditions in the past. However, the use of these elemental data is not necessarily straightforward due to the complexity of human, climate and ecosystem interactions. Concentrations of multiple elements (Al, Ca, Fe, K, Mg, Mn, Na, As, Ba, Be, Cd, Co, Cr, Cu, Mo, Ni, Pb, Se, Sn, Ti, V, and Zn) were measured on samples from a 39-cm-long sediment core
taken from Lake Erie, off the Vermilion coast of northern Ohio, USA. Activities of radionuclides ($^{210}$Pb, $^{137}$Cs and $^{226}$Ra) were counted on selected sediment samples for age control. Combination of these results allows us to develop a 210-year multi-element sediment record of ecosystem changes in the lake. We employed statistical tools such as hierarchical clustering and principal component analysis (PCA) to disentangle the major factors (fluvial inputs, lake-level changes, and in-lake cycling processes) that affected the lake’s ecosystem changes over the past 210 years. Following a slow eutrophication during European settlement, Lake Erie experienced a period of accelerated eutrophication which resulted in an ecosystem regime transition into a eutrophic lake state in 1950. The lake’s biological productivity has ever since remained fairly high even though a significant reduction in nutrient loading was realized from rigorous abatement programs that began as early as 1969. The majority of these ecosystem changes were attributed to fluvial inputs from various anthropogenic sources, as represented by 73% of the total elemental variations in the record. Nonetheless, there is robust evidence that the lake’s ecosystem was affected by lake-level fluctuations and that in-lake biogeochemical cycling has played an important role in sustaining the loadings of bioavailable nutrients and trace elements in this already eutrophic lake today.

070 SHOTGUN LIPIDOMICS IN EARLY SCREENING AND DIAGNOSIS OF ALZHEIMER'S DISEASE

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Alzheimer’s disease (AD), the most common form of progressive dementia, is estimated to affect 27 million individuals worldwide with numbers doubling every 20 years. By the current diagnostic tools, AD can’t be diagnosed until the disease progresses into the final stage of dementia. Thus, there is an urgent need to develop means for the early detection of the disease. Lipids are known to play critical roles in brain activities and have been implicated in numerous neurological disorders including AD. Growing evidences suggest that classes of lipids such as the phospholipids and sphingolipids play a major role in disease progression. Hence, we have developed an effective shotgun lipidomics method to profile the various classes of lipids that tend to be affected at the early stage of the disease, as a means for early detection and diagnosis of AD. In this work, we compared the compositional changes of lipids in plasma from two AD patients and two normal controls. Plasma samples spiked with internal standards were first extracted by modified Bligh-dyer method; then, fractionated into various lipid classes by amino-propyl solid-phase-extraction cartridges. Each class of lipids was subjected to array of multiple precursor and neutral loss scans through direct sample infusion. Lipid identifications (over 300 glycerolipids and phospholipids) were accomplished by LipidView™ software. Semi-quantitative analyses of glycerolipids and phospholipids were achieved using the spiked internal standards of representative lipids. Statistical analysis of plasma lipids was carried out by MarkerView™ software using principal component analysis (PCA) and t-test. In this preliminary study, more than 60 phospholipid species showed significant differences between normal controls and AD patients (p < 0.005, t-test), with concentration changes ≥ 5 folds. The method developed provides a powerful means for the discovery of biomarkers of AD.

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

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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. Transposition 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.

072  TARGETING ANDROGEN RECEPTOR MESSENGER RNA TRANSLATION USING SMALL MOLECULES

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Approximately 233,000 men are newly diagnosed with prostate cancer each year and about 29,000 of those men will die from it. Androgen ablation or deprivation therapy initially depletes circulating androgens, however, the adrenal glands and intratumoral derived androgens can fuel production of androgens and promote androgen receptor (AR) signaling and development of castrate resistant prostate cancer (CRPC). AR expression and function can be targeted at the mRNA levels using noncoding microRNA (miRNA). We will identify small molecule inhibitors that can target the translation of AR mRNA, turning off AR mRNA translation. First, firefly luciferase under AR 3'UTR control will be used to screen small molecule chemical libraries to identify inhibitors of AR protein synthesis in PC3 and DU145 cells. After primary drug candidates are indentified they will be validated using AR reporter under AR 3'UTR control in the same cells. To further evaluate that the compounds identified inhibit AR translation we will evaluate the target specificity using LNCaP and VCap cells. The AR protein levels of the top inhibitors identified will be quantified using AR mRNA quantitative RT-PCR and immunoblots. This AR reporter assay system to screen small molecule libraries will allow us to potentially find new drugs to treat CRPC and prevent thousands of men from dying from it.

073  PEROXYNITRITE INTERACTION WITH SYNTHETIC MELANIN FILMS

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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, the primary product of the reaction of superoxide ion and nitric oxide, and is relatively a new member of the nitroxidative array of reactive metabolites. Early 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.
FACIAL AFFECT RECOGNITION DEFICITS IN STUDENTS THAT EXHIBIT SUBCLINICAL BORDERLINE PERSONALITY TRAITS

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Intro: Borderline personality disorder (BPD) is a mood disorder that affects 2-4% of the general population, up to 20% of psychological inpatients, and 10% outpatients. It is characterized by unstable affect, behavior, mood, interpersonal relationships, and self-image, and tends to stem from a history of abuse. The DSM-5 scales are labeled as: impulsivity, affect inability, abandonment, relationships, self-image, suicide, emptiness, anger, and quasi-psychotic. Those with BPD tend to have difficulty recognizing and reacting to negative emotions (mainly fear, anger, and disgust). Additionally, researchers have found the brain areas that relate to emotion, planning, attention, memory, and decision-making are smaller in borderlines than healthy subjects.

Objective: The purpose of this study was to examine participants with subclinical borderline features and determine the relationships between facial affect recognition deficits.

Methods: Thirty-five undergraduates from Cleveland State University participated in a computer-based study assessing reaction times (RT) and accuracy to Ekman's Pictures of Facial Affect, the now-standard emotional facial stimuli.

Results: The majority of participants were Caucasian (68.8%) and female (88.6%). Mean age was 20.89 ± 4.75, and 16/35 (45.7%) exhibited high borderline traits. There were no significant differences comparing RT and accuracy between groups (all p values ≥ .124). With regard to lateralization, there is a significant difference in the relative disgust index when comparing borderlines (M=.61 ± .08) to controls (M=.73 ± .12) (t(33)=1.31, p=.002).

Conclusions: Our sample of adults with subclinical borderline features did not exhibit significant deficits in recognition of facial affect, yet appeared to have difficulties in reacting quickly to the stimuli. Our data suggests lateralization of disgust is symptom specific. As such, it could be that when those with borderline traits are experiencing an episode, the lateralization changes. Therefore, we should think about the concept facial affect recognition as a dynamic process of emotional state.

POLYSACCHARIDES ISOLATED FROM AGARICUS BLAZEI MURILL INDUCE PHOSPHORYLATION AND APOPTOSIS IN RAW 264.7 CELLS

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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 several different polysaccharides from ABM and named them as TJ1, TJ2, TJ3 and TJ4. Interestingly, these polysaccharides displayed distinctive bio-functions in the treatment of macrophages. TJ1, TJ2 and TJ4 stimulated the proliferation of Raw 264.7 cells while TJ3 significantly induced the phosphorylation and promoted apoptosis in the cells, a function similar to lipopolysaccharides (LPS). The preliminary results warrant further investigating their functions in the immune system.

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

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Lesser celandine (Ranunculus ficaria), an invasive plant brought over from Europe, is becoming widespread throughout the north eastern and north western United States. Despite being aesthetically pleasing, lesser celandine can cause extensive damage to ecosystems or communities. Its rapid reproductive rates and spring ephemeral growth pattern, linked with its production of bulbils and tubers, allow lesser celandine to disperse and establish more rapidly than its local competitors. There is cause for concern as fresh leaves of lesser celandine contain protoanemonin, a chemical compound that is toxic to...
most mammals. This invasive species is able to outcompete many native plant species due to its earlier growing season and its ability to create extensive dense mats that limit the resources available during a short spring window critical for native species. This study aims to explore the effects that site characteristics have on the reproductive output of this herbaceous invasive. This will be examined through the measurement and comparison of reproductive output (seed, bulbil and tuber production rates) in lesser celandine plants collected from a variety of habitats, and the consequences of these varying reproductive rates will be investigated through demographic models of lesser celandine population growth.

077  **TRYPANOSOMA BRUCEI RAP1 PLAYS AN IMPORTANT ROLE IN SUPPRESSING SUBTELOMERIC VSG ASSOCIATED GENE CONVERSION BY REDUCING R-LOOPS AT TELOMERES**

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*Trypanosoma brucei* is a parasite that causes fatal human African trypanosomiasis. While proliferating inside its mammalian host, *T. brucei* regularly switches its major surface antigen, VSG, to evade elimination from the host immune response, which is the key virulence mechanism for *T. brucei* to establish a persistent infection. VSGs are expressed exclusively from subtelomeric VSG expression sites (ESs) in a strictly monoallelic fashion. Both monoallelic expression of VSGs and VSG switching are essential for a successful antigenic variation. We have shown that *TbRAP1*, an integral component of the telomere complex, play critical roles in VSG silencing by maintaining a heterochromatic structure at the telomere. Here we show that *TbRAP1* is important for VSG switching regulation. A transient depletion of *TbRAP1* led to an increased VSG switching frequency, and VSG-associated gene conversion is the predominant mechanism. It is well known that actively transcribed regions often form R-loops, which are an RNA:DNA hybrid structure, resulting from invasion of the nascent RNA strand into the double-stranded DNA. It has been shown that R-loops increase DNA double strand breaks and make highly transcribed regions more prone to DNA recombination. In *T. brucei*, telomeres are transcribed into a long non-coding RNA, TERRA, and depletion of *TbRAP1* leads to derepression of all ESs and elevated TERRA level. We have also observed a stabilization of R-loops at telomeres upon depletion of *TbRAP1*, suggesting that in *TbRAP1* depleted cells, elevated TERRA level leads to increased amount of telomeric R-loops and subsequent more frequent DNA recombination at the ES-linked *VSG* loci, which are immediately adjacent to the telomeric repeats.

078  **THE CORRELATION OF YOUNG SOCCER PLAYERS WHO PLAY ON SYNTHETIC TURF AND HEMATOPOIETIC DISEASES: AN ARTICLE REVIEW**

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Coach Amy Griffin of the University of Washington observed a striking correlation of several female soccer goalies being diagnosed with non-Hodgkin lymphoma who played on synthetic turf. She took her findings to NBC News where the article was released. Synthetic turf is fake grass covering a rubber cushion, crumb rubber, which is made of ground recycled tires. Sathiakumer et all describe in their article how those working in the rubber industry are exposed to the hazardous chemicals due to high exposure and the increased risk and contraction of lymphoma and leukemia. Soccer players share some of the same risks as workers in the rubber industry because they ingest the crumb rubber, inhale the off gassing, and are exposed to the chemicals for extended periods of time (Zhang et all). Several studies have shown that the components of crumb rubber are hazardous chemicals which can be released into the atmosphere and absorbed by those around it.

079  **INDIVIDUAL FUNCTIONAL DOMAINS OF TRYPANOSOMA BRUCEI RAP1 CONTRIBUTE TO TELOMERIC SILENCING**

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**Trypanosoma brucei** is a protozoan parasite that causes sleeping sickness in humans and nagana in animals. The main reason for persistent infection of *T. brucei* in its mammalian host is that *T. brucei* undergoes antigenic variation and regularly switches its major surface antigen, Variant Surface Glycoproteins (VSG), to evade the host's immune response. VSGs are exclusively expressed in a monoallelic manner from VSG expression sites (ESs) located at subtelomeric loci. We and others have shown that telomeres play important roles in VSG expression and switching regulation. So far, we have identified three conserved telomere proteins in *T. brucei*: TbTRF (ortholog of TRF2; Li et al. 2005. *MCB* 25:5011), TbRAP1 (ortholog of RAP1; Yang et al. 2009 *Cell* 137:99), and TbTIF2 (ortholog of TIN2; Jehi et al. 2014. *Cell Res.* 24:870). Studies from our lab have established that TbRAP1 is essential for VSG silencing, as depletion of TbRAP1 leads to derepression of all subtelomeric VSGs and expression of multiple VSG proteins on *T. brucei* cell surface simultaneously (Yang et al. 2009. *Cell* 137:99; Pandya et al. 2013. *NAR* 41:7673). However, the mechanism by which TbRAP1 regulates VSG silencing is not completely clear. TbRAP1 contains three conserved functional domains: BRCA1 C-terminus (BRCT), Myb, and RAP1 C-terminus (RCT). In order to characterize functions of individual domains of TbRAP1, we deleted different functional domains of TbRAP1. We have established a number of TbRAP1 conditional knockout strains expressing various TbRAP1 mutants and examined their effects on VSG silencing. We will provide data about functions of different TbRAP1 domains.

**080 NON CANONICAL ROLES OF THE MUSCLE REGULATORY TRANSCRIPTION FACTOR MyoD**

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The canonical role of the muscle regulatory transcription factor MyoD during differentiation is to play a role in increasing the expression of the cyclin-dependent kinase inhibitor p21 followed by increasing the expression of genes responsible for muscle function. By comparing parental myoblasts with those silenced for MyoD expression, we have identified and explored three novel roles for MyoD. Firstly, we have determined that myoblasts silenced for MyoD expression proliferate almost twice as fast as their parental counterparts. Cell cycle analysis of myoblasts in growth medium (GM) indicates that silencing of MyoD results in a 20 percent increase in cells in S phase. Consistent with this result, we have determined that there is decreased expression of p21 mRNA in the absence of MyoD. Thus, MyoD regulates p21 expression and cell cycle progression in GM in addition to its canonical role during differentiation. Secondly, since MyoD is responsible for changing the transcriptome in differentiating myoblasts, we speculated that MyoD might also play a role in regulating translation to accommodate this changing transcriptome. To this end, our lab has determined that MyoD positively regulates the expression of molecules critical to Cap-dependent translation. Consistent with this discovery, we have determined that IRES mediated translation is facilitated in the absence of MyoD. Finally, we have also previously reported that when myoblasts are cultured in DM, MyoD directly regulates the expression of the pro-apoptotic Bcl2 family member PUMA, causing a sub population of cells to undergo apoptosis. However, the signaling pathway responsible for determining when MyoD will increase the expression of myogenin and differentiation, or PUMA and apoptosis, remains unknown. We now report that inhibiting signaling by the p38 kinase increases the expression of PUMA and that this increase is MyoD-dependent.

**081 THE EFFECTS OF DIFFERING INITIAL SOIL PH ON MICROSTEGIUM VIMINEUM GERMINATION AND SEEDLING GROWTH**

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*Microstegium vimineum*, is an invasive C4 grass species that inhabits forests in the eastern United States. Previous research has shown that *M. vimineum* prefers higher soil pH for establishment, and that it can possibly alter the soil chemistry to change the pH to its optimal level for growth and development. In this greenhouse experiment, *M. vimineum* seeds were planted in potting soil treated with various levels of hydrated lime powder to increase the soil pH. The number of days it took for the seeds to germinate and for cotyledons to fully emerge was recorded and observed. After growing for about 6 weeks, the seedlings were removed from pots, dried, and weighed. The average number of days it took for the seeds to germinate indicates that it *M. vimineum* may prefer the untreated potting soil with lower pH. Conversely, the percentage of seeds that germinated concurs with previous research and shows how it prefers the soil with the higher soil pH. However, having a larger sample size in future research could create more accurate results.
082 P.R.E.P. PRE-RETIREMENT EDUCATION PROGRAM: A PILOT PROGRAM

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Some of the most recurring questions in studies on retirement planning involve what the person will do in this unique stage of life. In order to successfully transition from the workforce to retirement, it is important to understand the factors that contribute to a healthy, well-balanced lifestyle. A literature review revealed common themes of influence on physical, cognitive, leisure and social health in retirement. Lack of awareness or failure to incorporate these principles can lead to a decline in health and well-being during this transition.

The primary purposes of this project are to aid pre-retiree’s in preparing for a successful transition into retirement, and to study the most effective methods for preparing workers for retirement. A service learning course for Cleveland State University students enrolled in the Masters of Occupational Therapy Program, supervised by a faculty member, has been created to address these and other retirement issues and concerns. Occupational therapy professionals have the expertise to implement such programs due to their training in the meaning and use of activities to promote a healthful life. Through the use of a pre- and post-test, instructional manual, and evidence-based learning modules, the service learning program will educate participants and provide them with helpful resources and opportunities for learning and involvement. This project will serve as a pilot in developing a model for wider dissemination.

083 INVESTIGATING THE ROLE OF OPEN BIGRAMS IN WORD PERCEPTION

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Many models of word identification suppose a hierarchical system in which units at increasing levels respond to features, letters, letter combinations, and words. Some models suppose units responsive to bigrams—letter pairs—that may not be adjacent in a letter-string stimulus. In such a model, a stimulus such as BIRD would activate, at the bigram level, bigrams representing adjacent letters BI, IR, and RD, and also bigrams representing nonadjacent letters BR and ID. Grainger, Mathot, and Vitu (Acta Psychologica, 2014) reported an experiment in which strings to be classified as words or nonwords were flanked by bigrams from the target string or not; for flanking bigrams consisting of target-string letters, the order of the bigrams was as in the target string or switched, and the order of letters within the bigrams was as in the target string or switched. (For example, BIRD could appear with these flankers: BI BIRD RD; RD BIRD BI; IB BIRD DR; DR BIRD IB; CE BIRD NT.) Grainger et al. (2014) 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); but whether flanking bigrams were ordered as in the target did not affect performance. We will investigate whether flanking open bigrams facilitate lexical decisions. Experiment 1 will investigate performance in the conditions from Grainger et al. (2014). Experiment 2 will include four additional conditions in which the flanking bigrams consist of letters separated by one letter in the target (e.g., BR BIRD ID; ID BIRD BR; RB BIRD DI; DI BIRD RB).

084 DETERMINATION OF BARDOXOLONE METHYL BY ULTRA PERFORMANCE LIQUID CHROMATOGRAPHY TANDEM MASS SPECTROMETRY (UPLC-MS/MS)

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Bardoxolone methyl [2-cyano-3,12-dioxooleane-1,9(11)-dien-28-oic acid methyl ester; CDDO-Me] is a semi-synthetic triterpenoid with high anti-inflammatory activity. Currently, there are two Phase II clinical trials are open for patient recruitment, one for pulmonary arterial hypertension disease, and the other one for type 2 diabetic and chronic kidney disease.
In this work, we have developed a rapid and highly sensitive method for quantitation of CDDO-Me in human urine matrix using positive electrospray ionization UPLC-MS/MS. In this method, CDDO-Me and internal standard (CDDO-TFEA) were first extracted from the human urine using methyl tert-butyl ether (MTBE). Chromatographic separation was carried out isocratically on Kinetex C18 column (2.1 × 50 mm, 1.7 µm) using a mobile phase containing 80% Methanol and 20% 10 mM ammonium formate with 0.2% formic acid at a flow rate of 0.5 mL/min. Quantitation was accomplished by tandem mass spectrometry using multiple-reaction-monitoring mode with mass transitions of m/z 506.4→446.4 for CDDO-Me and m/z 573.4→446.4 for the IS. This method has a lower limit of quantitation (LLOQ) of 0.250 ng/mL and a linear calibration range up to 100 ng/mL in human urine, which has been validated according to the industry guidance for bioanalytical method.

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

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Emotion recognition is essential for interpersonal communication. However, previous research has suggested that older adults are not accurate as younger adults in recognizing emotion, in particular negative facial expressions (Slessor, Phillips, & Bull, 2010, Murphy & Isaacowitz, 2010, Henry, Livingstone, & Phillips, 2008, Mienaltowski et. al, 2013). Including additional contextual information (e.g., manipulation of certain facial features) as well as investigating the physiological saliency of facial expression stimuli might alleviate such age differences. In this current study (n=60), we are investigating how general age differences in emotion recognition are influenced by stimulus factors (eye gaze direction configuration) and behavioral and physiological attention measures (visual fixation and attentional orienting assessment). We are predicting greater emotion recognition in younger adults for anger, fear, and sadness, but no age differences for averted gaze recognition for fear or for positive emotions such as happiness. We are also predicting, greater eye region fixation for anger, fear, and sadness for younger adults, however older adults might show a greater mouth region fixation for happy. If older adults do better at recognizing fear with an averted gaze, they should show greater fixation to the eye region for those stimuli than for eye regions for other stimuli, namely direct gaze of negative emotions. Furthermore, previous research suggests that cardiac OR may be more prominent for aversive, negative stimuli (i.e., fear stimuli; Bradley, 2009). Therefore, we would expect that any age differences in cardiac orienting to potentially track with recognition performance (i.e., greater orienting responses for younger adults compared to older adults for directed anger, fear, and sadness, as well as averted anger and sadness, while age differences in ORs could be attenuated for averted fear and happiness).

086 DESIGN AND SYNTHESIS OF BORONIC-ACID CONTAINING MACROMOLECULES AS NEO-LECTINS (LECTIN MIMETICS)

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Carbohydrate recognition is a crucial event in many biological processes. 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 therapeutic targets or diagnostic mechanisms for various diseases, including viral infections, autoimmune diseases, cancer, and cardiovascular disorders. In the past decade, lectins, the sugar-binding proteins, have been conventionally used to determine the structure and function of glycoproteins. However, the number of available lectins is still limited compared with diversity of glycan structures. Exploring new lectins or lectin mimetics is therefore highly demanded. Boronic acid (BA)-containing compounds have unique properties for carbohydrates and have been shown to be highly specific. Their ability to form cyclic esters with diols of sugars 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. This research proposes a synthetic approach to model boronic acid-containing proteins, polymers, and dendrimers as neo-lectins for carbohydrate-recognition. The characterization, quantitation, and kinetics of each to be shown by SDS-PAGE, MALDI-tof, and Fluorescence.
**087 PRE-SERVICE TEACHERS’ EXPECTATIONS REGARDING PARENTAL INVOLVEMENT IN URBAN SCHOOLS**

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There is overwhelming research evidence that increased parental involvement improves important student outcomes. Urban schools rarely achieve high levels of parental involvement. Several barriers to high parent involvement in urban schools include parents’ feeling unwelcomed by school staff, parental lack of resources, and parents’ lack of familiarity with schools.

Teacher expectations of parental involvement in urban schools impact involvement. Discrepancy between urban school teachers and families’ values may inhibit teacher-parent collaboration and parent involvement. By surveying pre-service teachers at Cleveland State University, this study aims to investigate whether (a) teachers perceive urban parents as less likely to be involved in their child’s education; (b) teachers judge urban parents more harshly than suburban counterparts; and (c) whether teacher expectations about low involvement or blaming predicts teachers willingness to build teacher-parent partnerships in urban schools. The survey will consist of three sections. The survey includes items regarding teacher characteristics, beliefs about parent involvement and vignette items addressing attitudinal and action items. Results will be discussed regarding belief differences based on district setting. Best practices to increase urban parent involvement will be discussed.

**088 AR PRECURSOR mRNA SPLICING: UNDERSTANDING THE CAUSE AND CONSEQUENCE OF DRUG RESISTANCE IN PROSTATE CANCER**

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Prostate cancer is the most prevalent cancer in American male and only second to skin cancer. In a large number of patients, progression of prostate cancer depends on expression and signaling of androgen receptor (AR). AR is a ligand-dependent steroid receptor family transcription factors and required for normal growth and development. However, plays a pivotal role in development of prostate cancer. Conventional treatment for the prostate cancer is mainly involving androgen deprivation (surgical or medical castration). However, nearly 20% of prostate cancer progresses to castration resistance prostate cancer (CRPC), which is an advanced form of disease in which the cancer cells either bypass or sensitize the AR signaling pathway. Among many molecular mechanism involving AR functions in development of CRPC, expression of novel alternative spliced isoform also appears to play a role in development of CRPC. In addition, various AR alternatively spliced isoforms have been identified in prostate cancer tumor, however molecular mechanism contributing to the expression of these novel tumors-specific isoforms and their function in prostate cancer biology remained undefined. In this study, we are investigating AR precursor mRNA splicing in an attempt to understand development of drug resistance, presumably mediated by novel AR mRNA alternatively splicing isoforms in prostate cancer. Using a novel AR minigene reporter construct, we are planning to study effect of AR mutations on AR pre-mRNA splicing. Our experiments will reveal the consequences of naturally occurring mutations of AR in prostate cancer patients those have developed resistance to next generation of therapeutics including Enzalutamide (Xtendi) and Abiraterone Acetate (Zytiga). We will discuss the preliminary data obtained from initial AR minigene splicing characterization experiment. Understanding the basic molecular mechanism of alternative splicing of AR in prostate cancer will help better management of prostate cancer.

**089 INVESTIGATING THE ROLE OF U12-DEPENDANT SPICEOSOME SPECIFIC PROTEINS IN U12-DEPENDENT SPLICING**

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Splicing is one of the modifications that a pre-mRNA undergoes in order to remove the non-coding introns and the coding exons are joined together. Nearly, all metazoans genome contain two different types of introns with distinct cis-acting signature sequences. These are known as major or U2-dependent and minor or U12-dependent introns. As the name indicates
the minor class introns only comprise <0.5 of the total introns with ~2-fold slower rate of splicing as compared to major class introns. U12-dependent introns are harbored in the genes which are involved in various important cellular functioning. The two different types of introns are spliced by two different set of machineries known as spliceosomes. Minor class spliceosome functions through specific U11, U12, U4atac and U6atac snRNAs and U5 serves in both the spliceosomes. It has been reported that both the spliceosomes share many proteins. However, U11/U12 di-snRNP 18S complex is associated with a set of seven proteins (65K, 59K, 48K, 35K, 31K, 25K and 20K) which are specific to minor class spliceosome only. The main focus of this study is to understand RNA-protein interactions specific to U12-dependent spliceosomal snRNA and its associated proteins. Proteins that are specifically associated with minor spliceosome are p20, p25, p31, p48, p59, and p65. In order to address this, we have cloned the ORFs of all seven proteins with FLAG-tag at the N-terminal and 6×His-tag at C-terminal in pET3a bacterial expression vector. We transformed these constructs in BL21 GOLD cells. The protein was induced using IPTG and affinity purified using HIS-binding resin. We are in the process of generating radiolabeled U12-dependent snRNAs. By Electrophoresis Mobility Shift Assay (EMSA) we will explore the potential RNA-protein interactions occurring in minor spliceosome.

090 VARIABILITY AND LOCATION OF MOVEMENT ENDPOINT DISTRIBUTIONS IN A CYCLIC AIMING TASK

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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 variability of movement endpoint distributions should fill the target region (Meyer et al., 1988). Because increases in the amount of movement endpoint variability correlates with increases in movement speed (Schmidt et al., 1979), centering the distribution on the target center and expanding variability to the limits of the target boundaries should allow for maximization of movement speed, without the production of movement errors (i.e., target misses). Slifkin and Eder (2015) recently found that those predictions only held over a range of small target widths; however, as target width increased the endpoint distribution variability increasingly underestimated the variability permitted by the target boundaries and the location of the distribution center increasingly underestimated the target center. Those results suggest that the downward shift in endpoint distribution location was based on “knowledge” of the amount of endpoint variability relative to the unused space in the target. Here, we provide a proposal to extend the results of that study (Slifkin and Eder, 2015) by explicitly manipulating endpoint distribution variability by delivering tasks instructions with an emphasis on either 1) movement accuracy, 2) both movement accuracy and speed, or 3) movement speed. Participants will generate movements under different target width conditions. It is expected that variability will increase as the emphasis on movement speed increases. In turn, as variability increases within a given target width condition, the amount of unused space within the target region should decrease and the center of the movement endpoint distribution should shift up toward the target center. Such results would provide further support for the notion that where participants aim is based on “knowledge” of variability relative to the amount of space in the target region.

091 EDUCATIONAL OUTREACH PROGRAM “PHYSICS FRIDAYS” AT CAMPUS INTERNATIONAL SCHOOL

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Physics Fridays is the outreach program run with members of the Society of Physics Students (SPS) at the Campus International School (CIS). Since 2011 together with several CSU students (SPS members) and CSU alumni, we have gone to the CIS once a month for an interactive physics exploration sessions with K-6th graders. The outreach program serves 30-50 kids of the afterschool program at CIS. Through the program, students in the CIS’s afterschool program have participated in many engaging physics lessons. The lessons are built around interactive and exciting large group demonstrations and small group activities. The students learn physics through hands-on exploration of topics like simple machines, sound waves, electricity, optics, phases, and much more.

Learning through inquiry is an excellent way to get kids excited about science. This outreach program has won five consecutive Marsh W. White Awards (2011-2015) from the National SPS, a division of the American Institute of Physics.
INTERACTION OF INTERNAL CLOCKS TO REGULATE RHYTHMS IN METABOLIC ACTIVITY

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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. CLOCK and BMAL1 are core clock genes that are involved in this transcriptional-translational feedback loop which in turn regulate metabolic processes and coordinate them with daily rhythms. Availability of nutrients too, 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. Also previous studies have shown that mice entrained on 12:12hr light-dark cycle showed circadian rhythms in food anticipatory behavior (FAA, driven by food entrainable oscillator - FEO). How these internal clocks interact, whether their functions overlap or are independent of each other is the subject of our investigation. Hence we plan to study these interactions by using different feeding paradigms and performing behavioral analyses.

A RUGGED ETALON-BASED DISPERSIVE ELEMENT FOR HIGH RESOLUTION SPECTRAL IMAGING

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Spectral imaging offers many advantages over more invasive, destructive analytical techniques and yields maps of chemical composition as well as differences in the physical characteristics of the sample, depending on the spectral modality employed. To date, narrow-band methods like Brillouin inelastic scattering spectroscopy have not been adapted for turn-key line-scan or wide-field imaging applications due, in part, to the lack of suitable wavelength filters. The Brillouin modality results from the interaction of incident photons with the acoustic phonons of the sample and Brillouin imaging would be useful for optically mapping the elastic properties of the sample nondestructively. The challenge is developing suitably narrow-band image filters. Recently the Brillouin spectrum has been resolved using a virtually imaged phased array (VIPA), which can be thought of as a modified side entrance Fabry-Perot etalon employing a range of incident angles. In the work presented here, we have developed and characterized several narrow-band VIPAs. A fully generalized dispersion equation has been developed which relates the input optical field to the VIPA response for both isotropic and anisotropic dielectrics. Hence, the dispersion relation is well suited for designing tunable VIPA elements that would enable high spectral resolution in a fixed image plane. In addition to the full theoretical description, validation studies as well as the design of a Brillouin imaging system are presented.

THE EFFECT OF MIXED-FONT ITEMS ON LEXICAL DECISION PERFORMANCE

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The multistream model of word perception suggests that word identification generally involves whole-word information, but that when the orthographic form of a letter string is not standard, the processing is slowed. For example, within-item case transitions have been shown to slow responses in lexical decision experiments, in which participants decide whether each presented letter string is or is not a word. We plan to investigate the effect of within-item font changes on lexical decision performance. The individual letters within high-quality font types are designed to be distinct yet related in order facilitate reading (Sanocki & Dyson, 2011). The letters of a font are related by sharing certain design parameters. The extent to which within-item font transitions disrupt processing of letter strings may depend on the similarity of those design parameters between fonts. For example, Old Bookman Style and Optima are highly similar in terms of letter weight, contrast, angle of stress, and reference frame; thus, a within-item transition between these fonts may not slow processing. However, Old Bookman Style and Arial Black are similar only in angle of stress and reference frame; a within-item transition between these
fonts is more likely to disrupt processing in a lexical decision task. Experiment 1 will investigate whether between-item variation in font interferes with lexical decision performance. Experiment 2 will investigate whether within-item font mixing interferes with performance.

096 PLASMODIUM FALCIPARUM GENE DISCOVERY USING APICAL ORGANELLE PROTEIN SPECIFIC MONOCLONAL ANTIBODIES

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Malaria parasites use apical organelles, known as rhoptries, micronemes and dense granules, to secrete proteins that are involved in host cell invasion. In previous studies we showed that immune complexes (IC) formed from incubating monoclonal antibodies (Mabs) and *P. falciparum* extracts could be analyzed by multidimensional protein identification technology (MudPIT) in order to identify genes encoding specific proteins. We characterized mouse monoclonal antibodies, SA1B5 and SP2B6 clones, specific for apical proteins by immunofluorescence assay, western blotting and immunoprecipitation. We also performed solubility studies to determine whether proteins recognized by antibodies are soluble or integral membrane proteins. Precipitated proteins will be subjected to MudPIT analysis in order to generate peptides for proteomics analysis gene identification. Western blot analysis shows that Mab SA1B5 F1 and SA1B5 G7 clones recognize a 48/50 kDa protein while Mab SA1B5 H12 binds to a 100 kDa protein. Mab SP2B6 clones recognize a 29/35 kDa protein. Immunoelectron microscopy was performed using Mab SP2B6 G1 to identify the localization of the protein identified by the antibody. The protein recognized by Mab SP2B6 G1 was identified in the body of merozoite. rhoptries. Results of MudPIT analysis using the Mabs in IC formation will be discussed.

097 RESPIRATORY SINUS ARRYTHMIA PATTERNS PREDICTIVE OF DEPRESSION SPECIFIC TO INTERPERSONAL SADNESS

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The parasympathetic branch of the autonomic nervous system (PNS) is believed to support the experience of emotions (Thayer & Lane, 2009) and social engagement (Porges, 2007). Not surprisingly, reduced PNS activity is linked to depression, a disorder marked by enduring feelings of sadness and interpersonal impairment (Rottenberg, 2007). Recent works show that patterns of PNS activity, indexed via naturally occurring heart rate variability and spontaneous breathing (respiratory sinus arrhythmia, RSA) during rest and in response to a sad film clip depicting loss of loved ones, incrementally predict depression symptoms relative to either PNS state alone (Yaroslavsky, Rottenberg, & Kovacs, 2013; 2014). Specifically, atypical RSA patterns comprised of high resting RSA levels and increased RSA activity during the film clip are most predictive of depression outcomes. However, it is unclear whether these patterns reflect atypical RSA responses to sadness in general, or interpersonal themes of sadness. The latter would be consistent with the role of PNS activity in adaptive interpersonal functioning that is impaired in depression individuals. Therefore, the present study aims to examine whether RSA patterns that predict depression are specific to interpersonal sources of sadness. Participants will complete measures of depression and a psychophysiology protocol during which we will collect electrocardiograms (ECG) during a resting period and during two negative mood induction tasks: a sad film clip depicting loss of loved ones (interpersonal sadness) and sad music (non-interpersonal sadness). Resting RSA will be derived from the participants’ resting ECG, and RSA reactivity will reflect the difference between RSA during the resting period and RSA derived from each of the mood induction tasks. Greater frequencies and predictive utility for depression of atypical RSA patterns in response to the sad film relative to the sad music will support PNS’ role in the experience of emotions and social engagement.

098 INVESTIGATION OF IRES-MEDIATED TRANSLATION OF PUMA mRNA AND INITIATION FACTOR REQUIREMENTS

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Translation of the majority of cellular mRNAs occurs by a cap-dependent/scanning mechanism of initiation, whereby the small 40S ribosomal subunit along with associated initiation factors (eIF1, eIF1A, eIF3, eIF5) and the ternary complex (eIF2-GTP-Met-tRNAi) forms the 43S preinitiation complex that binds (with the help of the cap-binding complex eIF4F) to the mRNA 5’ terminal cap structure and scans the 5’ untranslated region (UTR) of mRNA in search of the initiation codon. However, some viral and cellular mRNAs are translated via a cap-independent mechanism. Cis-acting elements, called Internal Ribosome Entry Sites (IRESs), located in the 5’-UTRs of some viral and cellular mRNAs facilitate direct recruitment of the 40S ribosomal subunits to the vicinity of the initiation, AUG codon. IRES-mediated translation may thus proceed without the help of many canonical initiation factors that are required during cap-dependent translation initiation. Cellular IRES-containing mRNAs usually operate under the conditions of the decrease of global protein synthesis and are important players in cellular physiology. The proapoptotic Bcl-2 family member PUMA (p53 upregulated modulator of apoptosis) has been implicated in several diseases such as cancer, cerebral ischemia and cardiac dysfunction. Importantly, PUMA has been previously shown to contain an IRES element that is active under conditions of eIF2-α phosphorylation and hypophosphorylation of eIF4E-BP leading to inhibition of cap-dependent translation. To further investigate the mechanism of PUMA IRES-mediated translation and PUMA mRNA recruitment to the ribosome, we employed the use of in vitro translation system. Sucrose density gradient centrifugation experiments revealed that PUMA IRES is not able to bind 40S ribosomal subunits directly. Further, the use of specific inhibitors such as hippuristanol (that targets eIF4A helicase, part of the eIF4F complex) and HRV2 2A protease (that cleaves the scaffolding protein eIF4G, which is also part of the eIF4F complex) showed that PUMA IRES requires intact eIF4G and eIF4A for its activity.

099  SARCASM’S IMPACT ON GOAL ORIENTATION AND ITS RELATION TO FEEDBACK SEEKING BEHAVIORS

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This study will investigate whether goal orientation acts as a mediator between sarcasm from management and feedback-seeking behaviors of the employees. 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 is the goal preference to improve one’s knowledge and to achieve personal enlightenment. Prove performance goal orientation is the goal preference to prove one’s competence and be viewed favorably. Avoidance performance goal orientation is the goal preference to avoid showing one’s incompetence and avoiding to be viewed negatively. It is known 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 (QSR) have noticed that crew members tend to not seek feedback. Feedback-seeking behaviors are important in QSRs because feedback motivates employees to work better and perform tasks correctly. This study will investigate the impact of managers’ use of sarcasm on employees’ goal orientation which would impact their feedback-seeking behaviors. It is expected that sarcasm from management will lead employees to have an Avoidance Performance Orientation and not seek feedback. We plan to investigate these relationships by surveying employees across different stores and work shifts within a fast food district. The data we collect will allow us to look at employees’ goal orientations and to see whether there is a relationship between goal orientation and manager sarcasm. The results will allow us to see if there is a connection between environmental factors that are controlled by managers, such as manger’s sarcasm, and employee feedback seeking behaviors and their desire to try new things and take risks at work.

100  THE DYSPHAGIA HANDBOOK: THE SPEECH LANGUAGE PATHOLOGIST’S GUIDE TO THE TREATMENT OF DYSPHAGIA IN ADULTS

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Dysphagia is a disruption in any of the four phases of the swallow: oral preparatory, oral, pharyngeal, and esophageal. The speech language pathologist (SLP) plays an important and integral role in the assessment, diagnosis, treatment, and maintenance of dysphagia. The Dysphagia Handbook is useful for all SLPs who work with adults with dysphagia, but it is...
geared towards new clinicians and clinicians who are perhaps changing career paths and entering the medical setting after a hiatus. The corresponding handbook outlines general information that an SLP needs to carry out treatment, such as the physiology and neurology of the normal swallow, disorders with descriptions, helpful handouts to give to family and caregivers, and more.

101 ATYPICAL PATTERN OF PARASYMPATHETIC NERVOUS SYSTEM INDICES AT REST AND IN RESPONSE TO A SAD MOVIE PREDICTS 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 problems that affects about 1%-2% of the general population. Many professionals agree that multiple factors influence the development of BPD, including genetics (Calati, Gressier, Balestri & Serretti, 2013), environment (Carr & Francis, 2009), and nervous system development (Houston, Ceballos, Hesselbrock & Bauer, 2005). Abnormalities in the parasympathetic nervous system (PNS) may be particularly important for understanding BPD because the PNS regulates emotions (Thayer & Lane 2009). Recent work with depressed individuals has shown that combining indices of PNS activity during resting states and in response to a sad film better predicted emotion regulation (ER) deficits and depression symptoms than either PNS state alone (Yaroslavsky, Rottenberg & Kovacs, 2013). 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. The forthcoming study will investigate whether atypical patterns of PNS activity, indexed via the fluctuations of heart rhythms during respiration (respiratory sinus arrhythmia, RSA), at rest and in response to a sad film predict BPD symptoms. The participants of the study will be students and community-dwelling adults with BPD symptoms who will be screened for the disorder through self-report surveys and clinical interviews. Respiratory sinus arrhythmia will be measured by electrocardiogram (ECG), using in a modified Lead II configuration on the chest. Resting RSA will be collected while participants are sitting calmly, and RSA reactivity will be calculated as the difference between resting RSA and RSA while participants watch a sad film clip. The results are expected to reflect a positive association between atypical RSA patterns and BPD symptoms. The results may help to illuminate origins of BPD.

102 SIMULTANEOUS DETERMINATION OF DIHYDROTESTOSTERONE AND ITS METABOLITES IN MOUSE SERA BY LC-MS/MS WITH CHEMICAL DERIVATIZATION

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Prostate cancer is the second leading cause of cancer-related deaths among men. Androgens play a key role in the prostate cancer development, and their elimination and blockade is vital in the disease management. Dihydrotestosterone (DHT) is the key ligand for androgen receptor (AR) in prostate and is locally synthesized from testosterone. In prostate, DHT is predominantly metabolized to 5α-androstane-3α,17β-diol (3α-diol) and 5α-androstane-3β,17β-diol (3β-diol). Recent studies show that impaired DHT catabolism is associated with the prostate cancer. To study the disease mechanism, a sensitive method for quantitative determination of DHT and its metabolites is critically needed.

In this work, an LC-MS/MS method has been developed and validated. Steroid-free serum was prepared and used for the preparation of serum calibrators and QC samples. DHT and its metabolites along with their respective stable heavy isotope labelled internal standards were first extracted with methyl tert-butyl ether (MTBE) and derivatized with picolinic acid, then the derivatized analytes were extracted again with MTBE, dried under nitrogen and reconstituted in the mobile phase (80% methanol and 0.2% formic acid in water). Chromatographic separation of the derivatized analytes was achieved isocratically on Xterra C18 column (2.1 x 100 mm) using the mobile phase at a flow rate of 0.25 mL/min. Quantitation was carried out using multiple-reaction-monitoring (MRM) mode with positive electrospray ionization. The mass transitions used were m/z 396 → 255 for DHT, m/z 399 → 258 for DHT-d3, m/z 398 → 257 for 3α-diol, m/z 401 → 260 for 3α-diol-d3, m/z 503 → 257 for 3β-diol and m/z 506 → 260 for 3β-diol-d3, respectively. The method has calibration ranges from 0.0500 ng/mL to 50.0
ng/mL for DHT and its two metabolites with acceptable assay precision, accuracy, recovery, and matrix factor. It has been applied to the determination of DHT and its metabolites in a preliminary animal study.

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

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Incera and M’Lennan (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 the currently proposed study, bilinguals and monolinguals will take 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 will be presented with stimuli modeled after x-rays of luggage shown to airport screeners and told to scan the image for large liquids. We will compare bilinguals’ and monolinguals’ accuracy and mouse tracking performance in this detection task. The results of this study will contribute to the literature on the bilingual advantage as well as the field of applied psychology.

104 THE EFFECT OF SODIUM CHOLATE ON THE ACTIVITY OF NANODISC-BOUND eNOSoxy: A POSSIBLE INTERFERENCE WITH GRIESS REAGENTS

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Previously we have successfully presented the incorporation of eNOS oxygenase domain into lipid nanodiscs as membrane model for the first time. The nanodiscs are formed from circular recombinant lipoproteins (MSP) that harbor lipids and cholesterol under defined experimental conditions. To elucidate the nanoenvironment effect of these bilayers on the behavior of the enzyme, we have compared and contrasted enzymatic activity of free eNOSoxy and eNOSoxy bound on lipid nanodiscs in terms of NO synthesis using the Griess assay. Our results indicated that the specific activity of nanodisc-bound eNOSoxy appeared to be much lower when compared to the free enzyme under same conditions. These data needs to be examined and assessed in depth in order to explain the obtained change in specific activity.

Sodium cholate is an ideal detergent used to solubilize the dried lipid film for nanodisc formation. According to the manufacturer’s product description, sodium cholate is readily soluble in H2O (neutral pH) up to 1M. On the other hand, Griess assay quantifies NO in the form of nitrite (NO2-) in a two-step diazotization reaction in which acidified nitrite produces a nitrosating agent, which is then derivatized to produce the final azo-product with a maximum absorption at 540 nm. To rule out the effect of sodium cholate as a possible interference with griess reagents, we evaluated the solubility of sodium cholate in acidic solution. Also we measured the activity of the enzyme with and without sodium cholate before and after dialysis. Our results revealed that sodium cholate precipitates in acidic solution however it does not affect the activity of the enzyme.

105 USE OF THE POREH COMPLEX FIGURE IN ASSESSING EXECUTIVE FUNCTIONS IN THE ELDERLY

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The use of complex figures to assess visual spatial abilities dates back to the work of Andre Rey (Rey, 1941). Studies have repeatedly shown that this figure also taps into organizational ability and planning abilities, abilities associated with executive functions. Several attempts have been made to adapt complex figures to the assessment of the elderly population (RBANS, Rey 1941). However, these figures are unable to tap into executive functions as they do not utilize the union jack.
The goal of the present research proposes to develop copying and planning norms for the Poreh Complex Figure (PCF). Scoring of the copying quality will employ similar guidelines to those originally proposed by Paul Osterrieth (1944) whereas planning scores will be assessed using Bennet-Levin (1984) and Savage et al. (1999) guidelines. It is hypothesized that poor planning when copying the figure will result in poor memory after a delay. It is also predicted that high convergent validity will be found between the scores of executive function measures, such as the trail making test, and the five point test.

106 ASYMMETRICAL VARIATION IN THE TRABECULAR BONE WITHIN THE HUMAN LUMBAR VERTEBRAE OF THE LIBBEN HUNTING POPULATION

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Trabecular bone, a porous network of struts found within mammalian bone, has been understood to show regional variations in response to weight bearing activities. In this study, the L4 vertebrae were examined from a population of prehistoric hunters and gatherers, with the hypothesis that the trabecular bone would show left-right asymmetry that may be an indicator of asymmetry in trunk and upper limb use such as during spear throwing. The L4 vertebra of 10 male and 10 female individuals aged 18-35 were digitally imaged using micro-computed tomography (micro-CT). Trabecular bone properties were quantified in the left and right sides of each vertebral body, then asymmetry determined as the difference. In males, no asymmetry was found in the volume, thickness, or number of trabecular bone. Females however showed greater bone volume on the left, both compared to the right side and to males. These results suggest that perhaps the activity and postural differences in the sexes influenced bone asymmetry. Future studies will explore whether there is a relationship between this asymmetry in the L4 vertebrae and asymmetry in other skeletal indicators of upper limb use (handedness), which may be useful in understanding the evolution of human tool use.

107 THE EFFECTS OF TRAUMATIC SYMPTOMATOLOGY, 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 (when traumatic events cause very strong dissociation). The proposed research predicts that, in contrast to non-traumatized individuals, when participants reporting more (vs. less) trauma symptoms are reminded of mortality they will display increased accessibility of death-related cognitions, regardless of whether they engage in a self-affirmation task (because trauma renders the cultural anxiety buffer ineffectual for them). The proposed research design will be a continuous (dissociative trauma symptomology) x 2 (MS vs. not) x 2 (self-affirmation vs. not) design, measuring the accessibility of death-related cognitions.

108 REGIONAL VARIATION OF TRABECULAR BONE PROPERTIES WITHIN THE POST-INDUSTRIAL HUMAN LUMBAR VERTEBRAE

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The internal structure of the human vertebrae is comprised of trabecular bone, a porous network of calcified bone known to strengthen with applied loading. Various habitual movements, such as unilateral upper limb use, are thought to asymmetrically distribute weight onto the lumbar vertebrae, affecting the strength and structure of the spine. Using a skeletal
population of thirteen post-industrial males, the trabecular properties and angulation of the spinous processes of the fourth lumbar vertebrae were quantified and measured to determine the extent of lumbar asymmetry across various age and body-weight groups. Medical imaging, regional sectioning, and statistical analysis were used to demonstrate that significant left-right differences in trabecular bone volume do, in fact, exist within the lumbar vertebrae. Specifically, the right side was found to have greater bone volume versus the left. Digital measurements of the spinous process deviation show that a majority (69%) within the sample deviate to the right. As a baseline study for future bone morphology research, this investigation serves to provide a better understanding of the modern, lumbar vertebrae and the regional, weight-bearing properties of the lower back.

109 CASE TRANSITION FORMAT AND LEXICAL DECISION PERFORMANCE: DOES SPACING ATTENUATE THE PRIVILEGE OF INITIAL UPPERCASE?

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Some models of visual word identification propose that identification is mediated exclusively by letter identification. However, some phenomena suggest that letter identification alone does not explain word identification. For example, lexical decisions (deciding whether a letter string is a word) are slower for words presented in mixed-case (e.g., TRAvel; traVEL) than in homogeneous-case formats (e.g., travel; TRAvel). Previously, we have found that not all forms of case-mixing slow lexical decisions: In an experiment in which six-letter stimulus items were shown in eight different 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; respectively)—for words, responses to homogeneous case formats were faster than those to mixed-case formats, but response times for initial uppercase words did not differ significantly from those for homogeneous case words, and were faster than those in the other mixed-case formats. Responses to initial uppercase words were as fast as the average speed of responses to homogeneous-case word, suggesting that initial uppercase, a regular orthographic form in English, is “special” mixed-case format. To investigate whether the initial-uppercase advantage is due to regular holistic properties, we conducted a new experiment with four-letter stimulus items presented in 16 formats that involved crossing eight formats (e.g., bird; BIRD; Bird; biRD; BiRD; birD; BIRd) with two spacings (packed, e.g., bird, and spaced, e.g., b i r d). (In spaced stimuli, adjacent letters were separated by one space.) Of interest is whether spacing, which reduces the extent to which a stimulus composed of multiple elements, such as letters, reduces response time differences among the mixed-case formats.

110 NOVEL METHODS TO STUDY GENES WITH MULTIPLE FUNCTIONS IN CAENORHABDITIS ELEGANS

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To establish a method for conditional disruption of protein function in Caenorhabditis elegans, we are implementing a degron system. This system utilizes a plant polypeptide tag, the Auxin Inducible Degron (AID), which, when added to a protein of interest (POI), triggers rapid degradation in the presence of the plant hormone auxin. TIR1, a plant F-box protein, binds the AID tagged POI in the presence of auxin and recruits an SCF ubiquitin ligase complex, resulting in polyubiquitination and degradation of the tagged POI. This system has been effective in yeast and in cells derived from mice, hamsters, chickens, and humans. We cloned TIR1 into a plasmid containing a C. elegans promoter and 3’ UTR that drive robust expression in the hermaphrodite gonad and early embryo. Two versions of TIR1 were constructed - one with a nuclear localization sequence (NLS) and one lacking an NLS - to allow targeting of both nuclear and cytoplasmic proteins. We have integrated TIR1 transgenes into the C. elegans genome and are currently confirming that they are expressed. We have also assembled constructs to express AID-tagged POIs and are currently generating integrated strains. As proof of concept, we AID tagged one nuclear and one cytoplasmic protein known to function normally when tagged with GFP, which is similar in size to AID: NMY-2 is a non-muscle myosin required for cytokinesis, and H2B is a histone integral to chromatin. Depletion of either can be monitored by Western blot and immunofluorescence. We have also tagged HCP-3, the C. elegans ortholog of
CENP-A. HCP-3 is essential for mitotic chromosome segregation, but has been reported to be dispensable for meiosis. Our preliminary data suggest that this conclusion is incorrect, a result of incomplete HCP-3 depletion by RNAi. Combining RNAi with AID-induced proteolysis will allow a rigorous test of this model.

111 MOUSE TRACKING THE ORTHOGRAPHIC LEXICON

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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 letter strings. In this study, we will use MouseTracking technology to map the process of a lexical decision, providing a more complete understanding of word processing; MouseTracking may reveal more about cognitive processing than just the speed and accuracy of a binary response. We will use MouseTracking in two lexical decision experiments. The first will be a replication of an experiment by Barca and Pezzulo (PLoS One, 2012), using high frequency and low frequency words, pseudowords, and letter strings. (These four stimulus types are ordered levels of lexicality.) We expect our results to be consistent with their findings; mouse paths for high frequency words and letter strings will be more direct than those for low-frequency words and pseudowords, which should have more area under the curve of the path. In the second study, the effect of varying orthography will be examined by seeing whether a case-change affects responses. Our case-change manipulation will follow a case change pattern of either upper-to-lower case (XXXxxx), or lower-to-upper case (xxxXXX) in the lexical and non-lexical stimuli. The interest of this study is the effect of orthographic manipulation on responding, as measured by MouseTracking.

112 MURINE AKAP7 HAS A 2', 5'-PHOSPHODIESTERASE DOMAIN THAT CAN COMPLEMENT AN INACTIVE MURINE CORONAVIRUS ns2 GENE

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Viral 2’ ,5’-phosphodiesterases (PDEs) help disparate RNA viruses evade the antiviral activity of interferon by degrading 2’,5’-oligoadenylate (2-5A) activators of RNase L. A-kinase anchoring proteins (AKAPs) bind the regulatory subunits of protein kinase A (PKA) to localize and organize cAMP signaling during diverse physiological processes. Among more than 43 AKAP isoforms, AKAP7 appears to be unique in its homology to viral 2’,5’-PDEs. Here we show mouse AKAP7 rapidly degrades 2-5A with similar kinetics to that of murine coronavirus (MHV) strain A59 ns2 and human rotavirus strain WA VP3 proteins. To determine if AKAP7 could substitute for a viral 2’,5’-PDE, we inserted AKAP7 cDNA into an MHV genome with an inactivated ns2 gene. The AKAP7 PDE domain, or an N-terminal truncated AKAP7 (both lacking a nuclear localization motif), but not the full length AKAP7 or a mutant AKAP7 (H185R), restored infectivity of ns2 mutant MHV in bone marrow macrophages and in liver of infected mice. Interestingly, the AKAP7 PDE domain and the N-terminal deleted AKAP7 were present in the cytoplasm (the site of MHV replication), whereas full length AKAP7 was observed only in nuclei. Our results suggest that viral acquisition of the host AKAP7 PDE domain during evolution allowed diverse RNA viruses to antagonize the RNase L pathway.

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

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Attribution styles influence people’s interpretation of stressful life events with respect to how stable or global the cause is. Negative attribution styles place the causes of life events as self-generated, enduring, and pervasive to many aspects of a person’s life. Not surprisingly, such negative causal attributions worsen the already adverse effects of stress and are a strong risk factor for depression. However, research on negative attribution styles has been largely confined to European populations.
that hold individualistic values, raising the question as to whether negative attribution styles carry similar risks to people of other cultures. The few cross-cultural studies that examine this topic show different associations between causal attributions and depression between Chinese and European participants, based on whether they come from an individualistic or collectivistic society. For example, attributing negative events to external causes, a risk factor for depression among Europeans, was unrelated to depression among Mexican American participants who are believed to hold a fatalistic world view (Joiner et al., 2001). Conversely, others showed that negative attribution styles are a more pernicious risk factor for depression among participants hailing from a collectivistic culture (China) as compared to those of individualistic cultural origins (Americans) (Anderson, 1999). The Middle Eastern demographic continues to grow in the United States, yet there is little published research regarding the attributional styles of this group. Given that the Arab culture is collectivistic and possibly fatalistic, their attributional styles may function differently as a risk factor for depression. We aim to explore this possibility by surveying attributional styles and depression among first-generation Arab Americans and their native born Caucasian counterparts. As Arab Americans continue to grow and integrate with Western culture, elucidating the portability of depression risk factors across cultural lines will be critical for treatment and prevention efforts in this growing community.

114  A MULTI-CULTURAL EXAMINATION OF INTERDEPENDENCE AND SOCIOTROPY, IN INTERNALIZING DISORDER RISKS

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Sociotropy, defined as a dependency on others and a high need for approval and reassurance (Calvete 2010), is a risk factor for depression and anxiety (Grondin et al 2011). Sociotropy may be risky for individuals from individualistic cultures, or those who value autonomy over group harmony, and innocuous for individuals from collectivist cultures who value cooperation (Bailey & Dua 1999). The relationship between culture and sociotropy may be influenced by self-construals; personality characteristics that reflect individualistic and collectivistic values (independent and interdependent) (Sato & McCann 1998). This study examines whether associations between causal attributions, sociotropy, and internalizing symptoms vary as a function of cultural background.

One hundred and twenty eight undergraduate students (M_{age} = 23.29, SD =5.81, 84% female) 26% of who were first generation immigrants from collectivistic cultures completed measures of self-construal (self-construal scale, SCS), sociotropy (sociotropy autonomy scale, SAS), depression (Beck Depression Inventory-II, BDI-II), and anxiety (Beck Anxiety Inventory, BAI). Regression models examined the relationship of interdependent individuals, sociotropy, and depression symptoms as a function of cultural background.

Higher interdependent self-construals predicted greater sociotropy, \( \beta = .37, t(129) = 4.56, p = .00 \), that in turn, predicted depression and anxiety levels, \( \beta = .32, t(128) = 3.541, p = .001, \) \( \beta = .22, t(128) = 2.22, p = .03 \). The indirect effects of self-construal on depression and anxiety via sociotropy were significant, \( \beta = .12, t(127) = 2.73, p < .010, \) \( \beta = .09, t(127) = 2.33, p = .02 \).

Relationships did not change as a function of cultural background.

Findings suggest that the impact of being from a collectivist vs. individualistic culture does not alter the adverse effects of sociotropy on depression and anxiety. Sociotropy may be an important treatment target, irrespective of the client’s cultural background.

115  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 proposed
study will therefore replicate and extend that work, experimentally investigating the role of anxiety by also manipulating self- 
affirmation—which is known to reduce anxiety and reduce anxiety-motivated responses. Thus, the study will measure 
neuroticism, manipulate the awareness of one’s freedom, manipulate self-affirmation, and then measure autocratic and 
democratic leadership style preference. It is expected that low neurotics reminded of freedom will prefer a more autocratic, 
less democratic leadership style, unless they have engaged in self-affirmation.

116 THE RELATIONSHIP BETWEEN PRIMITIVE REFLEXES AND VISUAL SKILL DEFICITS IN 
CHILDREN WITH REPORTED ACADEMIC DIFFICULTIES

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The deleterious psychosocial and socioeconomic consequences of failing to address incidences of visual perception problems 
early in the life span has prompted research on the developmental risk factors that present in areas such as cognition, 
physiology, and environment (Ganesh, Sethi, Srivastav., Chaudhary, & Arora, 2013). Considering that visual skill deficits 
(VSD) may contribute to symptoms of depression and anxiety in addition to deficits in school performance, it is imperative 
that both early childhood screenings and rehabilitation programs focus on identifying the appropriate evaluation and 
treatment modalities that target those neurologically induced persistent reflex abnormalities that are mostly likely to 
impede scholastic achievement. Current research acknowledges an association between maladaptive progression in 
integrating the primitive reflexes and delays in reaching developmental milestones (McPhillips & Jordan-Black, 2006). For 
the purposes of this study, research is focused on determining the relationships between visual impairments and primitive 
reflexes to further advance occupational therapy intervention strategies.

117 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 or 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 the proposed study it is to investigate the relationship between urban college students’ measured 
perseverance, grades, and histories. Perseverance will be measured via the GRIT-S which consists of items related to 
perseverance and long-term goals. Grades will be measured via self-report and final semester grades. 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. A sample size of 100 Psychology 101 students 
is projected. Once informed consent is obtained, students will complete the demographic and history scale and the GRIT-S 
scale. Students should complete these measures at or before the midterm point of the semester. Students will also be asked to 
predict their final grades for the semester. We will collect final course grades for all study participants. It is hypothesized that 
GRIT-S scores will be strongly correlated with course grades. It is hypothesized that students with the lower positive 
previous educational experiences and higher family and individual risk factors will demonstrate lower GRIT-S scores and 
grades. It is hypothesized that students who report at least one positive relationship with a caring adult in previous 
educational experiences will have higher GRIT-S scores and course grades. From these anticipated results, we hope to 
recommend better ways to predict and improve a student success in college.

118 A PRELIMINARY STUDY 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, and phenyl-sepharose 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. A model constructed with the I-TASSER server (Zhang, 2008) 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. Our progress on this study will be presented.

**119 DO ATHLETES HAVE GREATER MOTOR CONTROL EFFICIENCY THAN NON-ATHLETES?**

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College athletes have undergone intensive and long-term training to prepare for competition. They are well-practiced in the control of their bodily movements and in the processing of movement-related bodily feedback. This study will address the question of whether college athletes’ training results in improved motor control efficiency over non-athlete college students. In order to answer this question, students and student-athletes from Cleveland State University will perform in a cyclical aiming task. Participants will move a computer mouse back-and-forth between two targets displayed on a computer monitor, under instructions to move as quickly and as accurately as possible. The dependent variables will be measures of movement speed and accuracy. It is predicted that the performance of athletes will be both faster and more accurate than non-athletes.

**120 ROLE OF MIR-149 IN PROSTATE CARCINOGENESIS**

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Prostate cancer (PCa) is the second leading cause of cancer related death in men. Current therapies for PCa include androgen depletion by castration and/or anti-androgen based treatments. However, these therapies become ineffective once PCa progresses to its castration resistant prostate cancer (CRPC). Development of better therapies requires clear understanding of molecular basis of development of PCa and its transition from hormone-dependent PCa to CRPC. Overexpression and stability of androgen receptor (AR) is one of the major determinants in PCa. AR and its associated signaling pathways play a central role in PCa development and progression. Aberrant expression of microRNAs (miRs) that target AR is one factor that influences its functions in prostate cancer. miRNAs are 18 to 22 nucleotide long regulatory non-coding RNA molecules, which are known to negatively regulate gene expression by translational silencing or decreasing the mRNA stability by binding to the mRNA in its 3’ untranslated region (UTR). We are investigating the role of miR-149 in PCa. We have observed significant downregulation of miR-149 in PCa cell lines. In this study we show that miR-149 binds to AR 3’UTR and downregulates AR protein and mRNA expression. Ectopic expression of miR-149 inhibits invasive potential of PCa cells. Functional annotation of the predicted target genes of miR-149 indicates focal adhesion, cell migration and apoptosis as the significantly regulated processes by miR-149. In addition, we have observed the down-regulation of mRNA expression of
AKT1, BCl-2 and GIT-1 (key regulators of cell migration and apoptosis) by ectopic expression of miR-149 in PCa cells. We are further examining the anti-proliferative and anti-apoptotic role of miR-149 in PCa carcinogenesis. Our results will provide insights into the role of miR-149 in PCa, which may serve as a therapeutic agent for the treatment of PCa.

**121 OCCUPATIONAL THERAPY IN THE NICU: FRAGILE – HANDLE WITH CARE**

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Medical technology has advanced significantly in recent decades; improving the survival rates of preterm infants. However, with improved survival also come increased morbidities and sequelae of preterm birth. Occupational therapists have become an integral part of neonatal care, addressing both ADLs of infants, motor skills, development, and the interaction between these infants and their parents. They focus on positioning, feeding and environmental modification. As part of a multidisciplinary team in this intense setting, the occupational therapist is responsible for a critical and complex portion of the infants’ wellbeing. Participation in the infants’ care and assisting parents and other practitioners in best serving this vulnerable population requires a broad, in-depth understanding of embryology, sensory development, and medical complications associated with prematurity and trajectory of typical and atypical development in these fragile infants. Despite this important and highly skilled environment, no standardized curriculum or certification exists to ensure quality service delivery across practitioners. This paper explores the topics relevant to the new neonatal practitioner to ensure optimal knowledge and service delivery in the neonatal intensive care unit.

**122 UNDERSHOOT BIASES IN TARGETED AIMING**

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According to dominant theories of motor control, speed and accuracy are optimized when movements are planned to reach the target center in a single open-loop "shot" (viz., Meyer et al., 1988). The current study tested that prediction. Participants \((n = 20)\) were required to generate 100 consecutive targeted hand movements under each of 15 unique conditions: There were three movement amplitude requirements (80, 160, 320 mm) and within each there were five target widths (5, 10, 20, 40, 80 mm). According to the results, it was only at very small target widths (5, 10 mm) that participants aimed for the target center; as width increased (20, 40, 80 mm), participants increasingly undershot the target center. We will discuss the implications of the results both for motor control theories in general and for extending our recent model of the time-series structure of movement outcomes (Slifkin and Eder, 2012; Slifkin and Eder, 2014).

**123 LESSONS LEARNED ABOUT AGING: PREPARING HEALTH SCIENCE STUDENTS TO TEACH OLDER ADULTS**

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Older adults needing healthcare services will rise over 20 years. Evidence is lacking of methods to improve intergenerational teaching and communication for health science students. Seven volunteer college students with a mean age of 25 years, an average of 4.6 years of completed college, 83% female, and 66% white participated. Each college student was matched with an older adult between the age of 60 and 85 years, who participated in a community Tai Chi class weekly. Students completed facts on aging quiz before and after teaching older adults how to use an MP3 player. The mean pre-experience fact on aging score was 68%. Students were asked to meet older adults once by phone to interview the adults about their music preferences and a second time at an urban older adult community center to teach how to use MP3 player. After their teaching students completed facts on aging quiz and open ended reflection questions about their experience were completed within 2 weeks. Three students improved, one student stayed the same and three students decreased their facts on aging scores. Five of six students said that they would work with older adults as a professional. Older adult stereotypes included little physical activity, not interested in technology, stubborn and difficult. Post experience reflections about applying information learned included: I will be more patient and willing to listen; I won’t assume physical capabilities; and not all older adults are alike.
Teaching older adults MP3 player technology changed student’s awareness that older adults may be open to learning new things, are more physically active, and can figure things out on their own.

124 MOTOR OUTPUT STRUCTURE IN TARGETED AIMING: A MECHANISTIC MODEL

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Studies using a variety of experimental tasks have established that when humans repeatedly produce an action, fluctuations in action output are highest at the lowest frequencies and fluctuation magnitude (power) systematically declines as frequency increases. Such time series structure is termed pink noise. However, the appearance of pink noise seems to be limited to tasks where action is executed in the absence of task-related feedback. A few studies have demonstrated that when action was executed in the presence of task-related feedback, power was evenly distributed across all spectral frequencies—i.e., white noise was revealed. Here, participants produced cyclical aiming movements under visual feedback conditions and we sought to determine whether variations of both the movement amplitude requirement (A) and the target width (W)—in the form of the index of difficulty [ID = \log(2(A/W))]—would predict the structure of movement amplitude (MA) time series. There were five ID levels, and there was a small-, medium-, and large-scale version of each ID: The A and W values doubled with each increment in scale level. Given that increases in ID are known to induce increased reliance on the available visual feedback, we predicted an ID-induced shift in MA time series structure from pink to white noise, with no change in MA structure across scale levels.

125 OCCUPATIONAL THERAPY LEISURE COACHING: CULTIVATING HOBBIES AND INTERESTS IN YOUTH WITH DISABILITIES

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The purpose of this qualitative case study was to explore the experience of 8 occupational therapists as they participated in a pilot study to gather information regarding the process and outcomes of Occupational Therapy Leisure Coaching on youth with developmental disabilities. Data was collected through OT Leisure Coaching Documentation forms filled out by the OTs on the child and the process used throughout the study. Six major themes emerged from the data: Set the Stage for Leisure Coaching; Explore and Identify Possible Interests Using an Interest Inventory with the Child/Youth; Explore Options for Participation and Share with Parent/Child; Make a Match: Share Options, Make a Choice, and Register; Just Do It, and OT Reflections and Future Planning. Additional qualitative findings include child/youth reactions, parent feelings/reactions, and occupational therapist reflection of leisure coaching. Findings suggest that OT Leisure Coaching has a distinctive pattern in the process, can be achieved in an array of different settings, and can positively benefit youth with developmental disabilities in cultivating hobbies and interests for mental and physical health. Occupational therapists can play a key role in facilitating the outcomes in the leisure coaching process, creating a difference in not only the child’s life, but the family’s life as well.

126 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 stable expression of a dominant negative Death Receptor 5 (dnDR5) in myoblasts inhibits differentiation by decreasing mRNA and protein expression of the master muscle regulatory transcription factor MyoD. Treatment with a histone deacetylase (HDAC) inhibitor allows partial recovery of MyoD expression and differentiation in differentiation-defective, dnDR5-expressing myoblasts, suggesting that an increase in histone acetylation is sufficient for
MyoD expression. The expression of MyoD is transcriptionally regulated by a distal regulatory region (DRR), which includes a non-canonical serum response element (SRE) that is required both for differentiation and for MyoD expression in proliferating myoblasts. Our lab has previously shown that the acetylation of histones associated with the MyoD promoter and DRR in dnDR5 myoblasts is decreased. Contained in the DRR is a CArG box required for MyoD expression; it has been demonstrated that two trans-acting factors, SRF and Mef-2, bind to this CArG element in proliferating and terminally differentiated myoblasts, respectively. Myoblasts stably expressing dnDR5 exhibit a decrease in the amount of Mef-2 and SRF bound at this CArG box. Additionally, we observe a decrease in activation of the mitogen-activated protein kinase p38, which is known to phosphorylate Mef-2 and may indirectly activate SRF. Pharmacological inhibition of p38 or application of a pan-caspase inhibitor results in reduced MyoD protein levels. We infer that (1) there is an inverse relationship between MyoD expression and Mef-2/SRF recruitment, (2) that basal caspase signaling through p38 may be necessary for the maintenance of MyoD protein levels in proliferating myoblasts and (3) that recruitment of HAT activity by Mef-2 and/or SRF bound to the MyoD DRR may be required for expression of MyoD in proliferating myoblasts.

127 RNA-PROTEIN INTERACTIONS IN THE MINOR SPLICEOSOME

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The removal of noncoding intervening introns, from the precursor mRNAs is an essential step in eukaryotic gene expression. U12-dependent introns are a minor subgroup of introns which comprise only <0.5% of the total introns. However, these introns are found in the genes which have ‘information processing function’ such as DNA replication and repair, transcription, RNA processing and translation. So far approximately 800 genes have been identified to harbor U12-dependent introns in humans. Attributes of U12 introns including conservation in distantly related organisms, presence in specific types of genes as well as slow kinetics of removal underlines their significance in gene regulation. Recently, defects in the minor class splicing pathway have been linked to human disease including severe developmental disorders. RNA-RNA, RNA-protein and protein-protein interactions occurring in U12-type spliceosome have not been extensively studied. In this study, we have found RNA elements in U12 and U6atac snRNAs which have structural and sequence similarities. The RNA element is located in the 3’ end of U6atac snRNA and has potential to interact with U11/U12 di.snRNP specific proteins (65K) via its c-terminal RNA recognition motif (RRM). The 65K protein interacts with stem loop III of U12 snRNAs and this interaction is essential for in-vivo U12-dependent intron splicing. In this study we interchanged U6atac and U12 RNA elements, however the swapping did not have any major effect on in-vivo splicing, signifying the importance of the elements as well as indicating the common 65K RNA binding protein partner. Many mutations introduced in the stem loop of U6atac snRNA were defective for both in-vivo splicing as well as in-vitro RNA-protein interactions. We have also validated the in-vivo U12 and 65K interaction by performing immunoprecipitation followed by RT-PCR. Our data indicates that structure and sequences of the U6atac stem loop is important for both in-vivo splicing and in-vitro protein binding.

128 CLONING AND MOLECULAR CHARACTERIZATION OF A NOVEL AR TRANSGENE TO INVESTIGATE REGULATORY ROLE OF AR 3’ UNTRANSLATED REGION IN PROSTATE CANCER BIOLOGY

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Androgen Receptor (AR) is associated with the onset, growth and development of Prostate cancer and the targeting of androgen- and AR- signaling axis remains the primary therapeutic option for Prostate cancer (PCa) treatment. The AR mRNA has a 6.8 kb long 3’ UTR with approximately 500 predicted miRNA binding sites which suggest the possibility of complex posttranscriptional regulation of AR expression mediated by miRNAs and possibly other 3’ UTR interacting/binding auxiliary factors and alternative 3’ end processing. In this context, the role of AR 3’UTR in the regulation of AR gene expression is of significance in the progression of cancer to untreatable metastatic castration resistant PCa (CRPC). Characterization of the AR 3’UTR is necessary to study the role of regulatory function of miRNAs in PCa biology. In this study, we have constructed an expression system containing the full length open reading frame and 3’UTR of AR mRNA in a reporter vector backbone. Using this reporter we are attempting to investigate multiple miRNA regulatory networks in Prostate Cancer cells. Furthermore, the transactivation of AR by DHT stimulation has also been studied to confirm the
functional ability of AR reporter to respond to androgens. The long term goal of this project is to functionally characterize the regulatory role of 3’UTR of AR in PCa biology, especially in the development of drug resistance to next generation of PCa therapeutics.

129 PHARMACOLOGICAL AND PRE-CLINICAL TESTING OF 5-NIDR AS A NEW THERAPEUTIC AGENT AGAINST BRAIN CANCER

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Approximately 4,000 children in the United States are diagnosed annually with a brain tumor. Brain cancers are the deadliest of all pediatric cancers as they have survival rates of less than 20%. Although surgery and radiation therapy are widely used to treat adult patients, chemotherapy is the primary therapeutic option for children. One important chemotherapeutic agent is temozolomide, an alkylating agent that causes cell death by damaging DNA. In this project, we tested the ability of a specific non-natural nucleoside developed in our lab, designated 5-NIdR, to increase the efficacy of temozolomide against brain cancer. Cell-based studies demonstrate that the combination of 5-NIdR and temozolomide kills more cells compared to treatment with either temozolomide or 5-NIdR used alone. Microscopy techniques demonstrate that the combination of 5-NIdR and temozolomide causes cell death via apoptosis rather than necrosis. Animal studies using xenograft (nude) mice were performed to evaluate the in vivo efficacy and safety of this drug combination against brain cancer. Preliminary results are provided which indicate that treatment with 5-NIdR does not inhibit the rate of tumor growth. In contrast, treatment with temozolomide reduces the rate of tumor growth but does not lead to the complete elimination of the tumor. Striking results are obtained using 5-NIdR and temozolomide together as this drug combination causes a significant reduction in tumor size. Finally, mice treated with the combination of 5-NIdR and temozolomide do not show overt signs of side effects such as weight loss, dehydration, or fatigue. Collectively, these studies provide pharmacological evidence for combining 5-NIdR and temozolomide as a new treatment strategy to effectively treat brain cancers.

130 A LIGHT SCATTERING STUDY OF PHOSPHOLIPID NANODISCS WITH AND WITHOUT THE ENZYME LOAD

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The structure and dynamics of discoidal phospholipid protein complexes (nanodiscs) with and without endothelial nitric oxide synthase (eNOS) were studied with multiangle polarized and depolarized light scattering. Nanodiscs present a mobile system that is similar to enzyme’s native microenvironment which allows exploring the potential effect of membrane phospholipids on the activity of eNOS. Light scattering revealed at least two different size distribution modes for empty nanodiscs, and nanodiscs loaded with eNOSoxy. In both cases, the first mode was diffusive (linear $\alpha$ vs $q^2$ with a small intercept) with apparent Rh= 4.5-5.5 nm for empty and loaded nanodiscs. These sizes are largely consistent with nanodisc dimensions. The strong similarity between observed sizes for loaded and empty nanodiscs is attributed to low concentration of enzyme used in solution. The second observed mode contributed about 50-60% to the intensity and showed non-diffusive behavior which might correspond to coalesced nanodiscs present in solution. Studied concentration dependencies and depolarized scattering measurements on enzyme free and enzyme loaded nanodiscs corroborated these findings.

131 MEASURING THE RESONANT FREQUENCY OF A PRIMARY CILIUM BY OPTICAL TRAPPING

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The primary cilium is a microtubule bundle that extends from the mother centrosome of mammalian cells into the extracellular space and is hypothesized to be a mechanotransducing structure. Optical tweezers uses focused laser light to manipulate nano-scale to micro-scale particles in a non-contact manner. Motion of the cilia can be tracked by detecting the scattered laser light. In addition to viewing the trapped cilium in real time, measuring the position of the trapped particle was done with Quadrant photo diode (QPD), which in this case showed a harmonic oscillation of the cilium tip. QPD x and y signals are recorded as a function of time. The cilium is modeled as a cantilevered beam that deflects due to the applied load. By using the trapping method and locating the trap on the tip of the cilia we are able to measure the applied force, oscillation frequency and Power Spectral Density (PSD) with MATLAB (The MathWorks INC.) programming. PSD calculated via the Discrete Fourier Transform (DFT) of the time domain data and the force that is applied by an optical trap can be calculated by fitting a Lorentzian to the power spectrum.

132 QUANTITATIVE MEASUREMENT OF HYPMETHYLATING EFFECT OF DECITABINE ON HL60 CELLS BY LIQUID CHROMATOGRAPHY TANDEM MASS SPECTROMETRY (LC-MS/MS)

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DNA methylation refers to the addition of a methyl group to the cytosine in the CpG dinucleotide by the DNA methyltransferase. Hypermethylation of DNA leads to transcriptional silencing of numerous tumor suppression genes and is the main cause for many types of cancers including acute myeloid leukemia (AML) and myelodysplastic syndrome. Decitabine (5-aza-2'-deoxycytidine) is a nucleoside analog that induces hypomethylation of DNA. Decitabine incorporates into DNA during S-phase of the cell cycle, irreversibly inhibits DNA methyltransferases, and leads to reactivation of the silenced tumor suppression genes. Although the anticancer property of decitabine has been known for forty years, the therapeutic dosage and schedules are still under clinical investigation. For instance, recent studies show that the low-dose drug regimen with low cytotoxicity was more desirable and efficacious than the high-dose ones.

To study the hypomethylating effect of low-dose decitabine, we have developed an ultrasensitive LC-MS/MS method for quantitative assessment of the amounts of decitabine, 2'-deoxycytidine, 5-methyl-2-deoxycytidine released from cellular DNA. In this work, cellular DNA was first subjected to a quad-enzyme system (i.e., DNase I, NP1, PDE1 and ALP) and the released deoxynucleosides and incorporated decitabine were separated by reserve-phase liquid chromatography (LC) and detected by tandem mass spectrometry (MS/MS). Quantitation was carried out by MS/MS using a stable heavy isotope of 2'-deoxycytidine as internal standard. The mass transitions of m/z 229 > 113 for decitabine, m/z 228 > 112 for cytidine, m/z 242 > 116 for 5-methylcytidine, and m/z 268 > 136 for guanosine were recorded by MRM mode. The method developed has a lower limit of quantitation at 0.250 ng/mL and a linear calibration range up to 500 ng/mL for decitabine. The method developed has been validated and applied to low-dose decitabine study on HL60 cells. The details will be discussed in the presentation.

133 SIMULTANEOUS DETERMINATION OF 25-HYDROXYVITAMIN D₃, CURCUMIN AND ITS METABOLITES BY LC-MS/MS IN A PHASE II CLINICAL TRIAL

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Curcumin (a natural compound derived from turmeric) was shown to disrupt interactions of chronic lymphocytic leukemia (CLL) cells with microenvironment, induce apoptosis independent of DNA damage, and upregulate vitamin D receptor in malignant lymphoid cells. Vitamin D (a steroid hormone) has been shown to be safe in multiple clinical trials of solid tumors in high doses. The current clinical trial (CASE 5913) is based on the hypothesis that combined use of curcumin and vitamin D is safe and would produce a synergistic effect against CLL.

To support the clinical study, we have developed an LC-MS/MS method for simultaneous determination of 25-hydroxyvitamin D₃, curcumin and its metabolites curcumin-O-glucuronide (COG) and curcumin-O-sulfate (COS) in human plasma using stable heavy isotopes of these analytes as internal standards (ISs). In this method, the analytes and their ISs in plasma samples were first prepared by protein precipitation using methanol as solvent, then separated on a Waters X Terra®
MS C18 column (2.1 mm x 50 mm, 3.5 µm) with a mobile phase containing methanol/10.0 mM ammonium formate by gradient elution profile. Quantitation of curcumin, COG and COS (by negative electrospray ionization, ESI−) and 25-hydroxyvitamin D3 (by positive electrospray ionization, ESI+) were accomplished by tandem mass spectrometry using multiple-reaction-monitoring (MRM) mode. The method developed is to be validated in accordance with the US FDA guidance for bioanalytical method validation and will be used for analysis of patient samples from Phase II clinical trial.

134 COMPARISON OF RAMAN POINT MAPPING AND RAMAN WIDE-FIELD IMAGING MODALITIES

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Raman spectroscopy yields a single spectrum representing the summation of inelastically scattered light intensity from the area of laser illumination. The Raman modality is chemically specific and requires little or no sample preparation; hence it is an important non-destructive method for sample identification when the use of labels, stains, dyes or contrast agents is to be avoided. It can be challenging to employ Raman spectroscopy to investigate spatially heterogeneous samples with high fidelity due to the inefficient conversion of Rayleigh light to inelastically scattered light. High fidelity imaging techniques, however, are important for understanding the chemical heterogeneity in complex samples and improved Raman imaging methods are sought. In the work presented here, we compare two types of imaging methods, Raman point mapping and wide-field Raman imaging. While both methods have been previously demonstrated, our work focuses on improving the signal to noise ratio of Raman imaging data and on the development of enhanced multivariate hyperspectral image analyses designed to extract the chemical information more efficiently. The design of the Raman imaging systems are presented along with hyperspectral image results from complex polymeric systems and validation samples.

135 INCREASING AWARENESS OF OCCUPATIONAL THERAPY IN PRESERVICE TEACHERS

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In 2011, 5,670,680 students in the USA, ages 6-21 were identified as needing special education services due to learning difficulties, disability, or developmental delays (Institute on Disability, University of New Hampshire, 2013). Despite their training, general education teachers are not always equipped with the proper skills to handle the non-traditional student. (Hargreaves, Nakhooda, Mottay & Subramoney, 2012). Occupational therapists (OTs) can be a valuable resource for teachers in helping students struggling within the school settings in both academic (classroom) and/or non-academic (recess, cafeteria, hallways, etc.) tasks. A lack of awareness regarding OT in the school is a common occurrence, preventing children and teachers from receiving services they could benefit from. The lack of knowledge of OT within schools reflects the dearth of knowledge of OT in general “as each profession does not understand the way in which each contributes to the educational goals of the learner” (Hargreaves et al., 2012p. 8). This two-year research study aims to increase awareness of OT among pre-service teachers at Cleveland State University (CSU). Part 1 of the research was conducted in the 2014-2015 academic year, and included creation of an assessment tool, “Teacher Awareness of Occupational Therapy Measurement Tool,” and a learning module, “Occupational Therapy in Schools.” These tools were reviewed by content experts for increased validity, and a pilot test was administered to teachers to collect feedback to improve construct validity. Part 2 of the research will be conducted in the 2015-2016 academic year. A pre-test, post-test design will be utilized and CSU education students will be recruited and placed in a control and experimental groups to view the research materials. Data will be collected via Qualtrics and data analysis, using SPSS, will be completed. We hypothesize our research will increase knowledge of school based OT to preservice teachers.

136 INVESTIGATION OF LIPID EFFECTS ON THROMBOMODULIN’S PROTEIN C AND THROMBIN-ACTIVATABLE FIBRINOLYSIS INHIBITOR ACTIVATION

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Protein C (PC) and thrombin activatable fibrinolysis inhibitor (TAFI) are both activated by the thrombin-thrombomodulin (TM) complex yet have seemingly opposite effects in haemostasis. Activated PC (APC) downregulates coagulation while activated TAFI (TAFIα) maintains already formed clots. There is strong evidence to suggest that PC and TAFI act as competitive inhibitors to one another. Furthermore, it is well known that the activation of protein C by thrombin-TM is greatly affected by phospholipid presence, especially negatively charged phospholipids such as phosphatidylserine which can be exposed during platelet activation. Both APC and TAFIα are significant indicators on haemostatic performance. Elevated TAFI antigen levels have been associated with coronary heart disease and other pathologies. We hypothesize that in the presence of different phospholipids, the inhibitory role of PC towards TAFI activation can be significantly altered and result in reduced activation of TAFI in protein C presence. In this work, we determined which lipids have the most significant effect on APC and TAFIα generation. We also determined which lipids result in enhancement of protein C inhibitory role towards TAFI activation.

137 IN VITRO ANALYSIS OF DESEASE CAUSING SYNONYMOUS MUTATION IN BLOOD COAGUALTION 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. Over 130 different non-synonymous mutations (which change encoded amino acids) in F9 gene 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. A new paradigm that adds another level of complexity to our understanding of the disease is effects of synonymous mutations. Synonymous mutations (which do not change encoded amino acids) affect gene function mostly via perturbations of mRNA splicing and/or mRNA stability. However, recent studies suggest that synonymous mutations also alter protein folding. It has been found that a mild form of hemophilia B is caused by a synonymous GTG>GTA (Val107Val) mutation. All affected individuals had antigen and anti-FIX antibody levels corresponded to mild hemophilia B. Studies of lymphocyte F9 mRNA in these individuals showed no skipping or retention of introns and/or change in mRNA levels. Several other synonymous mutations CGA>AGA (Arg162Arg) and CAA>CAG (Gln237Gln) have been recently also found to lead to a disease. To understand molecular mechanisms that alter FIX coagulant activity due to changes in codon usage/translation rates, we explored how these synonymous mutations affect the FIX translation rates. We found that it takes about 7 min to synthesize full-length (unprocessed) FIX in a reconstituted in vitro translation system and that single synonymous substitutions (above) may affect the global translation rates and the yield of the protein produced (leading to its decrease). This project will add to our understanding of the relationship between genotype and phenotype.