



**College of Sciences
and
Health Professions
Research Day
2012**

**Friday, April 20, 2012
Physical Education Building Lobby
and Fenn Tower Panel Hall
Cleveland, OH**

*COS Research Day abstract book
designed and created
by
Ms. Rose M. Carrabine
College of Sciences and Health Professions Dean's
Office*

Welcome to the College of Sciences and Health Professions 2012 Research Day!

We are delighted that you have joined us.

The mission of our College is to educate a diverse body of students for careers in science and health, to provide science education to all students in the University; to increase the number of students that we educate in STEM disciplines and health professions; to foster development and application of new knowledge through research and scholarship; and to promote a culture of service to the University and its diverse communities. These goals are epitomized by the presentations today at Research Day.

The wealth of science, education and service topics represented in today's poster presentations reflect the collaborative nature of a lot of the research that we are doing in the College today. You will find much evidence of collaborative ties of our students and faculty with students and investigators from the greater Cleveland area, e.g. the Cleveland Clinic, Cleveland Museum of Natural History, MetroHealth, Brookhaven National Labs, Cleveland Department of Health, Case Western Reserve University. We are also delighted to welcome our colleagues from Northeast Ohio Medical University (NEOMED).

Today we also take the opportunity to acknowledge our recently promoted and retiring College faculty members, we will honor the winner of our Researcher of the Year Award, Dr Gregory M. Lupton of the Department of Mathematics, and we eagerly look forward to hearing the Keynote presentation by Dr. Evalyn Gates, Executive Director and CEO of the Cleveland Museum of Natural History.

Enjoy our exciting program!

Meredith Bond,

Dean

College of Sciences and Health Professions

College of Sciences and Health Professions 2012 Research Day

Friday, April 20, 2012
12:30 – 5:30 pm

Physical Education Building and Fenn Tower

Agenda

12:30 - 3:45 pm Poster Session: (*Physical Education Building Lobby*)
Posters of research, teaching and service topics presented by students and faculty in chemistry, biology, geology, environmental science, health sciences, mathematics, physics, and psychology

Poster authors will be at their posters during these times:

12:45 pm - 2:00 pm	Odd numbered posters
2:15 pm –3:30 pm	Even numbered posters

3:45 – 4:00 pm Break and Poster take-down

4:00 – 5:30 pm Award Presentation: (*Fenn Tower Panel Hall Room 303*)

**2012 College of Sciences and Health Professions
Outstanding Research Award
Dr. Gregory M. Lupton, Professor
Department of Mathematics, Cleveland State University**

Keynote:

**Dr. Evalyn Gates, Executive Director and CEO
Cleveland Museum of Natural History**

“The Architecture of Spacetime”

**College of Sciences and Health Professions
2012 Research Day
Keynote Speaker**



**Dr. Evalyn Gates
Executive Director and CEO
Cleveland Museum of Natural History**

Dr. Evalyn Gates is the Executive Director and CEO of the Cleveland Museum of Natural History. Before coming to the Museum in May, 2010, she was the Assistant Director of the Kavli Institute for Cosmological Physics and a Senior Research Associate in the Department of Astronomy and Astrophysics at the University of Chicago.

Her research focuses on various aspects of cosmology and particle astrophysics, from neutrinos to the cosmic microwave background. Most recently she has been working on various aspects of dark matter, and searching for ancient stellar fossils in the form of the oldest white dwarfs.

After receiving her Ph.D. in theoretical physics from Case Western Reserve University in 1990, Dr. Gates held postdoctoral fellowships at Yale University and the University of Chicago, and was a member of the theoretical astrophysics research group at Fermi National Accelerator Laboratory. She spent seven years at the Adler Planetarium and Astronomy Museum, initially as Director of Astronomy and then as Vice President for Science and Education.

Dr. Gates has a strong interest in addressing the under-representation of women and minorities in the physical sciences and has written several articles on the topic of women in physics. She is also committed to inviting individuals of all ages and backgrounds to explore the ideas and discoveries of current scientific research. Her first book, *Einstein's Telescope: The Hunt for Dark Matter and Dark Energy in the Universe*, was published by W.W. Norton in February 2009.

The College of Sciences and Health Professions and Cleveland State University welcome Dr. Evalyn Gates and are proud to introduce her as our Keynote Speaker for Research Day 2012.

**College of Sciences and Health Professions
2012 Outstanding Research Award
Recipient**



**Dr. Gregory M. Lupton
Professor
Department of Mathematics
Cleveland State University**

Dr. Gregory M. Lupton holds a Bachelor of Science from the University of Leeds (England) and a Certificate of Advance Study (Part III) from Cambridge University (England) and a Doctor of Philosophy degree in Mathematics from the University of Edinburgh in Scotland.

Dr. Lupton came to CSU in 1990 after serving as a John Wesley Young Instructor and then Visiting Assistant Professor at Dartmouth College. In recognition of his research, Dr. Lupton has been named a lifetime member of Clare Hall College of Cambridge University, England. He is an internationally recognized expert in rational homotopy theory (the study of the most fundamental topological qualities of spaces) and Lusternik-Schnirelmann category along with their application to function spaces and topological robotics.

He has been an invited visiting professor at one of the top centers of rational homotopy in the world, the Catholic University of Louvain-La-Neuve. Additionally, he received a grant from the Swiss government to carry on research at the Ecole Polytechnique Fédérale de Lausanne in Switzerland.

Last year was the first time the Simons Foundation offered an award in mathematics, and Dr. Lupton was a recipient of the Swiss National Science Foundation International Short Visit Research Award. His proposal for an internal conference was held at the Mathematisches Institut Oberwolfach (MFO), one of the premier mathematical research institutes in the world. This conference introduced many young researchers to the new field of topological robotics.

In mathematical research, it is challenging to make conjectures that are new and are contributions to the field in ways that have not been thought of previously, but Dr. Lupton has written nearly 30 original research articles in well-respected mathematics journals. He has also been an active participant in our local geometry and topology seminars. His contributions have helped maintain this important part of the Cleveland mathematical community.

The faculty, staff and students of the College of Sciences and Health Professions are delighted to recognize Dr. Gregory M. Lupton as the recipient of the 2012 College of Sciences and Health Professions Outstanding Research Award.

COLLEGE OF SCIENCES AND HEALTH PROFESSIONS

ABSTRACTS

RESEARCH DAY 2012

001 SCATTERING OF A TRANSVERSELY CONFINED NEUMANN BEAM BY A SPHERICAL PARTICLE

James A. Lock, Ph.D.

Department of Physics, Cleveland State University

Various properties of an electromagnetic wave whose spherical multiple expansion contains only Riccati-Bessel functions are examined. When a Neumann beam is scattered by a spherical particle, the diffraction and external reflection portions of the Debye series expansion of the partial wave scattering amplitudes constructively interfere for large partial waves. As a result, a rapidly decreasing set of beam shape coefficients, corresponding to transverse confinement, is required to cut off the partial wave sum in the scattering amplitudes. Because of its strong singularity at the origin, a Neumann beam can be produced by a point source at the center of a spherical cavity in a high conductivity metal, and Neumann beam scattering by a spherical particle can occur for certain partial waves if the sphere is placed at the center of the cavity as well.

002 A FORWARD GENETIC ANALYSIS ON NON-ALCOHOLIC FATTY LIVER DISEASE IN ZEBRAFISH

Mihir M. Shah, B.S.¹; Takuya F. Sakaguchi, Ph.D.²

¹ Northeast Ohio Medical University

² Department of Stem Cell Biology and Regenerative Medicine, Cleveland Clinic

Non-alcoholic fatty liver disease (NAFLD) is the most common liver disease in the United States and affects an estimated 10-24% of the world's population. Non-alcoholic fatty liver disease has been associated with steatosis, the accumulation of lipids in the liver. There are many pathways that can lead to steatosis such as *de novo* lipogenesis, lipid oxidation, and lipid uptake. We have isolated a novel zebrafish (*Danio rerio*) mutant which shows significant steatosis in the liver compared with their wild type siblings. Through oil red o staining, we have determined that over 90% of the mutants show steatosis ($p < .0001$). These mutants also show degeneration of the endocrine pancreas, which may correlate with diabetes. There appears to be an increase in the ALT and ASC enzymes outside of the liver, which would signify liver damage. Moreover, we have seen fluorescently labeled hepatocytes floating through the blood stream of mutants, which is a signal of liver damage. We have seen a two-fold increase in triglyceride levels of the mutants. Through genome mapping we have been able to determine the linkage group where the mutation causing steatosis is present, and through successive positional cloning, we will be able to isolate exactly where this mutation occurs. This study can be used as an animal model for NAFLD, and the precise determination of the mutated gene will shed light on novel pathways for NAFLD occurrence.

003 A 43-YEAR-OLD MAN WITH RECURRENT KIDNEY STONES. A CASE REPORT AND LITERATURE REVIEW OF PRIMARY HYPEROXALURIA TYPE 1

Chirag N. Dave, B.S.¹; Dan Ricchiuti, M.D.²; Joshua Nething, M.D.³; David Gemmell, Ph.D.²

¹ Northeast Ohio Medical University

² St. Elizabeth's Healthcare Center

³ Department of Urology, Akron General Medical Center

Background: Primary Hyperoxalurias (PH) are rare (two per million people), autosomal recessive, inborn errors in the metabolism of glyoxylate and oxalate that are characterized by recurrent urolithiasis and nephrocalcinosis. PH Type 1 (the most common form) accounts for 80% of all cases. The most common extra renal manifestations of the disease include

cardiac conduction defects, metaphyseal deposition leading to pathologic fractures, arthritic changes secondary to joint deposition, and retinal and macular deposition.

Observations: We present a case of a 43-year-old man with a history of recurrent kidney stones. He was admitted to the hospital for acute renal failure and experienced continued deterioration of renal function despite treatment with IV fluids for presumed acute tubular necrosis. 24-hour urine collection showed elevated oxalate level and subsequent kidney biopsy confirmed multiple calcium oxalate crystals in the tubules. Scanning electron microscopy images are also provided. Liver biopsy showed deficient AGT (alanine glyoxylate aminotransferase) activity and glycolate reductase activity, which is consistent with Primary Hyperoxaluria Type 1.

Conclusions: The case highlights the pathophysiology, highly variable presentation, and diagnostic approach for this rare disease state, as well as an extensive literature review on the genetic and biochemical basis accounting for the heterogeneity of disease expression. The preferred treatment method for PH is combined liver and kidney transplantation. Primary Hyperoxaluria Type 1 should be included in the differential diagnosis for a young patient presenting with recurrent kidney stones as early diagnosis can prevent or delay end organ failure.

004 IMPROVED ENZYME LOADING IN LAYER-BY-LAYER THIN FILMS OF NITRIC OXIDE SYNTHASE AND POLYETHYLENIMINE; EFFECT OF PH ON ENZYME IMMOBILIZATION AND ACTIVITY

Bhagya Gunasekera, Mekki Bayachou
Department of Chemistry, Cleveland State University

Layer-by-layer multi-component protein-polyelectrolyte films provide the opportunity to build nanometer-thick coatings with functional components such as enzymes. The possibility to include active enzymes in thin coatings enables the fabrication of coatings that are not only biocompatible but also are able to impart biological function to the surface. In this project, we investigate the layer-by-layer (LBL) adsorption of nitric oxide synthase (NOS) as the functional component and polyethylenimine (PEI) as the matrix on model surfaces. Our research has previously established that these films, when exposed to the ingredients of the NOS reaction, release fluxes of nitric oxide (NO).

At pH 7, polyethylenimine carries a net positive charge in solution versus a net negative charge carried by the NOS protein. In this work, we examined if the pH of the protein medium, which affects the net surface charge on the protein in solution, can modulate the amount of NOS protein that can be adsorbed onto a PEI-coated surface. To this end, we used buffered NOS solutions and PEI solutions adjusted to desired pHs to investigate the charge-driven layer-by-layer adsorption.

Imaging of the outermost NOS layer by Atomic Force Microscopy (AFM) shows the enzyme in varying cluster densities representing the NOS layers on films incubated at pH 7 and pH 8.6. In terms of enzymatic function, we measured the cumulative NO release from the various films using the Griess assay. The assay results show an initial burst of NO through the first 12 hours followed by a decline and then stable NO release up to 72 hours.

Overall, our results show that the pH of the NOS protein solution modulates the amount of NOS proteins ultimately immobilized in the LBL NOS-PEI film. We will discuss the implication of this finding in the optimization of NOS-based nanofilms as potential antithrombotic coatings.

005 PREDICTING THE PRESENCE OF HLA-C*02:10 BASED ON THE HLA-A, -B HAPLOTYPE AND RACE

Maria Zlobinsky, B.S.¹; John Barnard, Ph.D.²; Aiwen Zhang, Ph.D.³; Garnett Smith, B.S.⁴; Dawn Thomas, B.S.³; Chad Elaison, B.S.³; and Medhat Askar, M.D/Ph.D.³

¹Northeast Ohio Medical University

²Department of Quantitative Health Sciences, Cleveland Clinic

³Allogen Laboratories, Cleveland Clinic

⁴Cleveland Clinic Lerner College of Medicine, CWRU

Matching for HLA-C locus is among loci associated with better overall survival in hematopoietic stem cell (HSC) transplantation. Knowledge of haplotype association is important in predicting which unrelated HSC donor has the highest potential of being an allele match. We investigated associations of HLA-A, HLA-B haplotypes and race with the presence of HLA-C*02:10 in individuals with low resolution HLA-C typing (C*02:XX). We interrogated our laboratory database for C*02:10 positive subjects and identified a data set-1 of 21 subjects (17 African American, AA; 2 Caucasian, C; 2 Hispanic, H). Then we interrogated our database for C*02:XX subjects and HLA-A and -B alleles commonly associated with C*02:10 in data set I to create data set II. The 3 most frequent HLA-A,HLA-B haplotypes conditional on being an AA with a C*02:10 allele (set I) were A*23:01-B*1503 (Haplotype Frequency 0.275), A*02:01-B*15:03 (0.107), A*03:01-B*53:01 (0.088), with estimated HLA-A, HLA-B LD (D') of 0.474 (SE=.0211). Set II (n=93) included 29 C*02:10 (2 C, 27 AA) and 64 C*02:02 (49 C, 15 AA). There was a strong association in set II between A, B haplotypes and the probability of having C*02:10 vs. C*02:02 allele when the race was ignored (p =0.00035, score test). Among set-2 AA the association remains strong (p=.0006). However, this association weakened when adjusting for race in set-2 (p=0.112). These results demonstrate a strong linkage disequilibrium between C*02:10 containing HLA-A, HLA-B haplotypes that associate with the presence of C*02:10 v. C*02:02 in combined and AA sets.

006 MECHANOSENSATION, THE PRIMARY CILIUM, AND RENAL EPITHELIAL PHYSIOLOGY

Marie Blatnik¹; Prasenjit Bose¹; Brianna Boslett, B.S. ²; Joseph Glaser¹; David Hoeplich, B.S. ¹; Briana McGuinness, B.S. ²; Andreea Sandu²; Andrew Resnick, Ph.D. ^{1,2}

¹ Department of Physics, Cleveland State University

² Department of Biological, Geological and Environmental Science; Cleveland State University

Our laboratory seeks to understand how physical forces influence physiological function. Specifically, we culture conditionally immortalized renal epithelial tissue derived from the cortical collecting duct of a mouse and subject the tissue to various physical stimuli: fluid flow and optical trapping. The putative target of stimulation is the primary cilium, an organelle similar to a flagellum that is hypothesized to transduce a mechanical stimulus into a biological response. We then measure physiologically relevant responses (directed Sodium transport, protein localization, and activation of signaling pathways) to understand the homeostatic mechanism and pathophysiological disease states: Autosomal Dominant Polycystic Kidney Disease (ADPKD), hypertension, cystic liver disease, etc. Here, we present recent results demonstrating the physiological role of the primary cilium and ongoing work to further explore ciliary-mediated mechanosensation.

007 SCHIZOTYPAL TRAITS AND NONVISUAL SPACE PERCEPTION

Naohide Yamamoto, Ph.D. and Evelyn Muschter, B.A.
Department of Psychology, Cleveland State University

Efference copy has been considered as a component of nonvisual space perception, but empirical data that support this notion have been sparse. The present study was designed to find evidence for the involvement of efference copy in space perception by capitalizing on the idea that dysfunctional efference copy underlies positive symptoms of schizophrenia. In two experiments, blindfolded participants who had varying degrees of premorbid schizophrenia (i.e., schizotypy) traits either walked along a linear path or were guided along it while sitting in a wheelchair. Subsequently, they verbally estimated the distance traveled. It was hypothesized that high-schizotypal participants would be less accurate in distance estimation than low-schizotypal participants when they walked, given that efference copies generated by walking presumably take a part in walked distance perception. By contrast, these two groups were predicted to perform similarly when they were in the wheelchair because no intentional actions (and thus no efference copies) were involved in this task. Results verified these predictions, suggesting that efference copy does play a role in space perception.

008 THE EFFECTS OF TALKER VARIABILITY AND LISTNERS' GENDER ON THE PERCEPTION OF SPOKEN TABOO WORDS

Samantha E. Tuft, B.A.; Maura L. Krestar, M.A.; Conor T. McLennan, Ph.D.
Department of Psychology, Cleveland State University

The proposed experiments will examine the effects of inter-talker variability, taboo words, and listener's gender on the spoken word recognition. 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 across the two blocks of trials. When words were repeated across the two blocks of trials, but the identity of the talker changed (e.g., male to female), longer RTs or reduced accuracy resulted relative to when words were repeated across the two blocks, and the identity of the talker remained the same (e.g., male to male). Such performance costs, or talker effects, followed a time course, occurring only when processing was slow but not fast. The proposed study will address whether attention also plays a role in spoken word recognition by using taboo or swear words that grab people's attention. Two lexical decision experiments varying in task difficulty will be conducted, and participants' mean accuracy rates and reaction times (RTs) will be analyzed. Although previous work has found talker effects only when processing was relatively slow and effortful, it is predicted that hearing taboo words will surprise the listeners and grab their attention even when processing is fast, resulting in talker effects even when processing is fast. It is also predicted that there may be an interaction between the listeners' gender and the gender of the talker due to the evidence of gender differences on frequency of use of taboo words.

009 GRANT PROPOSAL TO FUND A TRANSITION PROGRAM FOR HIGH SCHOOL STUDENTS WITH DISABILITIES TRANSITIONING TO COLLEGE

Glenn D. Goodman, Ph.D.; **Rebecca T. Liskay, B.S.**; **Irina L. Rosenberg, B.S.**; **Bridget K. O'Donnell, B.S.**; **Nicole J. Hirsch, B.S.**; **Jennifer L. Fink, B.S.**
School of Health Sciences, Master of Occupational Therapy Program, Cleveland State University

"Post-secondary education is the gateway to the acquisition of a wide variety of marketable skills for high school graduates" (Dutta, Schiro-Geist, & Kund, 2009). Education beyond high school is often responsible for improving one's earning potential, career prospects, and long term quality of life. It is imperative that students with disabilities have an effective transition program in order to get the best education possible. We are seeking funding to provide a college transition program for high school students with disabilities in Cuyahoga County. This program will provide evaluation and training that will help the students to gain knowledge about career prospects, enhance learning potential and improve overall quality of life. The program will include comprehensive evaluations and interventions to address career choice, transition to college, services for students with disabilities, library services, financial aid, use of assistive technologies, and peer mentoring. Over the past year, we have been developing a draft of a grant proposal to submit to a potential funding source. To develop the grant proposal, we have engaged in several preparatory activities, including an extensive literature review, developing a budget, meeting with the university grant office, developing a timeline, creating an IRB approval form, consulting with a representative from the assistive technology lab on campus, holding a meeting with stakeholders, and contacting potential participating school districts. If grant funds are secured, CSU will be able to meet a community-wide unmet need for transition services for students with disabilities.

010 QUANTITATIVE DETERMINATION OF SECURININE, A POTENTIAL ANTICANCER AGENT IN MOUSE PLASMA BY LIQUID CHROMATOGRAPPHY-TANDEM MASS SPECTROMETRY

Simuli L. Wabuye¹, David Wald², Yan Xu^{1,3,*}
¹ Department of Chemistry, Cleveland State University
² Department of Pathology, Case Western Reserve University
³ Case Comprehensive Cancer Center, Case Western Reserve University

Securinine is a major alkaloid of plant *Securinega suffruticosa*, with a wide range of increasing biological activities, including anticancer properties. Securinine preferentially selects and induces apoptosis in colon cancer cells that are p53 deficient, and it has been found to be a differentiation inducing agent in myeloid leukemic cells with increased efficacy and

low toxicity. Hence, it has potential for clinical use for treatment of these cancers. A sensitive and reliable analytical method is needed for pharmacological studies of this compound. In this work, we developed an LC-MS/MS method for quantitative determination of securinine in mouse plasma. A salting-out assisted liquid/liquid extraction (SALLE) method using a mass spectrometer friendly organic salt (2 M ammonium acetate) was used with acetonitrile for preparation of plasma samples. Chromatographic separation of securinine and an internal standard (IS) was achieved on a Gemini Nx C₁₈ column with a mobile phase composed of 40% acetonitrile and 60% 10 mM ammonium acetate (pH 6.8) at a flow rate of 0.2 mL/min. Quantification was performed by AB SCIEX QTRAP 5500 mass spectrometer using positive turbo-ion-spray ionization in multiple-reaction-monitoring (MRM) mode with mass transitions m/z 218.1 → 84.1 for securinine and m/z 204.2 → 70.2 for the IS. Separation of securinine and the IS was achieved in less than 6 min and the analytical performance of the developed method was evaluated. A linear range of 0.0500-50.0 ng/mL (r = 0.999) with a weighted (1/x) least square method was obtained in mouse plasma. The lower limit of quantitation (LLOQ) achieved was 0.0500 ng/mL. The IS normalized recovery of securinine in mouse plasma ranged 99 to 110 %. The accuracy (%RE) and the precision (%CV) of the method were well within ±15% and 15%, respectively. The validated method has been successfully applied to the measurement of securinine concentrations in mice.

011 APPROXIMATE ORBITS IN A CENTRAL FORCE POTENTIALS: EFFECTIVE ANGULAR MOMENTUM

Cameron Tuckerman and Ulrich Zurcher, Ph.D.
Department of Physics, Cleveland State University

The motion of orbits in a central-force potential $\Phi_0(r)$ are conic sections [ellipse, parabola, and hyperbola] only in the case of Kepler potential $\Phi_0(r) \sim 1/r$. In the general case, there are no known closed expressions for the orbits and approximate methods must be found. The interest in finding approximate orbits started with Newton who was interested in potentials $\Phi_0(r) \sim 1/r^{1+n}$. Newton found $\Theta = \pi/(1-n)^{0.5}$ for the apsidal shift in the limit of small eccentricity, where $\Theta - \pi$ is the apsidal precession. We introduce a rotating reference frame based on an effective angular momentum and find excellent approximate expressions for the apsidal precession in the case of arbitrary eccentricity. We apply the method to $\Phi_0(r) \sim 1/(1+r)$, which is relevant for orbits of stars in elliptical galaxies.

012 EXPLORING THE FORMATION OF OPTICAL CAUSTICS VIA CATASTROPHE THEORY

Michael T. Hardin; James A. Lock, Ph.D.
Department of Physics, Cleveland State University

Numerous advances have been made in the understanding of wave optics and the partial focusing of light waves to form bright lines, called optical caustics, on surfaces. A mathematical treatment of catastrophe theory is used in understanding caustic formation and shape reconstruction through consideration of phase singularities of gradient mappings. The elementary cuspid catastrophes are considered and compared to experimentally obtained caustic patterns by directing a helium-neon laser beam through a water droplet on a microscope slide.

013 BUILDING A MOLECULAR MODEL FOR LCAT, THE ENZYME THAT REMODELS THE HIGH DENSITY LIPOPROTEIN

Christopher Pechura¹ and Valentin Gogonea, Ph.D.^{1,2*}
¹Department of Chemistry, Cleveland State University;
²Department of Cell Biology, Cleveland Clinic

Lecithin cholesterol acyltransferase (LCAT) is a plasma enzyme that remodels nascent high density lipoprotein (HDL) into a mature form called spherical HDL. The impeding of this critical step in reverse cholesterol transport (RCT), the transport of excess cholesterol from periphery cells to the liver for catabolism, leads to atherosclerosis. Our goal is to use computational chemistry and molecular modeling tools to build molecular models for LCAT and its complex with nascent HDL. The

molecular models are constructed from low resolution structures of LCAT and LCAT-HDL complex obtained by small angle neutron scattering (SANS) with contrast variation. Ultimately, we combine various experimental data (SANS data, hydrogen-deuterium exchange tandem mass spectrometry, other biochemical data) with computational techniques (bioinformatics, molecular modeling, SANS modeling, protein-protein docking, molecular dynamics simulation) to produce a molecular model for LCAT and its complex with nascent HDL. The model will be used in the future to map the amino acid residues from LCAT and the protein component of nascent HDL (apoA1) involved in the mutual interaction, and to identify LCAT residues interacting with the lipid phase of nascent HDL.

014 THE LOW RESOLUTION STRUCTURE OF NASCENT HIGH DENSITY LIPOPROTEIN REVEALED BY SMALL ANGLE NEUTRON SCATTERING

Celalettin Topbas, B.S.^{1,2}; Xavier Lee, Ph.D.²; Stanley L. Hazen, M.D., Ph.D.^{2,3,4}; Valentin Gogonea, Ph.D.^{1,2,3*}

¹Department of Chemistry, Cleveland State University;

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³Center for Cardiovascular Diagnostics and Prevention, Cleveland Clinic;

⁴Cardiovascular Medicine, Cleveland Clinic

The high-density lipoprotein (HDL), the carrier of ‘good cholesterol’, transports cholesterol from periphery cells to the liver for catabolism, a process termed reverse cholesterol transport (RCT). HDL particles are complexes of amphipathic proteins (e.g. apoA1) with various lipids (phospholipids, cholesterol, cholesterol ester, and triglycerides). We used small angle neutron scattering with contrast variation and the isotopic labeling of the protein (apoA1) to determine the low resolution structure of the protein and lipid components of nascent HDL reconstituted with dimyristoyl phosphatidyl choline (DMPC). The scattering data indicate that apoA1 conformation in this particle is open, contorted, and out of plane, while the shape of the lipid phase is an oblate ellipsoid that fits well within the protein shape. This overall architecture of HDL may be suited for changing lipid cargo content by stochastic expansion of apoA1 domains hinged by proline residues.

015 EXPRESSION AND PURIFICATION OF IKK γ /NEMO, A KEY COMPONENT IN THE ASSEMBLY OF THE IKB KINASE COMPLEX

Dmitriy Parshakov¹; Carolina Parada¹; Camelia Baleanu Gogonea, Ph.D.¹; Valentin Gogonea, Ph.D.^{1,2*}

¹Department of Chemistry, Cleveland State University;

²Department of Cell Biology, Cleveland Clinic

The role of NF- κ B transcription factors in human inflammation and disease makes them targets for therapeutics. IKK γ /NEMO is a critical component of the assembly of the high molecular weight I κ B kinase (IKK) complex, an important player in the NF- κ B transcription pathway. This complex is composed of two protein kinases, IKK- α and IKK- β , and IKK γ /NEMO protein. It is believed that the activation of IKK γ /NEMO requires a drastic change in its conformation. We investigate the hypothesis that IKK γ /NEMO oligomerizes as a compact trimer in order to expose its binding domain to the IKK- α /IKK- β complex. This assumption is based on previous results obtained by small angle neutron scattering (SANS). To accomplish our goal, we are studying both the full length IKK γ /NEMO (419 amino acids) and a C-terminus truncated form (125 amino acids). We are expressing the two proteins using cDNA prepared in our lab, and in the next stage of the project, we will use the proteins to perform SANS analyses and crystallography studies. The SANS results will be used in conjunction with the published crystal structure of the N-terminus of IKK γ /NEMO to build a molecular model for the full length IKK γ /NEMO. The model will be further used to predict the mutual interactions between IKK γ /NEMO monomers within the trimer, and with IKK- α /IKK- β within the IKK complex.

016 GEOGRAPHIC VARIATION IN SONGS OF THE VEERY (*CATHARUS FUSCESCENS*) ALONG THE APPALACHIAN MOUNTAINS

Courtney L. Brennan, B.S.¹; Andy Jones, Ph.D.²

¹Department of Biological, Geological and Environmental Sciences; Cleveland State University;

²Cleveland Museum of Natural History

The Veery (*Catharus fuscescens*) is a Neotropical migrant that breeds in secondary growth and woodland habitats subject to fragmentation and loss (Bevier et al. 2005). This is threatening their breeding populations. Their breeding distribution spans from southeastern British Columbia across southern Canada and south into the northeastern United States, continuing through the higher elevations of the Appalachian Mountains from western Maryland to northern Georgia (Bevier et al., 2005). Veery song may vary regionally in the Appalachians (Bevier et al., 2005), but these variations have not been studied. Song divergence among bird populations is recognized as a potential mechanism of premating isolation and may be a step towards speciation (Ruegg et al., 2006). This study will investigate geographic variation among breeding Veeries along the Appalachian Mountain range. Field vocalization recordings will be coupled with genetic analysis of Veery specimens from each sampling site to determine if geographic variation is occurring.

017 REACTANT CONSUMPTION ANALYSIS IN MICROCHANNEL BASED FUEL CELLS

Joseph D'Alessandro, B.Sc.; Petru S. Fodor, Ph.D.

Department of Physics, Cleveland State University

In this work, a miniaturized fuel cell design based on microchannels using liquid fuel and oxidizer streams is optimized for improved fuel usage. This particular design exploits the laminar nature of the fluid flow at small Reynolds numbers to keep the fuel and oxidizer confined in the vicinity of the corresponding electrodes without the need of a proton exchange membrane. Thus typical issues associated with the proton exchange membrane, such as reactant crossover, membrane dry-out and fouling are avoided. While the long term functional degradation effects associated with a physical membrane are eliminated, for an arbitrarily chosen geometry the slow thermal diffusion limits the efficiency of the cell due to the formation of depletion layers close to the electrodes. The performance of the cell is sensitive to geometry and rate of fluid flow with high aspect ratio cells operated at high Peclet number regimes being the most efficient.

018 MCP-1 MEDIATES CHRONIC PELVIC PAIN THROUGH MAST CELLS

Fuat Bicer, M.D.^{1,4}; Kenan Izgi, M.D.^{1,4}; Ahmet Ozer, M.D.^{1,2}; Michael Kavran, M.S.¹; Ismail Sayin, M.S.^{1,3}; Firouz Daneshgari, M.D.^{1*}; Cengiz Z. Altuntas, Ph.D.^{1*}

¹Urology Institute, University Hospitals, Case Medical Center;

²Department of Genetics, Case Western Reserve University;

³Department of Biology, Case Western Reserve University;

⁴Department of Clinical Chemistry, Cleveland State University

Background: Chronic pelvic pain is one of most important and disturbing symptom of Interstitial Cystitis/Painful Bladder Syndrome(IC/PBS), a chronic inflammatory bladder condition with unknown pathophysiology. Mast cell (MC) leading autoimmune condition is the most probable reason for the condition. MCP-1 level was found in the urine of IC/PBS patients.

Objective: The main reason of the condition and cause of pain in IC/PBS is still an enigma. The aim of this project was to identify the pathophysiology of IC/PBS, the origin of the pelvic pain and most importantly to find a biomarker by using the model.

Design, setting: We used a recently created animal model. BALB/c mice were immunized with UPK3A 65-84 peptide in an emulsion and Complete Freund's Adjuvant (CFA) via subcutaneous injection of 200 µg of UPK3A65-84 in 200 µl of emulsion. We also used MCP-1 KO mice on BALB/c background to show the relation of this chemokine with MC and pelvic pain.

Measurements: The pelvic pain was measured from the suprapubic region of the immunized and control mice by using calibrated von Frey monofilaments. Immunized and control mice were sacrificed at different times, and their organs were harvested for RT PCR and immunohistochemistry. The pelvic pain and MCs were also evaluated on the immunized KO mice compared to control groups.

Results: We found that pain responses on immunized mice were significantly increased compared to CFA mice. We showed MC accumulation in the bladder by RT-PCR, and immune-staining methods increased on immunized WT BALB/c mice compared to CFA. We also showed MCP 1 mediated MC accumulation in the bladder of the immunized KO mice compared to immunized WT mice significantly decreased and correlated with the pelvic pain.

Conclusions: We showed that created novel EAC model induces pelvic pain; MCP- 1 mediated MC at different time points increases in the bladder and causes pelvic pain.

019 IMPACT OF COGNITIVE AGING ON SPATIAL LEARNING WHEN PERSPECTIVE AND PRESENTATION ORDER VARY

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This study examined the impact of healthy aging on two important factors that are common in spatial learning. The first is the perspective a person views an environment from. The second is the sequence that the items are encountered in the environment. In order to test the effects of these factors on spatial learning, participants watched four videos in which they learned two environments from the ground-level perspective and another two from an aerial perspective. One video of each perspective presented each side of the rectangular layout sequentially, and the other presented the layout in a random order. After each video, participants created a map of the environment to determine how well they learned the layout. This study compared performance between healthy young adults and healthy senior citizens. It was anticipated that healthy senior citizens would show a similar pattern of learning to healthy young adults with the exception of having a higher level of error. Overall, the present study demonstrated that people tend to learn a layout better from a map-like view than from a 1st-person view, that people learn a layout better by following a set presentation order, and that while the ability to navigate a layout from a ground-level perspective declines, the ability to learn a layout from a map does not significantly change as we age.

020 THE APPLICATION OF MOUSETRACKING AND LEXICAL DECISION IN THE STUDY OF PROCESSING OF BODY IMAGE WORDS IN EATING DISORDERS

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Previous research has shown that individuals with an eating disorder selectively attend to stimuli related to their concerns, and this attentional component might be one way in which eating disorders are maintained. Research using a variant of the Stroop task (Stroop, 1935) has demonstrated that women with an eating disorder are slower (than controls) to color name words related to eating, weight and shape. The conclusion is eating disordered individuals have an information processing bias to stimuli related to their disorder, and thus, slower processing. The main purpose of the current study is to investigate the use of various methodologies - mouse tracking and the lexical decision task - in the study of information processing of body image related words in females with varying levels of eating disorder symptomology and body dissatisfaction. Eating disorder symptomology and body dissatisfaction will be measured with the Eating Disorder Inventory (EDI). We predict that the scores on the EDI will relate to the processing of body image related words in our groups of females. All participants will complete the EDI and participate in one computer task measuring information processing of body image related words. We predict slower processing in mouse tracking (i.e., information processing bias). Mouse tracking will also provide information about how processing unfolds over time. Facilitation of body image related words is predicted in the lexical decision task. This research will contribute to the body of literature investigating cognitive processing and body image in eating disorders.

021 EXAMINING THE TEMPORAL ASPECTS OF THE STROOP INTERFERENCE EFFECT WITH MOUSETRACKER

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Mouse tracking measures were used during the performance of the classic Stroop (Stroop, 1935) color-naming task with ten right-handed participants. Participants moved the computer mouse to click on the color of the words presented on the computer screen for two conditions. In condition 1 (match), all of the words were congruent with the color presented (e.g., the word *blue* is printed in blue and the correct response is 'blue'). In condition 2 (interference), all of the words were incongruent with the color presented (e.g., the word *blue* is printed in green and the correct response is 'green'). The mouse tracking measures supplied rich trajectory data that revealed robust and significant differences in reaction times (RTs). Analyses of the time-course data throughout each trial were also performed. How these results add to our understanding of the Stroop effect, and how mouse tracking could be used to provide a deeper understanding of other effects involving information processing are discussed.

022 CORRELATIONS BETWEEN THIRD GRADERS IN THREE READING TESTS: AIMSWEB, FOUNTAS AND PINNELL, AND OHIO ACHIEVEMENT ASSESSMENT

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Using third graders from an inner city school that uses the International Baccalaureate curriculum, this study will look to see if there are correlations between the Ohio Achievement Assessment, AIMSweb R-CBM, AIMSweb M-CBM, and the Fountas and Pinnell's Leveled Literacy Intervention reading test. It is predicted that the second grade spring data from both AIMSweb and the Fountas and Pinnell's Leveled Literacy Intervention will each have a moderate correlation with the fall third grade Ohio Achievement Assessment. It is predicted that the third grade fall from both AIMSweb and Fountas and Pinnell's Leveled Literacy Intervention will each have a high correlation with the fall third grade Ohio Achievement Assessment. The difference in the correlations will most likely have to do with the three-month summer break that the third graders get before the Ohio Achievement Assessment in the fall. Future research should look at different school systems and different grades to see if the correlations remain the same.

023 APPLICATION OF THE TIME COURSE OF VARIABILITY EFFECTS IN SPOKEN WORD RECOGNITION

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Presently there are two models of spoken word recognition that aim to describe how speech is processed. The abstract model explains variability as acting as noise that does not affect performance in recognizing spoken language; in contrast, the episodic model explains that variability in talker does influence the performance in terms of accuracy and speed. The central question is no longer which model explains how spoken words are recognized; it is accepted that both are used at different times during processing. Evidence has been found that abstract models explain early processing, whereas episodic models describe how later processing occurs; this is referred to as the time course model. The time course model has a lot of supporting evidence found through basic research. The aim of the current study is to examine how the time course model can be applied to real world tasks that involve processing spoken words, particularly in a dispatcher task. Our predictions are consistent with the time course model. In the easy task, we predict participants reaction times will be the same for the matched and mismatched talkers; however, in the hard condition, we expect that the group with matched talkers will have faster reaction times than the group with mismatched talkers.

024 PAPER-AND-PENCIL VERSUS WEB ADMINISTRATION OF A STUDENT SATISFACTION SURVEY

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Web surveys have been proven more cost efficient and less time-consuming than the traditional paper-and-pencil method. This study demonstrated comparable results for two separate years from different modes of administration of the same survey under conditions where the intended population remained the same, and equal access to the internet was established for every member in the targeted population. A student satisfaction survey administered via the web generated results comparable to those from a traditional paper-and-pencil mode in terms of scale reliability, average scale ratings and inter-correlations among scales despite differences in sample characteristics. Results support the contention that web surveys may be used as a cheaper and faster alternative to paper-and-pencil surveys in university settings.

025 GEF26 REGULATES BORDER CELL MIGRATION THROUGH RAP1 GTPASE DURING DROSOPHILA MELANOGASTER OOGENESIS

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Collective cell migration is an important mechanism for cell navigation in cancer, tissue repair and morphogenesis. How groups of cells stay together to coordinate their motility is still not well understood. During *Drosophila melanogaster* oogenesis, 6-8 cells derive from the follicular epithelium to form the border cell cluster. The border cells migrate as a cohesive group from the posterior to anterior end of the egg chamber, the major subunit of the fly ovary. Earlier studies have shown that the PDZ guanine nucleotide exchange factor (PDZ-GEF) regulates both cell adhesion and cell shape during mammalian cell migration. The *Drosophila* homolog of PDZ-GEF, Gef26, was recently isolated in our lab in a screen for new genes required for border cell migration. Loss of either *gef26* or the small GTPase Rap1, which is known to be regulated by PDZ-GEF/GEF26, showed strong border cell migration defects. Specifically, expression of dominant-negative Rap1 led to both severe migration defects and a loss of cluster shape and integrity. In addition, we found that Rap1 is highly expressed in border cells throughout their migration. We propose that GEF26 acts through Rap1 GTPase to promote normal border cell cluster morphology during migration.

026 PRIMING AN EMOTION RECOGNITION DEFICIT IN HEALTHY VOLUNTEERS

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Images depicting thin women can lead to body dissatisfaction. Social comparison theory explains this with two processes. They are known as “upward comparison,” which is defined as comparing oneself to a more attractive image and “downward comparison,” which is defined as comparing oneself to a less attractive image. Upward comparison can result in depression and body dissatisfaction. Downward comparison can result in an increased body image. Extreme body dissatisfaction is a core feature of eating disorders. Previous research has shown that individuals with eating disorders, such as anorexia, have a deficit in emotion recognition and processing. Building upon this theory, our study is designed to examine the effect of priming normal individuals (those without an eating disorder) with pictures depicting thin women on their performance on an emotion recognition task. Our study will have three priming groups: thin-ideal prime, obese prime, and a neutral prime. After priming, all participants will perform a facial emotion recognition task and complete the Eating Disorder Inventory. Participants will view a series of faces on a computer screen and choose one of four emotions (anger, fear, surprise, or happy) to describe the face. Based on previous findings, it is hypothesized that the individuals primed with the thin images will take longer to respond than both the control and obese prime and make more errors in recognizing the emotions. It is expected that there will be a specific deficit on the emotion anger. It is also hypothesized that the obese prime will make fewer errors in recognizing emotions than both the thin and neutral prime group. These results would be important for clinical purposes. Therapy should focus on teaching emotion recognition and processing skills to eating disordered patients, if there is indeed a deficit.

027 STRUCTURE OF THE CATALYTIC CHAIN OF *METHANOCOCCUS JANNASCHII* ASPARTATE TRANSCARBAMOYLASE. INSIGHTS INTO THE PATH OF CARBAMOYL PHOSPHATE TO THE ACTIVE SITE OF THE ENZYME

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Crystals of the catalytic chain of *Methanococcus jannaschii* aspartate transcarbamoylase (ATCase) grow in the presence of the regulatory chain in a hexagonal space group, P6₃22, with one monomer per asymmetric unit. This is the first time that we obtained crystals with only one monomer in the asymmetric unit, all known structures of the catalytic subunit containing several crystallographically independent monomers. The symmetry related chains form the staggered dimer of trimers observed in the other known structures of the catalytic subunit. The central channel of the catalytic subunit contains a sulfate ion and a K⁺ ion and has a glycerol molecule at its entrance. It is possible that it is involved in channeling carbamoyl phosphate (CP) to the active site of the enzyme. A second sulfate ion near Arg 164 is near the second CP position in the wild type *E. coli* ATCase structure complexed with CP. We suggest that this position may also be in the path that CP takes when binding to the active site, in a partial diffusion process at 37° C. Additional biochemical studies on carbamoylation and the molecular organization of this enzyme in *M. jannaschii* will give further insight to these points.

028 EFFECTIVENESS OF OCCUPATIONAL THERAPY INTERVENTIONS FOR WOMEN WITH BREAST CANCER: A SYSTEMATIC LITERATURE REVIEW

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A breast cancer diagnosis has the potential to impact multiple degrees of the physical and psychological aspects of a person. Medical treatments for breast cancer can result in decreased ability to participate in meaningful occupations due to physical, emotional, and cognitive impairments. Individuals with breast cancer commonly report decreases in quality of life, occupational performance, and well-being. Research is needed to identify and support interventions provided by occupational therapists working with women with breast cancer. The objective of this systematic literature review is to determine what interventions are being used by health care providers when working with women who have a diagnosis of breast cancer and to determine the effectiveness of these interventions and their relevance to occupational therapy practice. Researchers conducted a systematic literature review using Academic Search Complete, CINAHL Plus with Full Text, and OT Search. The initial search yielded 1,146 articles. Two levels of review were completed, followed by a secondary level 2 review, producing a final count of 19 articles which met all inclusion and exclusion criteria. The following interventions were identified as being used with women diagnosed with breast cancer in order to address impairments in physical, psychological, social, and cognitive function: yoga, supportive-expressive group and/or couples therapy, cognitive-behavioral stress management, education, communication technologies, expressive arts, creative arts, spirituality, cognitive restructuring, self care tasks, and end of life planning. However, the effectiveness of these interventions is still under review. Future research to determine the effectiveness of occupational therapy interventions utilized in the treatment of women with breast cancer is warranted.

029 EFFECTS OF SCHIZOTYPAL TRAITS ON STIMULUS-DRIVEN AND GOAL-DIRECTED WALKING

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The objective of the present study is to provide information on the distinction between high levels and low levels of schizotypal traits in reference to spatial navigation. It has been postulated that individuals with high levels of schizotypal

traits are less accurate in perception of self-motion, presumably due to the lack of functional efferent signals in the central nervous system. However, previous studies regarding this hypothesis yielded seemingly discrepant findings. On one hand, consistent with the hypothesis, high-schizotypal participants were less accurate in estimating non-visually walked distances than low-schizotypal participants. On the other hand, these two groups were able to walk to a previewed target without vision with equivalent accuracy, showing no evidence of impaired self-motion perception in the high-schizotypal participants. The present study is designed to resolve this inconsistency by contrasting stimulus-driven and goal-directed walking. In an experiment, blindfolded participants who have high and low levels of schizotypal traits will be asked to walk to a previewed target by way of a two-segment path. In the first segment the experimenter will lead the participants away from the target, and they will verbally estimate how far they have walked at the end of the segment. It is hypothesized that in the stimulus-driven walking the participants with high levels of schizotypal traits will be more inaccurate in their judgment of the walked distance than those with low levels of schizotypal traits. After giving the verbal estimate, they will then be asked to walk through the second segment to the remembered target location without any assistance. It is also hypothesized that in this goal-directed walking all participants will reach the target with equivalent accuracy irrespective of their schizotypal traits. These results will provide insight into how schizotypal traits differentially influence stimulus-driven and goal-directed actions.

030 DFT/QTAIM ANALYSIS OF CARBON MONOXIDE CHEMISORPTION TO NICKEL (111) AND BIMETALLIC Ni_3X , Ni_2X_2 ($X=$ Pd, Cu, Ag, Au) CLUSTERS

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Density functional theory calculations combined with the quantum theory of Atoms in Molecules were used to examine the effect of various promoted nickel four-atom clusters on the surface-carbon and carbon-oxygen bond. All systems were optimized at the B3PW91/LANL2DZ level of approximation in Gaussian 09. Calculations of the carbonyl-surface binding energy, bond lengths, frequencies, and bond dissociation energies of the carbonyl bond were performed. The results show that trends in binding and dissociation energies cannot be ascribed to any one ensemble or ligand effect. QTAIM analysis of the bond critical point (BCP) between carbon and oxygen shows a migration toward carbon as the carbonyl was removed from the surface, though no connection between rate of BCP migration and carbonyl activation could be established. Molecular graphs obtained from the gradient vector fields combined with the bifurcation mechanism of structural change reveal greater structural stability for certain clusters. This may provide valuable insight into the nature of promoter effect on activation. Finally, quadratic synchronous transit guided optimizations were performed to search for a proposed transition structure for the H_2 -mediated dissociation of oxygen. A comparison of methods, with and without QTAIM assistance, is discussed.

031 CHARACTERIZATION OF HRAP1'S FUNCTION IN TELOMERE LENGTH REGULATION

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Telomeres are nucleoprotein complexes at the ends of linear chromosomes and are essential for genome integrity. Telomere length homeostasis is critical for the normal cell proliferation. Extremely shortened telomeres usually induce cell growth arrest, senescence, or apoptosis. The specific function of a telomere-associated protein, human Rap1, in telomere length regulation is not entirely understood, although previous studies imply that hRap1 negatively regulates telomere length. Human Rap1 does not directly bind the telomeric DNA and is only recruited to telomeres by the duplex telomere DNA binding protein, TRF2. In order to specifically characterize the function of hRap1, we aim to target hRap1 to telomeres independent of TRF2 by fusing hRap1 to a duplex TTAGGG-binding myb domain from the fission yeast TEB1 protein. We confirmed that the GFP-NLS-TEB1myb fusion protein binds telomeric DNA when expressed in a human cell line. In addition, two different mutations within the hRap1's TRF2-interacting domain have abolished interaction between hRap1 and TRF2. Therefore, we expect to target the engineered, ectopically expressed hRAP1 to the telomere without perturbation of endogenous hRap1 or TRF2, and its effect on telomere length are examined. Furthermore, phosphorylation site mutations were generated in hRap1 in order to study whether any of these known post translational modifications are important for its function in telomere length regulation.

032 RIBOSOMAL PROTEIN S5 MEDIATES EFFICIENT START CODON RECOGNITION DURING TRANSLATION INITIATION

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Eukaryotic translation machinery has evolved from prokaryotes to develop a more complex (both structurally and functionally) ribosome and numerous trans-acting factors unique to the eukaryotic system. Accordingly, one-third of the ribosomal proteins (rp) in eukaryotes are absent in bacteria with many others developing eukaryote specific segments. Recent x-ray crystal structure analysis of eukaryotic (yeast) ribosome suggests that these eukaryote specific rps & segments might be essential for efficient ribosome functions. Direct evidences in this regard are however lacking, mostly due to the extreme functional co-operativity between the rRNA and protein and the proteins themselves with many rps being essential for viability. We aim to understand the evolutionary complexity of eukaryotic translation by studying ribosomal protein S5 (rpS5). RpS5 in yeast belongs to the rpS7 families which include bacterial rpS7 and eukaryotic S5. Although rpS7 families show a conserved central and C-terminal region, it exhibits an extended N-terminus in eukaryotes which is absent in bacteria. To investigate the function of this eukaryote specific rpS5 N-terminal extension, we obtained and characterized yeast strains in which the wild type yeast rpS5 was replaced by its truncated variants, lacking 13, 24, 30 and 46 N-terminal amino acids respectively. In the present work, we show that a region between 30 & 46 amino acids from rpS5 N-terminus are essential for efficient translation initiation and also play important role in amino acid starvation induced stress response involving GCN4 expression via re-initiation. Biochemical evidences suggest that this region primarily influence events downstream of 48S complex assembly, especially those surrounding AUG start codon recognition. We also identified specific amino acid residues within this region which are responsible for this function and propose a hypothetical mechanistic model explaining the observed defects in the mutants.

033 EVALUATION OF CLIENT SATISFACTION WITH PRO BONO PHYSICAL THERAPY SERVICES AT A FREE MEDICAL CLINIC

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Little is known about client satisfaction with physical therapy services in a pro bono practice environment. The purpose of this project is to evaluate client satisfaction with pro bono physical therapy services provided at the Free Clinic of Greater Cleveland.

Methods and Materials: A satisfaction survey was developed with constructs related to treatment outcomes, physical therapist attributes, processes and organization of care. Twelve former physical therapy clients evaluated the questions for relevance and third year DPT students evaluated survey items for their importance to practice. The final survey was composed of 30 questions and administered with an interviewer who read the questions and recorded subject's responses. Chart abstraction was done to understand subject co morbidities and physical therapy diagnoses. The final survey was administered by trained investigators to 30 consecutive volunteer subjects who were receiving/had received PT services, with a mean age of 48 (sd 11).

Data Analysis: Completed paper surveys were scanned into Snap Survey Software to ensure reliable data entry. SPSS 18 was used to define descriptive statistics.

Results: Preliminary results show that subjects were generally satisfied with care overall and would return to the same office for services. The highest rated survey items included: feeling the therapist listened, was respectful and explained instructions well. Lowest rated survey items were related to complete resolution of pain, restoration of full mobility and making a

complete recovery. The lowest rated therapist qualities were engaging clients in decision making, considering client opinions and the meaning of illness to the client. **Conclusions:** The importance of these findings suggests that pro bono physical therapy services in a Free Clinic environment are valued by clients. Physical therapists need to be mindful of allowing patients to take part in decision making and to include interventions on management of pain.

034 DISPARITIES IN SURVIVAL WITH HIV/AIDS BETWEEN MALES REPORTING BISEXUAL VERSUS MALE-TO-MALE TRANSMISSION RISK IN CUYAHOGA COUNTY, 1995-2011

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Background: Survival with HIV/AIDS has improved greatly after 1994 with the widespread use of highly active antiretroviral therapy (HAART). While several studies have recently shown disparities in survival before and after the HAART-era between groups by demographics, the primary transmission risk reported was limited to male-to-male sexual (MSM) contact, any injection drug use (IDU) and heterosexual (HET) contact. Bisexual (BI) risk among males was not reported separately.

Objective: CDPH Confidential HIV/AIDS Surveillance Registry was used to examine differences in survival among Cuyahoga County residents with HIV/AIDS, stratified by race/ethnicity, sex and risk transmission including BI (male) risk.

Methods: A secure, deidentified data set was used to analyze demographic characteristics; median time to survival and life table analyses used Wilcoxon Log rank tests to determine survival differences across groups.

Results: 4,543 HIV/AIDS incidence cases diagnosed during 1995-2011 were identified: 3,470(76.4%) male, 1,073(23.6%) female, 2,707(59.6%) black/African American (BAA), 1,294(28.5%) white non-Hispanic (WNH), and 387(8.5%) Hispanic. Among males: 45.4% MSM, 10.0% BI, 9.6% IDU, 19.0% HET, and 15.8% other/unk. Females: 67.4% HET, 11.3% IDU, 21.3% other/unk. 18.7% mortality to date. Among MSM, Black/AA males were diagnosed younger than WNH (32.0 vs. 37.2 yrs., $p<0.0001$) and died earlier (median age 40.4 vs 45.0 yrs, $p=0.004$). For bisexual males, Black/AA males were also younger than WNH when diagnosed ($p<0.001$) but died at similar age to WNH BI males. Median survival (age at 50% survival) for WNH males was shorter for MSM/BI (vs. HET); among black males, median survival was shorter for MSM (vs. BI/HET).

Conclusions: We are not aware of previous studies of survival with HIV/AIDS separating males for BI and MSM transmission risk. Black/African American MSM males had poorer survival than their white counterparts despite earlier diagnoses. Bisexual risk appears to be an important distinction in HIV/AIDS public health surveillance and survival.

035 *TRYPANOSOMA BRUCEI* RAP1 PLAYS AN IMPORTANT ROLE IN SUPPRESSING SUBTELOMERIC VSG ASSOCIATED GENE CONVERSION

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Trypanosoma brucei is a unicellular protozoan parasite that causes human African trypanosomiasis. In the bloodstream of its mammalian host, *T. brucei* periodically switches the major component of its surface coat, Variant Surface Glycoprotein (VSG), and thereby evades the host's immune elimination. VSGs are exclusively expressed monoallelically from subtelomeric VSG expression sites (ESs), and regulated VSG switching ensures the pathogenicity of the parasite. Two major pathways of VSG switching have been identified in *T. brucei*. One is *in situ* switching of ES in which the active ES promoter is silenced and a previously silent ES promoter is activated. Other mechanisms involving homologous recombination consist of gene conversion or crossover events encompassing either the whole ES or only the fragments including VSGs. Telomeres have been shown to play a role in regulation of VSG silencing. TbRAP1 was identified as an intrinsic component of the *T.*

brucei telomere complex, and depletion of TbRAP1 leads to derepression of subtelomeric silent ES-linked *VSGs*. Here we identified that TbRAP1 also plays an important role in regulation of *VSG* switching. Depletion of TbRAP1 leads to nearly 8-fold increase in *VSG* switching frequency and nearly 50% increase in *VSG* associated gene conversion, suggesting that TbRAP1 plays significant role in *VSG* regulation. To further understand the mechanisms involved in TbRAP1's function in antigenic variation, we also aim to identify TbRAP1-interacting partners. We have recently identified few potential candidates by Immunoprecipitation experiment followed by mass-spectrometry analysis.

036 VIRAL AND CELLULAR 2H PHOSPHOESTERASES CONTROL ANTIVIRAL INNATE IMMUNITY BY DEGRADING 2',5'-OLIGOADENYLATE ACTIVATORS OF RNASE L

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The 2',5'-oligoadenylate (2-5A) synthetase (OAS)-RNase L system is an interferon inducible pathway that blocks virus infections by cleaving viral and cellular single-stranded RNA. Viral dsRNA, produced during infections by both RNA and DNA viruses, activates OAS (a pathogen recognition receptor) resulting in production of 2-5A from ATP, which then activates RNase L leading to RNA cleavage. The factors that determine how viruses overcome the OAS-RNase L pathway in vivo are still poorly understood. A recent collaboration with Susan Weiss' laboratory at the University of Pennsylvania has shown that the coronavirus, murine hepatitis virus (MHV) strain A59 accessory protein, ns2, blocks the RNase L pathway in macrophages and facilitates the development of hepatitis. The ns2 protein is a 2H phosphoesterase family member with two conserved His-x-Thr/Ser motifs that eliminates 2-5A, the activator of RNase L, through its 2',5'-phosphodiesterase activity. We show that cellular A-kinase anchoring protein 7 (AKAP7) and viral (rotavirus VP3) homologs of ns2 have a similar enzymatic activity extending the significance beyond MHV infections. Accordingly, RNase L-mediated cleavage of rRNA in response to poly(I):poly(C) activation of OAS was suppressed by all three proteins as determined in RNA chip analyses. In addition, cellular levels of 2-5A were reduced by ns2, VP3 and AKAP7 expression as determined by an indirect fluorescence resonance energy transfer assay involving RNase L. Furthermore, ns2 and VP3 enhanced replication of encephalomyocarditis virus (EMCV) as determined in viral plaque assays. These findings suggest that some viruses evade the antiviral activity of RNase L by inducing degradation of its activator, 2-5A. Our results also suggest that AKAP7 may be cytoprotective by preventing sustained activation of RNase L.

037 GENETIC VARIATION IN THE FRESHWATER MUSSEL, *PYGANODON GRANDIS*, IN LAKE ERIE AND LAKE ST. CLAIR

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Freshwater mussels are currently one of North America's most imperiled fauna. In Lake Erie, this fauna was almost destroyed by two invasive species, the zebra and quagga mussels, but some recovery of native populations has been observed. To gain an understanding of genetic connectivity within recovering Lake Erie populations, we assessed genetic variation in *Pyganodon grandis*, a common species in lakes and ponds. A total of 260 individuals were sampled that came from four bathymetrically different regions within the Lake Erie watershed: the Western basin, the Central basin, Sandusky Bay, and Lake St. Clair. A total of 33 different haplotypes were found, however, only two were shared among all areas sampled. One of those two represents a common haplotype (81% of all individuals) within Lake Erie, and no other haplotype exceeded 2.3%; many were found only once. This pattern of variation suggests that for *P. grandis*, refuges were sufficient to preserve genetic variation and that past gene flow contributed to similar levels of variation throughout the region.

038 HIGH RESOLUTION IN ELASTIC SCATTERING SPECTROSCOPY OF POLY-L-LACTIC ACID BONE TISSUE SCAFFOLDS

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Poly-L-lactic acid (PLLA) is an important biodegradable polymer that is capable of mimicking the mechanical and piezoelectric properties of bone. In recent decades, researchers interested in bone regeneration have investigated the biochemical modulators of bone growth and repair processes, but have largely ignored the biophysical and bioelectrical properties of bone. Improving the performance of synthetic bone implants requires a broader approach that encompasses chemical, physical, and electrical integration of the implant to natural bone *in vivo*. In the work presented here, we have developed a non-destructive, high resolution optical method to characterize PLLA bone cell scaffolds *in vitro* based on Raman and Brillouin vibrational spectroscopies. Our aim is to exploit the biomimetic elastic and piezoelectric properties of PLLA to create biodegradable bone implants that persevere during bone regeneration *in vivo*, but that ultimately biodegrade leaving intact bone behind. We present the novel optical design of a new Raman-Brillouin imaging system and demonstrate its effectiveness on model PLLA systems and cultured PLLA substrates *in vitro*.

039 A TUNABLE COUPLED SURFACE PLASMONIC CAVITY FOR HYPERSPECTRAL IMAGING

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Wide-field chemical imaging has been performed using a variety of methods that employ either fixed wavelength filters or electronically tuned filters. Tunable filters such as the liquid crystal tunable filter (LCTF) and acousto-optic tunable filter (AOTF) have been used successfully for decades, each having a set of advantages and limitations. In our work, we have developed a novel gold-based surface plasmon tunable filter (SPTF) for chemical imaging of biomaterials that has higher throughput than LCTF devices and greater image fidelity than AOTFs. With diffraction limited image resolution and 50% transmittance, the SPTF is an enabling technology for low-light spectral imaging applications. We demonstrate chemical imaging using the SPTF on model biopolymer and biomineral substrates and compare our results with LCTF and AOTF images of the same substrates. In addition, we present a theoretical description of the SPTF function and compare calculated results to experimentally obtained characterization data. The design and fabrication of the SPTF is also presented.

040 RAMAN SPECTROSCOPY USING A VIRTUAL IMAGED PHASED ARRAY (VIPA)

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The chemical conformation and mechanical properties of polymers are closely related to their functional capabilities and are important considerations when developing high performance devices such as artificial tissue implants and prosthetics. Noninvasive and nondestructive methods are needed to evaluate polymer performance during manufacture and use, which may include *in-vitro* and *in-vivo* testing. Raman scattering spectroscopy is ideal for nondestructively characterizing polymer composition, conformation, and crystallinity and requires little or no sample preparation. Achieving the necessary spectral resolution for Raman spectroscopy ($\text{FWHM} \ll 10\text{nm}$) is challenging, and conventional grating monochromators are often replaced with a cascaded series of Fabry-Perot filters. A more recent technology, the virtually imaged phased array (VIPA), is capable of passbands well below 1nm and exhibits high angular dispersion. The compact device is not appreciably polarization sensitive and its use in demanding applications like wavelength division multiplexing has already been demonstrated. In the work presented here we demonstrate high resolution Raman spectroscopy using a novel gold-film VIPA which allow us to indirectly measure the long-range crystalline order in biomaterials. The VIPA design, theory, and data analysis are presented.

041 SITE-SPECIFIC LIPIDATION OF RECOMBINANT THROMBOMODULIN

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We report an enzymatic site-specific lipidation of recombinant thrombomodulin (TM) *via* sortase A (SrtA) mediated ligation (SML). TM is a cofactor for protein C activation with thrombin, and thus a crucial regulator in protein C pathway and coagulation cascade. TM contains 6x epidermal growth factor (EGF)-like structures, in which the fourth to sixth EGF-like region (TM₄₅₆) is responsible and the minimum functional domain for the activity of Protein C activation. SrtA is a transpeptidase from *S. aureus* which recognizes and cleaves LPXTG motif on the target protein, and then catalyzes the linkage of the target protein with the compound containing glycine. Truncated TM₄₅₆ derivative with a C-terminal LPETG motif was expressed in *E. coli* and purified by Nickel Affinity Chromatography. Glycine-DSPE was synthesized and conjugated with TM₄₅₆ derivative by SML. Glycine-DSPE was successfully added to the C-terminal of TM₄₅₆ by SDS-PAGE confirmation. This site-specific covalent modification leads to molecules being arranged in a definitively ordered fashion and facilitating the preservation of the protein's biological activity.

042 ASSESSING DIFFERENCES AMONG RECIDIVIST AND NON-RECIDIVIST

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The purpose of this study was to determine if there was a difference in hospital outcomes between recidivists and non-recidivists including the evaluation of subgroups (Vehicular accidents, Assaults, Falls, Other). A prospective observational study identified trauma admissions from May 2009-May 2010. A total of 2,127 patients were admitted over the study period. Of these patients, 466 (22%) were recidivists. Patients were termed recidivists if they had a history of previous trauma center evaluation within the past five years by using a questionnaire and EMR. Analyses were completed by stratifying the recidivists into injury mechanism subgroups, racial subgroups and previous injury admission subgroups. Outcome measures consisted of Injury Severity Score (ISS), Emergency Department (ED) disposition, discharge disposition, functional status at discharge as reflected in the Glasgow Outcome Score (GOS) and other various measures. Results from the study showed non-recidivists were more severely injured and had worse hospital outcomes when compared with recidivists. These relationships held true even after stratification into subgroups.

043 ROLE OF MYOD IN THE REGULATION OF THE PRO-APOPTOTIC BCL2 FAMILY MEMBER PUMA IN SKELETAL MYOBLASTS.

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We have previously reported that the level of the muscle regulatory transcription factor MyoD correlates with the level of induction of the pro-apoptotic Bcl2 family member PUMA, and the ensuing apoptosis that occurs in response to various apoptotic stimuli. Herein, we report that MyoD plays a role in the transcriptional regulation of PUMA. In silico analysis of the PUMA promoter revealed 10 potential MyoD binding sites. Chromatin immunoprecipitation (ChIP) analysis using anti-MyoD antibodies identified two MyoD binding regions. Binding of MyoD to these regions increased in myoblasts cultured in differentiation medium (DM, no serum) when compared to myoblasts cultured in growth medium (GM, 10% serum). Additionally, ChIP analysis also reveals increased histone acetylation in DM, an indicator of active transcription. This increased acetylation requires the expression of MyoD. Further, we have created luciferase reporter constructs containing segments of the PUMA promoter. Luciferase expression from the vector containing the -2000 to +225 region of the PUMA promoter transfected into 23A2 myoblasts lead to a 500-fold induction when compared to control vector alone. The role of MyoD in driving this expression will be investigated using RNAi.

044 ORIENTED IMMOBILIZED SIALYLOLIGO-MACROLIGAND AND ITS PROTEIN BINDING SPECIFICITY

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We report a chemoenzymatic synthesis of chain-end functionalized sialyllactose-containing glycopolymers with different linkages and their oriented immobilization for glycoarray and SPR-based glyco-biosensor applications. Specifically, *O*-cyanate chain-end functionalized sialyllactose-containing glycopolymers were synthesized by enzymatically α 2,3- and α 2,6 sialylation of terminal galactose of lactose-containing glycopolymers that was synthesized by cyanoxyl-mediated free radical polymerization. ^1H NMR showed almost quantitative α 2,3- and α 2,6-sialylation. The *O*-cyanate chain-end functionalized sialyllactose-containing glycopolymers were printed onto amine-functionalized glass slides *via* isourea bond formation for glycoarray formation. The specific protein binding activity of the arrays were confirmed with α 2,3 and α 2,6-sialyl specific binding lectins together with inhibition assays. Further, immobilizing *O*-cyanate **chain-end functionalized** sialyllactose-containing glycopolymers onto amine-modified SPR chip *via* isourea bond formation afforded SPR-based glyco-biosensor, which showed specific binding activity for lectins and influenza viral hemagglutinins (HA). These sialyloligo-macroligand derived glycoarray and SPR-based glyco-biosensor are closely to mimic 3D nature presentation of sialyloligosaccharides and will provide important high-throughput tools for virus diagnosis and potential anti-viral drug candidates screening applications.

045 IMPROVING THE COLLEGE EXPERIENCE FOR STUDENTS WITH DISABILITIES (ICE): A MENTORING PROGRAM

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The purpose of this study is to explore the efficacy of a mentoring program that focuses on enhancing the college experience for undergraduate students with disabilities. The pilot, "*Improving the College Experience for Students with Disabilities (ICE): A Mentoring Program*," which is influenced by Matuska and Christianson's lifestyle balance model (2008) and the person-environment-occupation-model (2005), facilitates the enhancement of undergraduate students' college experience by creating opportunities to: 1) develop time management/lifestyle balance skills; 2) understand one's own learning style and develop skills necessary to seek out assistive technologies and university resources; and 3) explore and connect with campus activities to promote development of one's social well-being. Master of Occupational Therapy students will serve as mentor-researchers, providing one-on-one mentoring to address the unique needs of each mentee. Mentor and mentee will develop a therapeutic relationship, establish goals, and document progress over the course of a semester. A mixed-methods explanatory study design (Creswell & Plano Clark, 2007) will be used to determine the efficacy of the program. Data analysis will include descriptive statistics and correlations of pretest-posttest measures, and explanatory themes extracted from semi-structured interviews, reflective journals, and a focus group (Creswell & Plano Clark, 2007; Moustakas, 1994). Researchers expect participation in the *ICE: A Mentoring Program* will provide students with the knowledge and skills to become more successful in experiencing positive student engagement.

046 INFUENCE OF BODY RELATED SCHEMAS ON DESION MAKING DURING AN UNRELATED TASK

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In the proposed study, we will examine the effects of negative self-schemas in participants without eating disorders, and the extent to which these negative schemas influence performance on an unrelated task. In the proposed study, participants will view photos while listening to spoken words. On half of the trials the photos will be of supermodels, and on the other half of the trials the photos will be

of gender-neutral shoes. On half of the trials participants will hear body image words (thigh), and on the other half of the trials participants will hear neutral words (desk). On each trial, the participants' task is to make a gender decision, simply indicating the gender of the talker speaking the word. The purpose of the study is to determine whether the combination of the photo type (supermodel, shoes) and the spoken word type (body image, neutral) will affect participants' performance in the task. We predict slower responses and/or more errors when participants are hearing body words relative to when they are hearing neutral words, but only when participants are viewing the supermodels. We predict no difference in task performance when hearing body words and neutral words when participants are viewing the gender-neutral shoes. If the data support our predictions, it may suggest that pre-established schemas interfere with the performance of daily activities, even in presumably unrelated tasks.

047 RNASE L CONTRIBUTES TO THYMIC DEVELOPMENT AND IMMUNE RESPONSE

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RNase L is one of the key enzymes involved in the function of interferons (IFNs), a family of cytokines participating in innate immunity against viruses and other microbial pathogens. Upon binding with its activator 2-5A, RNase L degrades single-stranded viral and cellular RNAs. As a result, viral replication and cell proliferation are inhibited. To elucidate the role of RNase L in regulating immune system, mice were generated with a targeted disruption of the RNase L gene. By using this mouse model, our preliminary studies have revealed that RNase L deficient mice show enlarged thymus glands containing significantly higher numbers of thymic cells at the early stage than that from wild type mice, suggesting that RNase L may play an important role in thymic development, differentiation, and function; Also, the differential expression of proinflammatory and proliferatory genes was observed in the thymocytes from the two mouse types. As a specialized organ of the immune system, abnormality of the thymus can be associated with altered immune responses including humoral and cellular immune response, leading to immunological diseases. Our findings provide direct evidence that RNase L may be involved in the immune system and deficiency of RNase L may result in attenuated immune response under stimulation.

048 THE EFFECT OF OTOLITH FUNCTION ON PERSPECTIVE TAKING

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The purpose of the proposed study is to gain insight into individual differences in spatial abilities, especially those observed in perspective taking. It is hypothesized that people who perform perspective taking poorly have great difficulty in imagining self-motion, which stems from perceptual deficiency in their self-motion sensing systems. In particular, we will focus on their otolith function that measures linear components of body velocity and acceleration. In this study, participants' otolith function will be measured by a water level test, and those with good and poor otolith function will perform a judgment of relative direction (JRD) test. This test requires participants to judge object locations from a novel perspective in a remembered environment. The expected results are for participants who score poorly on the water level test (i.e., poor otolith function) to also score poorly on the JRD test. These results would show that perceptual functioning of the otolith organ is correlated with perspective taking ability, which suggests that increased difficulty in perspective taking originates from the imagined movement deficit. The expected results can also help explain large individual differences that occur during JRD tests.

049 THE EFFECT OF URBAN LANDSCAPE CONVERSION ON WASP ASSEMBLAGES IN CLEVELAND, OHIO

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Small habitat fragments found in urban ecosystems are important sources of biological diversity for cities. It is known that intermediate levels of habitat fragmentation can provide more ecological niches than larger, un-fragmented landscapes. While some animals may need more space, insects fill these niches efficiently. This study examines the role of vacant land and gardens in urban ecosystems by assessing the diversity of *Hymenoptera*, with particular focus on parasitoid wasps. Wasps are important in urban green spaces as a form of agricultural pest control and occasionally as pollinators. Wasps were collected in yellow pan traps, counted and identified to a morphospecies level. Vacant lots were found to have a higher abundance and higher diversity of insects overall, and of wasps specifically, as compared to community gardens.

050 MODALITY INDEPENDENCE OF SPATIAL INFORMATION IN LONG-TERM MEMORY

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This experiment is designed to demonstrate the similarities between inter-modal and intra-modal integration of spatial layouts by showing the functional equivalence of spatial information encoded through different sensory modalities. Participants learn locations of ten objects on a tabletop, some of which will be learned through vision and others of which will be learned through touch. After learning the object locations, participants will make judgments of relative direction (JRD) between them: They imagine being at object A and facing object B, and then point to object C from the imagined position and heading. This task involves intra-modal integration of object locations in memory when objects A, B, and C are learned through the same modality. On the other hand, when they are learned through different modalities, JRDs require inter-modal integration. It is hypothesized that the cost of integrating object locations learned in the same modality will be approximately equal to the cost of integrating those learned in different modalities. Such a finding will suggest that the sensory modality through which spatial information is encoded in memory plays a limited role beyond the initial encoding process.

051 THE EFFECT OF URBAN LANDSCAPE CONVERSION ON SPIDER ASSEMBLAGES IN CLEVELAND OHIO

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Ohio is home to approximately 39 families of spiders. The most common families of spiders in Ohio are Araneidae, Gnaphosidae, Linyphiidae, Lycosidae, Salticidae, Theridiidae, and Thomisidae. Spiders are identified using microscopic examination of physical characteristics. Spiders can be identified using a dichotomous key that examines eye arrangements, mouth parts, physical markings, sex organs, claws, and hair placement. Spiders are typically trapped using a jar or a box with an adhesive substance on the bottom to trap them in place. Spiders serve an important purpose in urban ecology in terms of biological control. They play a significant role in the consumption of small insects and contribute to the maintenance of biological diversity. Spiders were collected using Yellow Pan Traps at vacant lots and community gardens in Cleveland, Ohio. Insects of all types flew, fell, or crawled into the pan trap. Spiders were then separated and identified to family.

052 THE ROLE OF RNASE L IN INFLAMMATORY BOWEL DISEASE

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The inflammatory bowel disease (IBD) is a disease that causes chronic and relapsing inflammation in the intestine, which is associated with the expression of proinflammatory genes. 2-5A dependent RNase L (RNase L) is one of the key enzymes involved in the molecular mechanisms of interferon functions against viral infection and cell proliferation. The role of RNase L in the regulation of proinflammatory gene expression and cell apoptosis has been well established. We hypothesized that RNase L regulates the expression of proinflammatory genes, mediates the inflammatory responses and apoptosis in epithelial cells of the intestine, and contributes to the development of IBD. To induce acute and chronic colitis, age and gender matched RNase L^{+/+} and ^{-/-} mice were given drinking water with or without 2.5% dextran sulfate sodium (DSS). Survival and change in body weights of both mouse types were determined by feeding 3% DSS in drinking water. Intestinal tissues were examined histologically and/or immunohistochemically for evidence of colitis. The expression of specific proinflammatory genes were quantitatively determined by real-time PCR after treatment with DSS. The expressions of these genes were confirmed by ELISA. Mice lacking of RNase L developed signs of IBD significantly slower than that wild type mice upon treatment of DSS. Further, 100% of the wild type mice died on day 15 during the DSS treatment, whereas all RNase L deficient mice were surviving at least 17 days post-treatment. At the endpoint of the experiment, there were 40% RNase L^{-/-} mice survived. The intestinal mucosa of RNase L^{+/+} mice showed prominent features of ischemic colitis. Our results demonstrate that RNase L may play an important role in the development of IBD through regulating the expression of proinflammatory genes and lack of RNase L attenuates the disease.

053 NON-STEROIDAL ANTI-INFLAMMATORY DRUGS SULINDAC AND INDOMETHACIN DERIVATIVES EXHIBIT POTENT ANTI CANCER ACTIVITY THROUGH COX INDEPENDENT MECHANISM.

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The cyclooxygenase (COX) inhibitors Indomethacin and its structural analogs Sulindac exhibit cell growth inhibition and apoptosis inducing activities in various cancer cell lines via COX independent mechanisms. Our strategy utilizes Non-steroidal anti-inflammatory drug (NSAIDs) Indomethacin and Sulindac as lead compound, for further development as anti cancer agents. NSAIDs have been widely reported to display strong efficacy for cancer chemoprevention, although their mechanism of action is poorly understood. Indomethacin and Sulindac derivatives were chemically synthesized and evaluated by in vitro MTT assay and IC50 cytotoxicity determined. The results showed that one of the derivatives of Indomethacin, N-(3-(dimethyl amino) ethyl)-2-(5-methoxy-2-methyl-1-(3, 4, 5-trimethoxybenzoyl)-1H-indol-3-yl) acetamide, was most active against HT 29 cell line with an IC50 of 2.71±0.75µm. More importantly in conjugation with structural and docking studies, this compound provides an insight into the molecular determinants that govern the ligand binding in Tubulin polymer. Tubulin polymerization assay indicated this compound inhibited tubulin assembly at high concentrations, but promoted this process at low concentrations which is a very unique mechanism.

054 EFFECT OF MYOD ON PROLIFERATION AND IRES MEDIATED TRANSLATION

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A goal of our lab is to investigate novel roles for the muscle regulatory transcription factor MyoD. We have previously reported that MyoD regulates the expression of the pro-apoptotic Bcl2 family member PUMA and have determined that PUMA translation is IRES mediated. Since we have determined that MyoD negatively regulates the expression of molecules critical to cap-dependent translation, we hypothesized that MyoD may play a role in the IRES mediated translation of PUMA. We investigated if MyoD has any effect on the PUMA IRES using bicistronic reporter constructs with PUMA 5'UTR shown

to be essential for PUMA IRES activity. We compared the expression of these constructs in parental, control and MyoD silenced myoblasts and determined that MyoD has no effect on the PUMA IRES. MyoD, by inducing the expression of the cyclin dependent kinase inhibitor p21, is known to play a key role in inducing cell cycle arrest when myoblasts are switched from growth medium (GM:10% FBS) to differentiation medium (DM: 0% FBS). This led us to hypothesize that MyoD may also play a key role in classical proliferation in GM. Herein we report a new role for MyoD in regulating cell cycle progression in GM. Specifically RNAi mediated knockdown of MyoD in skeletal myoblasts resulted in increased proliferation when compared to parental and control myoblasts. We will next determine if this effect of MyoD is a consequence of regulation of p21.

055 CREATING BRAGG DIFFRACTION WITH HPC MICROGELS

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Hydroxypropyl Cellulose is a modified natural polymer of great interest both to science and engineering. It can be cross-linked into microgel nanoparticles and is safe for the human body, making it a potential future drug-delivery vector. Understanding the HPC nanoparticle properties and interactions will be crucial to its future work. I experimented with concentrated solutions of these microgels using the methods of drying and centrifugation in hopes to concentrate them enough to produce Bragg diffraction. Bragg diffraction occurs when the microgels interact in a way that they form a matrix--a short-order self-assembling of the nanospheres. The properties of the solution were analyzed with the methods of dynamic light scattering for the shape and size of the micelles, static light scattering for the density of the micelles, and spectrophotometry to scan for iridescence, the trademark of Bragg diffraction.

056 WHO STABBED YOU? IT DOES NOT MATTER!

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There is minimal literature comparing outcomes and hospital procedures for patients with self-inflicted (SI) to those with non-self-inflicted (NSI) anterior abdominal stab wounds (AASW). We hypothesized that there would be significant differences between these groups. The data used for this analysis was from a population of 215 adult patients who were treated at a level 1 regional trauma center from 2006 through 2011 for AASW. Demographics, procedures, length of stay (LOS), and hospital charge information were compared between SI and NSI AASW patients. Since we were comparing two groups we used the Mann-Whitney test for comparisons involving score outcomes, Fisher's Exact test for comparisons with binomial outcomes, and unpaired t-tests for measurement outcomes. The results of these comparisons are as follows. Of the 215 patients who were identified with AASW, 20% were SI. These patients had other injuries in addition to AASW. NSI patients had significantly more non-abdominal ($p<0.01$) and intra-abdominal injuries ($p<0.01$), and disposition directly to OR ($p=0.02$). 128 patients had isolated (injuries confined to abdomen) AASW, 28% were SI. NSI patients were less likely to be admitted ($p=0.01$) with similar LOS. Age, initial vitals, gender, and percent of patients with multiple AASW were similar. There were no significant differences in percent of hemodynamically unstable/symptomatic patients, operative rates, or intra-abdominal injuries between the two groups. 103 patients were stable/asymptomatic with isolated AASW, 31% were SI. NSI patients were less likely to be admitted ($p<0.01$), had lower ICU admission rates ($p=0.01$), shorter LOS ($p<0.01$), and lower hospital charges ($p<0.01$). Rates of intra-abdominal injury were similar between these two groups at 21%. Conclusion: After controlling for extra-abdominal injuries, SI and NSI patients with AASW have similar risks of intra-abdominal injuries; however, SI patients utilize more resources.

057 THE INFLUENCE OF EXPERIENTIAL TRAINING ON PARENTING STYLES

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Parenting may be something that people do naturally when they have children or when they have to raise somebody else's child. Just as every person is different, with different personalities and characteristics, every person has his or her own parenting style. Some child development classes use parenting training programs such, as the "My Virtual Child" (MVC) experiential program, which simulates how a person would raise a child. The aim of the study will be to examine whether the MVC program will influence parenting styles. Two groups of participants will be investigated, one which will be exposed to MVC and the other will not. Before and after going through the procedure, participants' parenting styles will be measured in order to know if the MVC program had an influence in their styles. If the results demonstrate a significant difference in parenting styles, such data would indicate an influence of the MVC on the parenting styles. If there is not a difference, then perhaps the MVC program does not influence parenting styles, although alternative interpretations would also be considered.

058 ANALYSIS OF KINEMATIC CHANGES IN REACH TO TABLE FOLLOWING ENGAGE PROTOCOL VIDEO GAMING IN AN INDIVIDUAL WITH CHRONIC STROKE

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Background and Purpose: Stroke is one of the leading causes of long term disability in the United States. Post stroke, individuals frequently experience residual upper extremity impairment that limits function. Prior research examining gaming interventions has shown that a change in function occurs, but there has been little investigation about how or why these changes occur. The purpose of this study is to examine kinematic changes in upper extremity motion measured using motion analysis as a result of participation in the ENGAGE video gaming protocol in an individual with chronic stroke.

Subject: One 51 year old male six years post stroke participated in the study.

Methods: The participant received 720 minutes of individualized video gaming as an adjunct to conventional physical therapy following the established ENGAGE protocol. Reaching from hand in lap to table top was analyzed using three-dimensional motion analysis before and after the intervention.

Data Analysis: Data were tracked and hemiparetic shoulder and wrist displacement, time, and movement velocity were calculated.

Results: The movement time decreased from 2.1 sec to 1.4 sec. The distance the hand moved decreased from 311 mm to 260 mm. Mean shoulder movement velocity increased from 177 to 207 mm/sec while peak velocity decreased from 354 to 327 mm/sec. Mean wrist movement velocity increased from 452 to 518 mm/sec while peak velocity decreased from 1124 to 999 mm/sec. Qualitatively, the velocity curves became smoother following the intervention.

Conclusion: Overall, the hand moved more directly as well as more quickly from lap to table surface following the intervention. While peak velocity of movement decreased, mean velocity increased. These changes also are reflected in the increased smoothness of the velocity curves following the intervention.

059 RNASE L REGULATES FACTORS RELATED TO MACROPHAGE MIGRATION

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In innate immunity, macrophages are often a frontline defense against invading disease or injury. The migratory capability is one essential characteristic of macrophages. Our previous data showed that RNase L, an interferon (IFN) inducible enzyme,

is positively correlated with macrophage cell motility. To elucidate the molecular mechanism by which RNase L regulates macrophage migration, the expression level of certain macrophage migration related factors in bone-marrow derived macrophages (BMMs) from RNase L wild type and knock-out mice was determined. Our results revealed that the expression of CCL2, a chemokine which plays an important role in regulating the migration and infiltration of macrophages, was markedly reduced in RNase L deficient cells after treated with LPS. Interestingly, we found that RNase L is necessary for the expression of TGF- β , but not for MSF in BMMs. This observation was further confirmed by using an RNase L knock-down Raw 264.7 cell line, a mouse macrophage cell line. In addition, the expression level of IL-10, which was recently found to induce macrophage migration through its inhibitory effect on macrophage migration inhibitory factor (MIF), was significantly reduced in RNase L deficient RAW264.7 cells. Taken together, our findings provide new insight into how RNase L regulates macrophage function, and suggest a novel role of RNase L in innate immunity.

060 DYNAMIC STABILITY IN ARBOREAL LOCOMOTION

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Arboreal locomotion - traveling on tree branches, trunks, twigs, and foliage - is common among many species of mammals. Arboreal locomotion is often used by animals when searching for food, mates, to escape a predator, or to seek shelter. Because traveling on arboreal supports involves substrates which are narrower than the animal's stance width, it is important to possess mechanisms of stability to avoid falling off the sides. In general, stability can either be dynamic or static. Static stability involves crouching lower to avoid toppling, grasping, and even moving slower. Dynamic stability, such as running faster on the narrow substrate, contributes to stability by utilizing angular momentum of different body parts. In order to study dynamic stability during arboreal locomotion, we videotaped five Siberian chipmunks (*Tamias sibiricus*) while negotiating a trackway which simulated an arboreal situation. We digitized landmarks on the head, torso, limbs, and tail using APAS motion analysis software. We recorded each subject's mass and measured the center of mass location to calculate angular momenta values around all three axes using MathCad software. Results showed that pitch angular momentum was significant. Pitch angular momentum is generated by the head and body and the continual flexion and extension of these parts during locomotion, and this motion aids in stability by resisting rolling. Rolling angular momentum was small and not significant for stability. Yaw angular momentum was random, but balanced between positive and negative, and therefore could not be considered significant.

061 LIPID PROFILING IN ALGAL SPECIES, SCENEDESMUS DIMORPHUS BY MASS SPECTROMETRY

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As concern grows over the supply of fossil fuels (*i.e.*, petroleum, natural gas, and coal, etc.), other sources of energy are being sought. Biodiesel from microalgae has been one of the frontiers. While the percentages of proteins, carbohydrates, and lipids vary from species to species, some algal species can store up to 40% of lipids of their dry masses. It is these lipids that can be extracted and converted to biofuels. In general, biological lipids can be divided into: fatty acids, neutral lipids (glycerolipids), polar lipids (glycerophospholipids, sphingolipids) and non-acyl lipids (saccharolipids, polyketides, sterol lipids, and prenol lipids).

The aim of the study was to profile lipid classes present in the algal species *Scenedesmus dimorphus* under different growing conditions to understand the biochemistry of algae for maximizing lipid productivity. In this work, all lipid classes were first extracted from algae dry mass by Bligh-Dyer method, and then fractionated into individual classes by NH₂ propyl cartridge with various solvents. Fatty acids and monoglyceride classes were qualitatively identified by both gas chromatography ion-trap mass spectrometry (GC-MS) and electrospray ionization tandem mass spectrometry (ESI-MS/MS). The GC-MS data showed that C-16 and C-18 fatty acids are the building blocks of the Neutral lipids, and the ESI-MS/MS data revealed that the acyl chain constituents involving the C-16 and C-18 fatty acids form the monoglycerides. Further, quantification of the identified lipids can be achieved by either or both mass spectrometric techniques.

062 DIFFERENCES IN BEETLE (*COLEOPTERA*) COMMUNITIES BETWEEN VACANT LOTS AND URBAN GARDENS WITHIN CLEVELAND

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Beetles represent the most diverse order of all living things. They can occupy many niches and can span every level of the food webs they exist in. Due to this, they can be excellent indicators of the state of an ecosystem. This project aims to examine how two different land use types, vacant lots and urban gardens are used by beetle communities and therefore, examine the ecological roles of these land use types in an urban environment. Due to the diversity of beetles and their range of habits, the results of this project will presumably translate to arthropod communities overall and potentially higher taxa as well. We will compare beetles collected using two trap types from 16 sites (8 gardens and 8 lots) over the summer of 2011. In order to quantify differences between these land use types, all individuals will be identified and placed into one of several feeding guilds so that *Coleopteran* biodiversity can be analyzed along with food web structure. We hypothesize that the vacant lots will stand as small bastions of ecologically important green space within an urban matrix, even more so than urban gardens. We hypothesize that lots on average will have higher biodiversity and more balanced food webs, while urban gardens will contain less diverse beetle communities and less balanced food webs with proportionally more phytophagous species. Samples have been sorted and specimens are currently being identified; we should have initial results soon.

063 YEAST-2-HYBRID SCREENING FOR *T.BRUCEI* TIN2- AND RAPI-INTERACTING PROTEINS

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Telomeres are DNA-protein complexes located at the ends of linear chromosomes. Acting like a cap, they protect chromosome ends from degradation and rearrangement, maintaining genomic stability. *Trypanosoma brucei* is a protozoan parasite, causing sleeping sickness in humans and nagana in cattle. To evade host's specific immune response, *T.brucei* cells switch their major surface antigen, Variant Surface Glycoprotein (VSG) regularly. Hence, understanding the VSG regulation by the telomere complex would help in developing means to eliminate this parasite.

Our understanding of *T.brucei* telomere complex is still at the initial steps. TIN2 (TRF1-interacting Nuclear Protein 2) and RAP1 (Repressor Activator Protein 1) are two of the known-proteins within the complex. In this study, we syb-cloned TbTIN2 and TbRAP1 into yeast-2-hybrid bait vectors and introduced these vectors into yeast strains separately. After confirming the expression of TbTIN2 in yeast cells, we introduced a normalized *T. Brucei* cDNA library into the tbTIN2-containing yeast strain. By using selective media and reporter liquid assay to screen for protein-protein interactions, we were able to obtain cells expressing both TbTIN2 protein and a potential TbTIN2-interacting protein for further analysis.

064 GLYCO-FUNCTIONALIZATION OF LIPOSOMES AND THEIR STABILITY STUDY

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Self-assembled lipid bi-layers such as liposomes have been widely used as biomimetic models of cell membranes and as drug/gene delivery carrier systems. Liposome encapsulation technique has been demonstrated to enhance their compatibility with the biological milieu *in vitro* and *in vivo*. Cell surface carbohydrates have specific interactions with proteins, which play an important role in various biological recognition processes such as fertilization, embryogenesis, metastasis, inflammations and host-pathogen adhesion. Therefore, carbohydrate molecules serve as attractive molecules for surface modification of liposomes with purpose for tissues specific and biocompatibility. In this report, glyco-functionalized liposome systems were prepared by the thin-film hydration and extrusion process followed by chemically selective glyco-functionalization of liposomes *via* Staudinger ligation. The structural characteristics and stability of the glyco-functionalized liposomes were confirmed by DLS and Fluorescence spectroscopy. Particularly, anchor lipid effects on the stability of glyco-functionalized

liposomes were investigated by using two different anchor lipids namely (Cholesterol-PEG₂₀₀₀-TP) and (DSPE-PEG₂₀₀₀-TP) monitored via the fluorescence leakage assay.

065 DEVELOPMENT OF A SENSITIVE METHOD FOR QUANTITATION OF 6-HYDROXIMINO-4-AZA-A-HOMO-CHOLEST-3-ONE IN MOUSE PLASMA USING LC-MS/MS

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It has been found that 6-hydroximino-4-aza-A-homo-cholest-3-one (HyM3) is a steroidal derivative with a significant anticancer effect. This compound displayed its antiproliferative activity against cancer cells and was able to inhibit tumor growth in an athymic mouse model. To develop a method for analyzing its pharmacological kinetics, HyM3 and the internal standard (3E)-Hydroximinocholest-6-one were extracted from mouse plasma samples through a protein precipitation procedure by mixing with acetonitrile (1:4 v/v) and then centrifuging at 12,400 g for 15 minutes. The supernatant (10 µl) was injected onto the LC/MS system consisting of a Shimadzu Prominence HPLC and an AB Sciex QTrap 5500 with positive electrospray ionization. A MRM mode was chosen for sensitive and specific detection of the analyte and internal standard. The HPLC separation employed a Phenomenex Kinetex C8 column (50x2.1 mm, 2.6µ) with a gradient mobile phase of 0.2% formic acid in water and 0.2% formic acid in acetonitrile at a rate of 0.2 ml/min. Full mass spectrometric scans of HyM3 and the internal standard showed protonated molecular ions of 431 and 416 m/z, and fragmentation of these two ions revealed predominant product ions of 370 m/z and 344 m/z respectively. HyM3 was retained on the HPLC column for 6.4 minutes, while the internal standard was retained for 7.3 minutes. The method was calibrated for a concentration range from 0.500 to 200 ng of Hym3 per mL of plasma. By measurement of quality control samples prepared by spiking HyM3 and the internal standard into plasma at three concentrations (low, medium, and high), we found that this method was precise (CV < 10%) and accurate (the error < 15%). The low limit of quantitation (LLOQ) was 0.500 ng/ml. Some plasma samples from HyM3-administrated mice were analyzed, and the results have showed that the method is applicable for such measurement.

066 URBAN LAKES ASSESSMENT: USING DIATOMS AS BIOINDICATORS OF WATER QUALITY IN CUYAHOGA COUNTY, OHIO

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In October of 2011, satellite imagery of Lake Erie displayed a bloom of harmful algae, *Microcystis sp.*, known to pose as a human health hazard and environmental risk. Recent investigations reveal Lake Erie's water quality to be commensurate with conditions prior to the adoption of the Clean Water Act in 1972. Cuyahoga County is a heavily urbanized environment on the shore of Lake Erie containing approximately 111 inland lakes greater than two and one half acres in size, the majority of which are man-made, private systems. Urban runoff plays a key role in the decline of freshwater ecosystems, however, it is unclear as to whether or not man-made lakes contribute as a nutrient source exacerbating the burden on Lake Erie or provide nutrient sinks thereby reducing nutrient loading. This study aims to use diatom assemblages preserved in sediment cores as bioindicators to assess historic water quality of these private lakes and untangle patterns of nutrient loading and eutrophication. Data collection will include water chemistry and physical lake features, as well as a survey of management practices for each sample site.

067 MASS SPECTROMETRY: A CENTRAL TECHNOLOGY FOR PROTEIN ANALYSIS

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Quadrupole time-of-flight (Q-TOF) mass spectrometry is a powerful analytical technique for protein research and for study of macromolecules. With its high sensitivity and specificity, Q-TOP mass spectrometry has been used for identification and

quantification of proteins and nucleic acids, as well as for characterization of protein-ligand complex, enzyme-inhibitor interaction and reaction mechanism.

In this work, we demonstrated the use of Q-TOF mass spectrometer for protein identification and characterization using intact bovine serum albumin (BSA) by both external and internal calibrations with renin, and Protein Pilot software for bioinformatics. The methodology established was applied to the studies of enzyme inhibition in certain novel antibiotics.

068 EFFECT OF POLYMER MOLECULAR WEIGHT AND SYNTHESIS TEMPERATURE ON STRUCTURE AND DYNAMICS OF MICROGELS

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Environmentally-sensitive microgels have been synthesized under varying conditions to study the dependences on polymer molecular weight (M_w) and synthesis temperature (T_{syn}). The dynamics and structure of the synthesized microgels below and above the LCST of the polymer ($T_c \sim 41^\circ\text{C}$) were studied using dynamic and static light scattering spectroscopy. All microgels exhibit a volume phase transition above the LCST of the polymer and undergo a reversible 15-50-fold volume shrinkage. The size distribution, structure, deswelling ability, and temperature response of microgels strongly depend on synthesis conditions. T_{syn} dependence was studied with 1000kDa polymer. Increasing $\Delta T = T_{syn} - T_c$ yields smaller microgels with a smaller swelling ratio up to $\Delta T = 8.5^\circ\text{C}$, after which the trend is reversed. The amphiphilic nature of the polymer may explain this trend. Polymer M_w directly affects microgel polydispersity and temperature response. While microgels synthesized with 1000kDa polymer are relatively monodisperse, synthesis with low M_w polymers (80-370kDa) yields systems with a large population ($R_h \sim 1000\text{nm}$) precipitating out of solution and a smaller population ($R_h \sim 300\text{nm}$) staying in suspension. M_w also influences the temperature response of microgels; high M_w microgels show a gradual shrinkage with increasing temperature while low M_w microgels display a delayed and sudden shrinkage at high temperatures.

069 LECTIN MIMETICS FOR GLYCO-CAPTURING, GLYCOMICS AND GLYCOPROTEOMICS APPLICATIONS

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Cell surface carbohydrates existing as glycoproteins and glycolipids represent the first information about the cell with the outside world and are closely involved in various biological processes such as cell communication, and the molecular orientation and cell targeting. However, the mechanisms of most of the processes at the molecular level are still unclear. It is therefore very important to develop specific carbohydrate-binding molecules for a fast, efficient, sensitive and accurate analysis of complex carbohydrates structures and functions. In addition, certain carbohydrate-binding molecules can be used in medical applications such as biomarkers for diseases diagnosis and targeted drug delivery applications. In this presentation, we report design and synthesis a lectin mimetics based on bovine serum albumin (BSA)-boronic acid (BA) conjugates. The BSA-BA conjugates were synthesized by amidation of carboxylic acid groups in BSA with aminophenyl boronic acid in the presence of EDC, and were characterized BSA-BA conjugates by Alizarin Red S (ARS) assay and SDS-PAGE gel. The BSA-BA conjugates were immobilized onto malimide-functionalized silica beads and their sugar capturing capacity and specificity were confirmed by Alizarin Red displacement assay. These lectin mimetics will provide an important tool for glycomics and glycoproteomics research and applications.

070 SYNTHESIS OF AZIDOETHYL SIALYLGLYCOSIDE FOR SIALYL GLYCO-MACROLIGAND FABRICATION

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Sialic acids, a family of 9-carbon containing acidic monosaccharides, often terminate oligosaccharide structures of cell surface glycoproteins and glycolipids and are involved in many biological recognition processes such as cell-cell signal recognition, adhesion to ligands, antibodies, enzymes and microbes. The importance of sialic acid in these processes, especially with respect to human disease states, has led to increased interest in the synthesis of natural and modified sialic acids both as probes of sialic acid-recognizing proteins, and as potential glycotherapeutics. We report here the synthesis and characterization of azidoethyl glycoside of sialic acid as key compound for sialyl glyco-macroligand fabrication applications, which facilitates strong binding affinity through multivalent interactions with the sialic acid-binding proteins. The azidoethyl sialylglycoside can be used for modification of polymer, liposome, nanoparticle, and immobilized lipid membrane directly via click chemistry or Staudinger ligation or by converting to amine derivative.

071 LIGHT SCATTERING CHARACTERIZATION OF SALT DEPENDENT THERMOREVERSIBLE MICELLES SYNTHESIZED FROM ELASTIN-LIKE POLYPEPTIDES

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Environmentally responsive nanoparticles synthesized from Elastin-Like Polypeptides (ELP) present a promising system for applications such as biosensors, drug delivery vehicles, and viscosity modifiers. These nanoparticles undergo a transition from a soluble state at room temperature to micellar aggregates above the transition. The ELP micelles have been found to be sensitive to various outside stimuli including pH, salt concentration, and solvent. Dynamic and Static Light Scattering were used to study structure and dynamics of ELP nanoparticles below the transition and of formed ELP micelles above the transition. Micelles were found to generally depend strongly on solution pH, however, in the pH window of 10.1-10.4 their size stayed constant. The apparent radius and molecular weight of micelles in this pH range strongly depend on salt concentration with three apparent regimes. At low salt (0-15mM), largely spherical micelles were found with $R_h=15\text{nm}$, which corresponds to the size of folded ELP hydrophilic tail; and molecular weight of 4000-5000kg/mol. At the intermediate salt (15-30mM) the observed particles are spherical micelles that increase in size (by about 3 fold) and molecular weight (by about 50 fold) as salt concentration increases. At high salt concentrations (30-60mM), $R_g/R_h \sim 1.3$, indicating the micelles behave as elongated elliptical particles with $L=700-1100\text{nm}$ that corresponds to the size of a stretched ELP chain with an apparent molecular weight of 300000-600000kg/mol.

072 SPINAL EPIDURAL ABSCESS: THE SUMMA EXPERIENCE

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Objective: This study presents the Summa experience with spinal epidural abscess patients. The purpose of this 10-year retrospective study is to analyze treatment protocol, hospitalization time, and time lapse for diagnosis and treatment as well as outcomes for this rare condition

Methods: We reviewed 120 patient charts with a discharge diagnosis of spinal epidural abscess between January 2001 to February 2012 within Summa Health system utilizing Electronic Medical Records System.

Results: This retrospective analysis (n=120) illustrated the mean age of patient with spinal epidural abscess was 68+/-3, with the most common presenting symptom of progressively debilitating back pain. Mean hospitalization time 13 days +/- 3 days, with MRI as most common diagnostic modality used for diagnosis (92%). Average time lapse before diagnosis 1.5 days. Spinal surgical decompression and drainage was the most common treatment modality (78%) while (22%) of patients got antibiotics only. The most frequent outcome was discharge to Skilled Nursing Facility/Rehabilitation with 6-8 wks of appropriate antibiotics (97%), while 3 patients expired.

Conclusions: Spinal epidural abscess could be a difficult diagnosis, however it should be suspected in patients that present with acute back pain, and risk factors (IV drug abuse, trauma or previous spinal surgery, increasing age, and nursing facility). Literature recommends MRI as gold standard for diagnosis of Spinal Epidural Abscess (SEA). In conclusion, this retrospective review was able to illustrate, that MRI was the most common diagnostic tool utilized within Summa Health System (92%).

073 ROLE OF THE MUSCLE REGULATORY TRANSCRIPTION FACTOR MyoD IN CONTROLLING 'eIF 2 α ', '4E-BP' & 'S6 KINASE', KEY MEDIATORS OF CAP-DEPENDENT TRANSLATION

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During myogenesis and muscle regeneration, the processes of apoptosis (programmed cell death) and differentiation are coordinately regulated. The muscle regulatory transcription factor MyoD is well known as the master switch controlling skeletal myoblast specification from multipotential stem cells into functional skeletal muscle. MyoD is also responsible for cell cycle exit and expression of muscle specific genes during differentiation. Our lab has recently reported that MyoD regulates apoptosis in myoblasts and fibroblasts through increased expression of the pro-apoptotic Bcl2 family member PUMA (p53 up-regulated modulator of apoptosis). Thus, MyoD regulates the mutually exclusive biological endpoints of growth arrest and differentiation or apoptosis. This activity of MyoD is reminiscent of the transcription factor p53, which has the dual capacity to induce either growth arrest or apoptosis in response to DNA damage or ER stress in most cell types. Interestingly, p53 has recently been reported to inhibit CAP-dependent translation by inhibiting the expression of 4E-BP, which inhibits 4E, a protein required for CAP-dependent translation. Hence, we are testing the hypothesis that MyoD also plays a role in the regulation of CAP-dependent translation by affecting not only the level of 4E-BP expression, but also eIF 2 α and S6 kinase, which are key mediators in the initiation of CAP-dependent translation. The data collected shows an increased expression of 4E-BP, eIF 2 α and S6 Kinase in myoblasts which had MyoD knocked down, suggesting MyoD's role in regulation of CAP-dependent translation.

074 DESIGN AND THEORETICAL MODELING OF A HYBRID VIRTUALLY IMAGED PHASED ARRAY SURFACE PLASMON WAVELENGTH FILTER.

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In demanding applications like Brillouin spectroscopy and high resolution Raman spectroscopy, wavelength discrimination and laser rejection are often performed using a cascaded series of narrow bandpass filters. Triple monochromators and cascaded Fabry-Perot filters have been employed, but are cumbersome and are not well suited for applications that require portable, compact, or rugged instrumentation. In the work presented here, we introduce a narrow band wavelength filter based on a hybrid design of the virtually imaged phased array (VIPA) and surface plasmon tunable filter (SPTF). The virtually imaged phased array is a modified Fabry-Perot etalon which provides high angular dispersion. Via the Kretschmann-Raether configuration, light from the VIPA excites surface plasmons in a thin gold film that is coupled to a similar film through a dielectric gap. The two metal films, in conjunction with the dielectric gap, act as a dipole-dipole resonator cavity that preferentially couples light of the resonant frequency to the output field of the device. By controlling the effective permittivity of the dielectric layer, light of different wavelengths can be isolated. We present the design and theoretically modeled results of the VIPA-SPTF hybrid filter. In addition, results from the characterization of the individual VIPA and SPTF components are presented.

075 USING VIDEO MODELING TO TEACH COMMUNICATION AND DAILY LIVING FOR PERSONS WITH DEVELOPMENT DISABILITIES

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Video modeling is a new technology that has emerged to meet some of the specific needs of children with disabilities. Video modeling has been demonstrated to have effectiveness in increasing conversation, play, and social skills. Evidence also shows video modeling as a means of improving daily living skills. Participants will be able to:

1. Gain knowledge about how video models foster conversation skills.
2. Learn to apply video models to foster play, social, and daily living skills.

076 THE MEANING OF INTERGENERATIONAL OCCUPATIONAL THERAPY PROGRAMMING ON THE SOCIAL AND EMOTIONAL WELL BEING OF COMMUNITY DWELLING OLDER ADULTS

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The older adult population is predicted to grow at an alarming rate over the next 50 years. Various community resources are needed to increase and maintain the quality of life of this group and allow them to preserve a sense of social and emotional well being. At the same time, there is an increase in single-parent homes and a lack of interaction between the younger generation and older adults. This study explores the implementation of a pilot program designed by occupational therapists that focuses on the meaning of group activities that promote intergenerational interaction of older adults with student participants. A phenomenological, mixed-method design study was conducted using 10 female community dwelling older adults and 15 children ages 9 to 10 years old. Participant observation, journaling, and in-depth interviews were used to determine the meaning of the program to the participants. It was found that the students involved in this study identified helping and cooperating with the older adults throughout the program as very important to them. The students began to feel a sense of empathy and increased self-awareness after spending time with the older adults. The program allowed the older adults to reminisce about their past, and feel a sense of generativity, or contribution to the younger generation. The experience of both groups interacting with each other is presented in the Model of Occupational Spin-off. This model includes affirmation, confirmation, actualization, and anticipation to summarize the meaning of the intergenerational program to the older adult participants and the student participants collectively. Findings provide an opportunity for others to use

similar programs to engage older adults and children in meaningful occupation that will contribute to their overall sense of social and emotional well being.

077 DESIGNING A TASK FOR USE IN RESEARCH ON LEARNING AND MOTIVATION

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In achievement situations, individuals are generally motivated in one of three ways: learning as much as they can (mastery), demonstrating their competence (performance approach), or avoiding demonstrating their incompetence (avoidance approach). Previous research has shown that these orientations can affect learning and performance, but less is known about how contextual factors such as a competitive environment affect these relationships. Furthermore, such research would require the creation of an achievement based task that is previously unknown to participants, can be learned within the short duration of a laboratory experiment, and is difficult enough to show performance differences across participants. To that end, we have been developing and refining a task that can be used in our laboratory. We chose to create a new task using traditional playing cards due to their multidimensionality (numbers, colors, suits). Points are accrued by participants placing their choice of cards on others on the basis of rules that they learn as they perform the task. After the creation of the task, we created a test to measure how well participants learned the task, and we used two different methods to show that participants who knew more about the task scored higher on the test. To put the finishing touches on the task, we are conducting a pilot study in order to establish a baselines for performance and learning. These baselines will be used as assigned goals in a future study to assess the interaction of competitiveness and goal orientation in the production of knowledge and performance. Ultimately, this rigorously developed task will be a useful tool for research on a multitude of factors related to academic and workplace achievement.

078 MACROPHAGE-SPECIFIC RIBOSOMAL PROTEIN L13A-KNOCKOUT MICE REVEAL AN ENDOGENOUS MECHANISM TO CONTROL INFLAMMATION.

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Synthesis of pro-inflammatory products by monocytes and macrophages is an obligatory component of the host defense mechanism. However uncontrolled production or accumulations of toxic inflammatory products are injurious to the hosts and thus endogenous mechanisms have evolved that limit their synthesis. Work from our laboratory identified such a mechanism. Using cell-based model we identified the absolute requirement of ribosomal protein L13a in the translational silencing of a group of mRNAs encoding inflammatory proteins e.g. chemokines and chemokine receptors. We hypothesized that L13a-dependent translational silencing is an endogenous defense mechanism against runaway inflammatory response and that genetic disruption of this pathway could lead to uncontrolled inflammation. To directly test this hypothesis we have recently generated macrophage specific L13a-knockout (KO) mice using the Cre-Lox system. Upon endotoxin challenge with sub-lethal dose these mice displayed prolonged symptoms of severe inflammation e.g. reduced motor activity, high breathing rates, little or no food intake and ocular exudates. In addition to these visual symptoms the KO mice showed significantly high infiltration of macrophages in the peritoneal tissue, formation of blood clots in liver, kidney and lung, high serum levels of TNF- α , IL-1 β and the markers for tissue destruction e.g. blood urea nitrogen (BUN) and aspartate aminotransferase (AST). Finally, ex vivo analysis of the macrophages harvested from these KO mice showed increased synthesis of several chemokine and chemokine receptors encoded by the target mRNAs of L13a-dependent RNA-binding complex due to the abrogation of their translational silencing. Taken together our studies reveal an essential role of L13a-dependent translational silencing in resolving inflammation and establish this KO mouse as a new model to study uncontrolled inflammatory response.

079 ANGIOPOEITIN-LIKE 4 (ANGPTL4) IS A TARGET OF THYROID HORMONE (T3)/PEROXISOME PROLIFERATOR ACTIVATED RECEPTOR GAMMA COACTIVATOR-1A (PGC-1A) SIGNALING IN HUMAN HEPATOMA CELL LINE

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Angiopoietin-like protein 4 (ANGPTL4) is known to be expressed in several tissues, including the metabolically active liver as well as adipose tissue. There is strong evidence of ANGPTL4 playing a role in lipid metabolism through its inhibition of the activity of Lipoprotein Lipase (LPL). Triiodothyronine (T3) is a hormone known to play a critical role in metabolic homeostasis especially in the lipid metabolism. Thyroid hormone mimetics such as KB2115 are under clinical development to treat hypercholesterolemia because of their ability to reduce LDL and total cholesterol levels in the plasma. We hypothesized that thyroid hormones play a role in the expression and function of ANGPTL4 in hepatocytes. We found that T3 or KB2115-treated HepG2 and Hep3B cells showed increased ANGPTL4 mRNA and protein expression compared to vehicle treated cells. Furthermore, reverse transcriptase PCR studies showed that T3 also induces the expression of peroxisome proliferator activated receptor gamma coactivator -1 α (PGC-1 α), a transcriptional coactivator, in these cells. Additionally we observed that PGC-1 α induced the expression of ANGPTL4 in HepG2 cells. Our studies suggest that PGC-1 α participates in T3 induction of ANGPTL4 via direct coactivation of thyroid hormone receptor (TR) or via another indirect mechanism. T3 induction of ANGPTL4 observed in the human liver cells is contrary to findings in rodent livers and is of clinical relevance in the development of thyromimetics for hyperlipidemia. In conclusion, our studies suggest a probable mechanism by which T3 regulates lipoprotein levels.

080 PHARMACOLOGICAL ACTIVITY ANALYSES OF SELECTIVE SULFONAMIDE TUBULIN INHIBITORS IN AFRICAN TRYPANOSOMIASIS

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Human African Trypanosomiasis, also known as sleeping sickness is endemic vector-borne parasitic disease transmitted by tse-tse fly that threatens over 60 million people in 36 countries of sub-Saharan regions of Africa. Current drug treatments available exhibit drawbacks in their methods of administration and their ineffectiveness in treating the disease when it reaches latter stages. A class of sulfonamide tubulin inhibitors developed as anti-cancer agents showed inhibitory action on the growth of *Trypanosoma brucei*, a parasitic protozoan that causes African trypanosomiasis. Sulfonamides are Non-steroidal anti-inflammatory drugs (NSAIDs) that are potent in the treatment of this disease. Sulfonamides act by tubulin inhibition mechanism and show anti-cancer activity by binding to colchicine domain.

Selective sulfonamide derivatives were evaluated in determining their selectivity against *T. brucei* to human breast cancer cell growth. A co-relational study was conducted on the potential of the sulfonamide analogs for inhibiting parasitic cell growth, breast cancer cell apoptosis and their effect on normal mammalian fibroblast cells. Several sulfonamide analogs showed excellent selectivity to the parasite. The difference in the colchicine binding domains between *T. brucei* and mammalian cells demonstrated the selectivity of the compounds for the parasitic cell growth inhibition. The study provides basis for new drug development approach to treat sleeping sickness.

081 A GRATING-LESS IMAGING SPECTROGRAPH FOR HIGH RESOLUTION VIBRATIONAL SPECTROSCOPY

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High resolution spectroscopy has conventionally been performed using a cascaded series of grating spectrometers or tunable etalon filters. Recent advances in portable instrumentation has opened new avenues in field research, but a tradeoff between instrument compactness and wavelength resolution has been necessary. In the work presented here, a new type of compact imaging spectrograph based on a virtually imaged phased array (VIPA) coupled to an array detector is introduced. A modification of the Fabry-Perot etalon, the VIPA etalon is illuminated at non-normal incidence and employs two reflective surfaces separated by a dielectric. The first surface is ideally perfectly reflective but has an entrance window to accept incident light. Thus, the maximum theoretical throughput of the VIPA is 100%. In conjunction with shot noise limited detector arrays such as cooled charge coupled devices, the VIPA is capable of high resolution ($\ll 1\text{nm}$), low light spectroscopy such as Raman or Brillouin scattering spectroscopy. We have characterized the performance of a VIPA-based spectrograph designed for Raman and limited Brillouin scattering spectroscopy and present these results here. In addition, the VIPA output field has been modeled numerically and the theoretical results are compared with the experimental findings. Advantages and limitations of the VIPA-based spectrograph are discussed.

082 CHEMOSELECTIVELY SURFACE FUNCTIONALIZABLE TETHERED BILAYER LIPID MEMBRANE FOR VERSATILE MEMBRANE MIMETIC SYSTEMS FABRICATION

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Cell membrane mimetic systems play fundamental roles as models in understanding biomolecular interactions on the cell surface and provide a tool in developing products for biomedical research and applications. Tethered bilayer lipid membrane (tBLM) has been applied in biosensing, drug delivery, biocatalysis, and cellular recognition studies due to its ability to mimic complex biomembranes. In the past, tBLM has provided a tool to study protein adsorption, ion transport, and membrane mechanical properties. We report functionalizable tBLM fabrication based on liposome immobilization, rupturing and fusion processes. Introduction of triphenylphosphine (TP) lipid into liposome allows it to immobilize onto an azide surface **via** Staudinger ligation. Its rupture followed by a second liposome fusion leads to the tBLM formation, which contains TP for further modifications on surface. The tBLM was functionalized with azide-containing glycans and biotin in chemically selective fashion under biocompatible conditions, and thus provides an approach for multifunctional membrane mimetic system fabrication.

083 AMPLITUDE REQUIREMENTS, VISUAL INFORMATION, AND THE SPATIAL STRUCTURE OF MOVEMENT

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Studies using a variety of experimental tasks have established that when humans repeatedly produce an action, the amount of variability in system output is distributed across a range of time scales or frequencies. A finding of particular interest is that fluctuations in the output of cognitive systems are the highest at the lowest frequencies with fluctuation magnitude (power) systematically declining as frequency increases (e.g., for a review see Gilden, 2001). Such time-series structure—captured by spectral analysis—is termed *pink noise*. (In contrast, *white noise* has equal amounts of power at all spectral frequencies.) However, the appearance of pink noise is limited to tasks where action is executed in the absence of external, action-related feedback (e.g., Gilden, Thornton, & Mallon, 1995; Gilden, 2001). A few studies have shown a white-noise structure for action executed in the presence of sensory feedback (e.g., Miyazaki et al., 2004). Here, we sought to determine if time-series structure would change when movement amplitude increased (6.35, 12.70, 25.40, 50.80, 101.60 mm) under conditions of full visual feedback. Given that increases in movement amplitude induce increased reliance on available visual feedback (Khan,

et al., 2006) we predicted a movement-amplitude-induced shift in time-series structure from pink to white noise. In other words, at low amplitude requirements movement should mainly be controlled by internal information processes—with minimized visual feedback processing—and pink noise should result; however, as amplitude requirements increase there should be increased reliance on visual feedback and time-series structure should shift toward white noise. Indeed, as movement amplitude requirements increased there was a shift in structure from pink to white noise. Last, the main findings were captured by a computer simulation; the model running the simulation was based on established principles of motor control.

084 OCCUPATION-BASED WELLNESS PROGRAMS CONTRIBUTING TO SELF-DETERMINATION AND INCREASING WELLNESS PROMOTION BEHAVIOR IN MEN

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Men's wellness programs and efficacy studies take place mainly in the workplace and on college campuses. These programs are more often focused on physical health outcomes rather than on wellness and are often education-based or intended for the employees in a specific workplace rather than being available for the community-at-large.

A systematic literature review using 79 databases sought to answer three questions: What quality wellness programs that are not workplace- or college campus-bound address the needs of men? What is the evidence that men's wellness programs increase wellness-promoting behaviors and decrease health risk behaviors? What aspects of wellness program designs increase men's self-determination through competence, autonomy, and relatedness?

A method from Brewer et al. (2006) was employed for the search methodology, selection, article assessment, and general organization of the timeline. The Self-Determination Theory of relatedness, autonomy, and competency (2000) served as a model for understanding the outcomes of men's wellness programs. Fourteen studies were selected and discussed according to four categories based on situational development issues, sexual and reproductive health programs, place and social spaces, and biomechanical outcome measures.

The findings suggested that various intrinsic and extrinsic factors influence men's engagement and success in wellness programs: self-efficacy, beliefs, social support, attitude towards wellness and health, perceived behavioral control, and identifications with the goals and social relatedness to the group. Programs that have greater levels of relatedness, autonomy, and competence were found to have the strongest outcomes. Wellness programs tend not to reach men of low socio-economic status. In congruence with our findings recommendations are offered for occupational therapists to reach this segment of the population and to design programs that include the three essential psychological needs of relatedness, autonomy, and competence for greatest effectiveness.

085 COMPROMISED MICROGLIA IN VALPROIC ACID MOUSE MODEL OF AUTISM

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Autism is a complex neurodevelopmental disorder, the cause of which is not exactly known. One of the hallmarks of the brain in autism spectrum disorders (ASD) is increased brain size and weight compared to age-matched controls. There is emerging evidence showing that increased brain size is due to an increase in the number of neurons in certain brain regions, including prefrontal cortex, an area important for social and emotional communication. There is also evidence showing that prenatal exposure to valproic acid (VPA) is associated with a higher risk of autism. Valproic acid, most commonly used as an antiepileptic drug, is also known to be an immunomodulatory agent through its ability to inhibit histone deacetylase and has been shown to induce microglial apoptosis in both cell culture and *in vivo* models of stroke. Microglia, the immune cells of the CNS, play a major role in early brain development. For example, they are involved in pruning of unwanted axons, phagocytosis of unwanted neurons and proper layering of neurons. Therefore, if microglia are compromised during early brain development by drugs or toxins, this could potentially have unwanted effects on brain development. Our validated VPA

autism mouse model shows both gender and age differences in microglial structure and brain size. This model also provides the first link between microglial dysfunction and autism.

086 A RAPID AND SENSITIVE LC-MS METHOD FOR THE QUANTIFICATION OF A NEUROPROTECTIVE THIAZOLIDINEDIONE LIGAND, NL-1, IN MOUSE SERUM

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Mitochondria play an important role in many neurodegenerative diseases due to their ability to produce reactive oxygen species (ROS). Considering ROS is implicated in multiple neurodegenerative diseases, such as Parkinson's disease (PD), inhibiting ROS is an attractive drug target. Recently, a new mitochondrial protein, mitoNEET, was identified as a target of the glitazones. The binding of glitazones to this protein was found to alter mitochondrial respiration. NL-1 is a novel ligand that binds to mitoNEET, but does not activate PPAR-gamma receptors and also been reported that NL-1 (5-[(3,5-di-tert-butyl-4-hydroxyphenyl)methyl]-1,3-thiazolidine-2,4-dione) prevents neurodegeneration a rodent Parkinson's disease model. In order to study the pharmacokinetics, pharmacodynamics, and other aspects of NL-1, a quantitative method in mouse serum is needed to properly evaluate this compound *in vivo*. In this order, NL-1 and the internal standard NL-2 (5-[(4-hydroxy-3,5-dimethyl-phenyl)methyl]thiazolidine-2,4-dione) were extracted from serum samples and were analyzed by a Shimadzu HPLC system interfaced with an AB Sciex QTrap 5500 mass spectrometer with negative electro spray ionization mode. A Phenomenex Columbus C-18 column (2 x 50mm, 5 μ m) was used using a gradient mobile phases of 15 μ M ammonium acetate in 2% Methanol with de-ionized water and 100% Methanol at 0.2 mL/min. The MS detection employs MRM mode set at m/z 334 \rightarrow 263 for NL-1 and 250 \rightarrow 179 for NL-2. The calibration curve was linear in a range from 1.0 to 100 ng of NL-1 per mL of serum. The extraction recoveries for the NL-1 and NL-2 were over within 6% deviation for three different QC concentrations in triplicate. This LC/MS method has been applied for the measurement of NL-1 levels in serum from three dosed mice and the results have shown that the method is applicable for the PK and PD studies.

087 MITONEET INTERACTIONS WITH ERK 1 / 2 KINASES

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MitoNEET is a newly discovered zinc finger mitochondrial protein which contains a 2Fe-2S cluster. Several studies have suggested that mitoNEET may play a role in regulating the redox reactions with mitochondria. Also, it has been shown that mitoNEET dimerization uncouples mitochondria and leads to a reduction in oxidative stress. Our interest in mitoNEET as drug target stems from its interaction with pioglitazone, a thiazolidinedione anti-diabetic drug. The goal of this study was to investigate possible protein-protein interactions of mitoNEET with kinases, specifically ERK 1/2. To do this, N2A cells were treated with hydrogen peroxide (100 μ M) to induce oxidative stress and ERK 1 / 2 phosphorylation was measured at 15 minute intervals for one hour. Mitochondrial and cytosolic fractions of the hydrogen peroxide treated cells were also evaluated for mitoNEET protein levels. Co-immunoprecipitation (Co-IP) experiments were also done with Cobalt Dynabeads attached to human recombinant His-tagged mitoNEET. Cells treated with hydrogen peroxide showed a time dependent phosphorylation with maximum ERK 1 / 2 phosphorylation at 15 min. We found that mitoNEET levels increased in the cytosolic fraction corresponding with the ERK phosphorylation. Co-IP data showed that mitoNEET was able to pull-down ERK 1 / 2. These data suggest that mitoNEET may play an important physiological role in the anti-apoptotic pathway through an interaction with ERK 1 / 2.

088 CLEAVAGE AT ARG1018 DURING THROMBIN-MEDIATED ACTIVATION OF COAGULATION FACTOR V IS DISPENSABLE

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Blood clotting results in the proteolytic conversion of prothrombin (Pro) to thrombin which in turn will produce the fibrin clot. The proteolytic conversion of Pro to thrombin is catalyzed by the prothrombinase complex which is composed of the enzyme, factor Xa (FXa), the cofactor, factor Va (FVa), assembled on a membrane surface in the presence of divalent metal ions. Factor V (FV), is a multidomain protein (A1-A2-B-A3-C1-C2) with nominal procoagulant activity and is activated by thrombin to FVa through three sequential proteolytic cleavages at Arg⁷⁰⁹, Arg¹⁰¹⁸ and Arg¹⁵⁴⁵. To determine the importance of the cleavage site at Arg¹⁰¹⁸ for procofactor activation and the function of amino acid region 1000-1008 during proteolysis, several other recombinant molecules were generated. FV^{RQR} is a FV molecule with the mutation Arg¹⁰¹⁸→Gln, and FV^{Δ1000-1008} is a mutant FV molecule with region 1000-1008 deleted. We have also generated FV^{Δ1000-1008/RQR} and FV^{Δ1000-1008/QRQ}. Two-stage clotting assays revealed that FVa^{RQR} and FVa^{Δ1000-1008/RQR} have similar clotting activities as FVa^{WT}, whereas FVa^{QRQ}, FVa^{Δ1000-1008/QRQ} are impaired in their clotting activities. Kinetic analyses demonstrated that FVa^{RQR} and FVa^{Δ1000-1008/RQR} have similar affinity for FXa as FVa^{WT} while FVa^{QRQ} and FVa^{Δ1000-1008/QRQ} were impaired in their interaction with factor Xa. The k_{cat} values for prothrombinase assembled with FVa^{RQR} and FVa^{Δ1000-1008/RQR} were similar to the k_{cat} obtained with prothrombinase assembled with FVa^{WT}, while prothrombinase assembled with FVa^{QRQ} and FVa^{Δ1000-1008/QRQ} had 2-fold and 7-fold reduced catalytic efficiency respectively, when compared to the k_{cat} values obtained with prothrombinase assembled with FVa^{WT}. Overall, the data demonstrate that cleavage at both Arg⁷⁰⁹ and Arg¹⁵⁴⁵ are a prerequisite for expression of optimum cofactor activity. Our data also suggests that cleavage at Arg¹⁰¹⁸ is redundant for cofactor activity. The role of cleavage at this site by thrombin during procofactor activation remains to be determined.

089 UNDERSTANDING THE CAUSES OF SEVERE ASTHMA

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The lung is directly exposed to higher oxygen tension than most organs because it is susceptible to many oxidants produced from regular metabolic processes as well as other factors such as cigarette smoke, ozone and free-radical environmental carcinogens. Oxidative stress, a major contributor to airway inflammation, occurs when there is an imbalance between oxidant production and antioxidant response. Asthma is an inflammatory disorder of the airways that is caused by oxidative stress and inflammatory cells infiltrating the airways. This chronic disease affects millions of people worldwide and therefore is very important in clinical research. Normally, many antioxidants combat the high levels of oxidants like reactive oxygen species (ROS) and reactive nitrogen species (RNS). ROS and RNS lead to modification of proteins that alter their function and lead to the maintenance of inflammation. This project focused on understanding the imbalance in the reducing and oxidizing (redox) systems in the asthmatic lung. Superoxide dismutase (SOD), an enzymatic antioxidant, converts superoxide (O₂⁻) into hydrogen peroxide (H₂O₂) and is the first line of defense against oxidative stress. Glutathione (GSH), a major reducing agent in the lung, prevents damage to important cellular components by reducing hydrogen peroxide (H₂O₂) to water (H₂O). These two antioxidants have critical roles in the lung and are important in understanding different lung diseases like asthma.

090 INSUFFICIENCY OF A LETTER ROUTE FOR WORD IDENTIFICATION

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Many models of visual word identification propose that identification is mediated exclusively by letter identification. However, some empirical phenomena appear to require a route to word identification other than through letters. In three lexical decision experiments, in which participants decided whether a presented letter string was a word or a nonword, a single case change in a letter string severely impaired performance relative to pure-case strings. These results challenge models in which word identification is mediated exclusively by letter identification and encourage the development of models that propose a role in word identification for whole-word properties.

091 ARTIFICIAL HABITAT AND LARVAL FISH MIGRATION WITHIN A BULK-HEADED NAVIGATIONAL CHANNEL (CUYAHOGA RIVER, OH)

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Previous study on larval fish migration within the Cuyahoga River Navigational Channel (Cuyahoga County, OH, USA) has indicated the possibility of low success rates most probably due to the harsh environment encountered by larval fish (Carlson 2002). Low habitat scores, fluctuation in dissolved oxygen levels, high sediment loads, and temperature fluctuation, are all identified as challenges to successful larval fish migration within the navigational channel. The primary objectives of this study are to determine the effectiveness of artificial habitat deployed within the navigational channel at providing habitat for aquatic wildlife and physically surviving the seasonally pulsing riverine environment, and to identify the causes of possible larval fish attrition within the navigational channel. Three types of artificial habitat were planted with native wetland vegetation and installed within the navigational channel. Sampling and monitoring was and continues to be conducted to gather qualitative and quantitative information on: artificial habitat condition, plant survival, larval fish assemblage, microaquatic life, water chemistry, adult fish, and physical water and channel parameters. Sampling was and continues to be conducted throughout the navigational channel and sample sites are spread throughout the first 5.6 river miles of the river from river mouth to the first riffle. The lower Grand River (Lake County, OH, USA) was chosen as a reference site for its similar attributes and higher habitat and biota quality. Due to higher than average precipitation and flows during the 2011 sampling season a limited amount of data has been collected. Future sampling will take this into account, and sampling will be modified to allow for more effective sampling procedures to produce more consistent and accurate data.

Carlson, Robert, and Enviroscience, Inc. Report on *Larval Fish Abundance and Survival in the Lower Cuyahoga River: 1998-2002*. 2002.

092 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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Signaling through the DR5/FADD/Caspase pathway plays a role in the apoptosis associated with skeletal myoblast differentiation. The stable expression of a dominant negative Death Receptor 5 (dnDR5) in proliferating myoblasts inhibits differentiation by decreasing mRNA and protein expression of the master muscle regulatory factor MyoD, but without altering MyoD mRNA stability. 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. Our lab has previously shown that the acetylation of histones associated with the MyoD promoter in dnDR5 myoblasts is decreased. 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. Contained in this *cis*-element 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. A third factor, YY1, was found at the MyoD DRR in proliferating myoblasts, but not complexed with SRF. Myoblasts stably expressing dnDR5 exhibit an increase in the amount of Mef-2 bound at this SRE and a decrease in MyoD protein expression levels in proliferating myoblasts and in response to serum withdrawal as compared with wild-type (WT) cells. Furthermore, YY1 recruitment to this SRE is increased in proliferating dnDR5 myoblasts, coinciding with reduction in MyoD protein and mRNA. We infer that there is an inverse relationship between MyoD expression and Mef-2/YY1 recruitment, and that recruitment of HDAC(s) by Mef-2 and YY1 bound to the MyoD DRR may at least partially explain the reduction in MyoD protein in proliferating and differentiating myoblasts and the concomitant delay in differentiation observed when dnDR5-expressing cells are induced to differentiate.

093 AUOTOIMMUNE T CELL SUPPRESSION VIA MYELOID DERIVED SUPPRESSOR CELLS

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Introduction: Systemic Lupus Erythematosus (SLE) is a systemic autoimmune disease that causes the immune system to produce antibodies against the patients' own tissues. It is estimated that 1.5 million people in the United States have SLE. In SLE autoreactive T cells stimulate B cells to produce autoantibodies. BWF1 mice are used as a spontaneous model to study SLE. Myeloid Derived Suppressor Cells (MDSCs) are a heterogeneous population, commonly characterized by the expression of Gr-1 and CD11b, and made up of early myeloid progenitor cells, immature granulocytes, dendritic cells, and macrophages. In cancer studies, MDSCs suppress the immune system to allow tumor growth.

Methods: We investigated if Myeloid Derived Suppressor Cells have the ability to suppress BWF1 T cells. I hypothesized that BWF1 T cells will be suppressed by the CD11b⁺ Gr-1^{low} subset of MDSCs. To examine Suppression we investigated the effect of MDSCs on T cell proliferation. We also investigated the role of costimulatory molecules to stimulate and inhibit the immune system as a result of T cell and MDSC interaction. We examined the Programmed Death Receptor 1 (PD-1) costimulatory molecule known to be a mechanism of suppression by MDSCs.

Results: We observed that the CD11b⁺ Gr-1^{low} MDSC subset suppressed BWF1 T cell proliferation. The suppression did not prevent T cells from being activated by stimulus indicated by the upregulation of CD69. The PD-1 costimulatory molecule was not significantly upregulated on BWF1 T cells. Examination of MDSCs however indicated a greater expression of the ligand (PDL1) for the PD-1 receptor on the CD11b⁺ Gr-1^{low} cells. The results indicate that the CD11b⁺ Gr-1^{low} cells are able to suppress T cells and that PD-1 may play a role. Further studies are needed to elaborate the mechanisms of suppression seen by the CD11b⁺ Gr-1^{low} cells in autoimmune diseases.

094 MIGRATION PATTERNS OF WHITE THROATED SPARROWS IN OHIO

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White-throated sparrows do not breed in Ohio, although they migrate through in spring and fall. Sex, age, weight, morph, or wing chord are all factors that may contribute to the timing of migration. There are two morph possibilities for white-throated sparrows, white or tan, which are independent of sex. We ask the question: If morph is independent of sex, which has a stronger influence on migration timing? The collection of white-throated sparrow specimens at the Cleveland Museum of Natural History was used to obtain the data. 213 of the specimens were analyzed. Each specimen was aged and the lateral and median crown stripes and superciliary stripe were measured and then used in Watt's formula for morph identification (Watt, 1986). Specimens in the collection contained a tag with date found, location, and gender. We then compared sex, date found,

and morph type to determine the effect of morph type and sex on timing of migration. It is anticipated that morph type will play a more significant role in migration timing than sex.

Watt, D. (1986). Plumage Brightness Index for White-throated Sparrows. *Journal of Field Ornithology*. 57(2): 105-113.

095 THE IMPORTANCE OF EXTENDED MONITORING IN URBAN STREAM RESTORATION PROJECTS

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Urban stream restoration is a large and growing enterprise. Motivation for these projects usually stems from the need to protect infrastructure, to fulfill mitigation requirements, or to make an area more aesthetically pleasing. However, in order to determine if a stream reach has been restored, ecological success should be measured through monitoring changes in plant, fish and macroinvertebrate assemblages (Kondolf and Micheli 1995) suggest that 10 years be the minimum monitoring time after a restoration project, but this can be difficult to attain. Many restoration projects are funded by grants that last only 2-3 years and deadlines and funding restraints also impede a long-term monitoring effort. We suggest that project designs should implement measuring success through ecological performance rather than simply be finished with a project upon completion of the design. Granting agencies should allocate money to monitoring and for support of restoration projects for a longer period of time. Extended monitoring of restoration projects would help relay the success of a project to stakeholders, would provide insight on whether further work is needed on a project, and would provide valuable feedback and other information to the natural resource community to help mold future stream restoration projects.

096 REGIONAL SMART GRID TECHNOLOGY

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With a global emphasis on moving toward sustainable and renewable energy sources, a focus on offshore wind farm development has become increasingly popular in the past few years. It is not arguable that wind energy is a more renewable, sustainable, and cleaner alternative to coal, nuclear or natural gas energy production. However, it is important to understand the potential impact of offshore wind farms on our environment for many reasons. Historically, the implementation of new forms of energy production has led us to vulnerable and potentially threatening states of environmental disorder. Before we jump into our next phase of energy development, it is important to understand the risks of this new development on our ecosystem and the potential implications it could have for the future of the earth.

Although there hasn't been a great deal of research on the impact of offshore wind farms, mostly attributed to the small number of offshore wind farms that are actually up and running and their short time in operation, we can still look to what we know about our earth, electricity and how offshore wind farms work to deduce the possible impacts of offshore wind farms on the ecosystem. This paper reviews the impacts of various components of the offshore wind farm on the marine ecosystems. An analysis of the ecological impacts of each part of the wind turbine will illustrate ecosystem impact of offshore wind production in terms of biodiversity and habitat loss and gain.

097 GREEN BUILDING CONCEPTS AND LEED

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The concept of green building has been central to the survival of civilizations for hundreds of years. Cavemen, Indians and farmers have incorporated landscape and nature into their homes and work spaces, but things have changed over the years. Current buildings in the United States of America are expected to cover 109.8 billion square feet by 2035. Energy consumption, water consumption and the increase in transportation is having a negative effect on the environment now and will for decades to come.

The United States Green Building Coalition (USGBC) started the Leadership in Energy and Environmental Design (LEED) program back in 1998. The program components have ways of saving energy, reducing water use inside and outside of buildings, and allowing less waste to come from renovating existing ones. The USGBC has grown to encompass 7,000 projects around the world, covering 1.501 billion square feet. The categories LEED covers are Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources and Indoor Environmental Quality.

Oberlin College in Oberlin, Ohio, adopted a policy in June of 2006 that all new buildings and renovations have to be certified LEED Silver. Robert Lewis Kahn Hall is a LEED certified dormitory where students pledge to make sustainability part of their life. Other LEED buildings include Allen Memorial Art Museum, Williams Fieldhouse and Kohl Building. The Adams Lewis Center for Environmental Studies was built before LEED certification though still includes a living machine wastewater treatment system, solar parking pavilion and native ecosystem landscaping.

This paper will look at how LEED can streamline the green building process, and how Oberlin incorporated innovative concepts into their environment.

098 THE TRUE COST OF COAL

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Coal is the leading producer of electricity worldwide. It accounts for approximately 40% of global electricity production and more than 45% of electricity production in the U.S. (United States). Currently, electricity produced from coal is among the cheapest forms of electric energy production in the U.S. The market price for coal is lower than almost all other electric energy production processes, because coal energy receives government subsidies, and the market price of coal energy has not accounted for the cost of the negative externalities associated with its use. This study records the negative externalities of coal energy; environmental impacts and health care costs. It examines the additional cost to the market price of coal, once the externalities are accounted for, and analyzes the economic impact of subsidizing coal. The study sheds light on the economic elasticity of coal; it is currently an inelastic good, a cheap and necessary part of our energy profile. However, with time coal will become more elastic, as supply runs low and demand starts to shift towards alternative energy.

099 THE IMPORTANCE OF FRACKING AND ITS IMPACT

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Fiscal strains resulting from the world's current volatile economic climate has led state and local governments in the US to make tough choices; tough choices including opting to open up state parks and public lands in the Marcellus Shale Region for drilling, an area that is teeming with natural gas. Even though the majority of the U.S. population agrees that natural gas is an important domestic resource to harness. It's what energy companies are doing and that troubles environmentalists, administrators of parks and public lands, and an increasing number of citizens. To elaborate upon the issue of Natural Gas extraction in the Marcellus shale, a brief history is provided of how natural gas originally formed, followed by an historical account of evolving human use related to energy production along with a natural gas extraction forecast crafted by the National Geological Survey (NGS). The focus then turns to the fracking process itself, with details on the substantial differences between new fracking and the old drilling techniques. Following, is an explanation based on recent scientific studies about what the top three threats to fresh drinking water are. Then, in search of solutions, the EPA report that couldn't get here fast enough is put into context for some much needed semblance regarding the need for more information about potential environmental impacts stemming from the already widely implemented process of fracking.

100 ENVIRONMENTAL AND ECONOMIC EFFECTS OF ALGAL BLOOMS IN LAKE ERIE

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Satellite images of the Great Lakes showed vast amounts of blue-green algae in the Western Basin of Lake Erie. Algal blooms cause eutrophic conditions, reducing oxygen levels needed by organisms, limiting aquatic plant growth by reducing sunlight penetrating the surface, and producing toxins that can harm fish, benthic animals, and humans.

Vessel-based observations were made from 2002-2007, and the most common nuisance species was identified as *Microcystis aeruginosa*, a cyanobacteria that forms blooms during summer months. Highest summer bloom volumes were observed during years with highest summer river flow.

The algal blooms have been attributed to increased nutrients in the lake. Agricultural runoff is the source of these nutrients. Two invasive species - zebra and quagga mussels – may also be contributing to algal blooms. Zebra and quagga mussels selectively feed on other phytoplankton species, but not microcystis. This removes competitors and microcystis can then thrive.

Remote sensing is an effective method to detect and map algal blooms. Images can then be compared year-by-year and also compared to other factors such as annual precipitation.

Some efficient and economic techniques can reduce nutrients from reaching Lake Erie. Field investigations have shown improved nutrient management techniques for fertilizers can reduce the load of runoff from land. Another study shows free-water surface wetland plants can uptake phosphorus before it reaches a lake.

101 GREENING URBAN ENVIRONMENTS

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Urban environments play a crucial role in the health of the environment. Most of the population in the United States live in an urban setting. Consequently, urban environments have a significant impact on Green House Gas emissions, water and air quality, and the amount of fossil fuels consumed.

Urban areas pose a challenge in that cities are mainly composed of impermeable surfaces. Such surfaces negatively impact natural water cycles. These surfaces do not absorb water; consequently, non-point pollution, erosion, and flooding occur. Impermeable surfaces also absorb and retain heat resulting in urban heat islands.

Greening urban areas, by converting impermeable surfaces to parks, and mini-parks, allows for natural absorption of water and allows any pollutants to be filtered through the soil. Trees provide a cooling effect through transpiration and providing shade. Through these processes, trees can reduce the temperature of surrounding areas and buildings reducing the need for air conditioning. Trees also sequester carbon dioxide offsetting carbon monoxide produced by fossil fuel burning appliances and automobiles.

Green spaces foster a connection between urban life and the natural environment allowing for a more livable city. Urban green spaces such as parks and mini parks increase the value of the surrounding properties.

The environmental, social and economic benefits of greening urban spaces has been well documented. However, valuation of these benefits needs to be quantified. Public policy is based on cost-benefit analysis. Often times, the environmental benefits cannot be qualified. Those that favor conserving or creating urban green spaces are often at a disadvantage in that the benefits cannot be shown in monetary gains or losses. Without some indicators of economic value for our natural resources, there is little financial incentive to consider urban nature in land use decisions, market transactions, and capital investment budgets.

102 SUSTAINABILITY THROUGH A GREEN ROOF

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Green roofs sometimes referred to as a vegetated roof are a living material on a preexisting roof. They save buildings energy from less heat escaping in the winter, and provide a cooler inside temperature during the summer. They improve the overall lifespan of that roof. They improve air and water standards, not only for the environment but for the cities and taxpayers. Green roofs provide ecological benefits, allowing many species to gather. Lastly green roofs have shown to increase the overall property value of the structure it's on, allowing some to use it as a marketing advantage. Germany who really started this trend, has been applying these roofs since the 1950s. Studies have shown that an average commercial roof life span is between 15-20 years. A green roof has been determined to last at the minimum 40 years, and even longer if it is properly maintained. They are a multilayer structure that prolongs a roofs life, cuts energy cost, and provides many other sustainable benefits. Green roofs are estimated to cost anywhere from \$12-\$17 per sqft. The return on investment (ROI) all depends on the variety of applications that can be used on a roof. Many cities and states offer grants for 'greening' areas. Credits also may be available to cut the overall cost down, these credits may include, property tax breaks, storm water management and air pollution credits. This paper looks at numerous studies of green roofs, determining the positive and negative effects adopted by this type of sustainability.

103 INVESTIGATING THE USE OF STEEL SLAG AGGREGATE ODOT CLASS C PAVING MIXTURE

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Meeting the ever increasing global demand for concrete in the future is becoming more challenging with each passing year. Since more than three quarters of the volume of concrete is commonly composed of aggregates and the realization that the Earth's resources are finite, finding suitable alternatives to natural aggregates has become increasingly important. This research was undertaken to explore the feasibility of utilizing the steel slag generated as a result of the steel making process by electric arc furnaces in the Northeastern Ohio region as a replacement for natural aggregate in the Ohio Department of Transportation's (ODOT) Class C concrete pavement mixture. Steel slag is a by-product of steel making produced during the separation of the molten steel from impurities in steel-making furnaces. Although worldwide production numbers of steel slag is unavailable, it is estimated that 110 to 160 million tons of steel slag was produced in 2009. The primary aim of this research was to examine the effects of rapid freezing and thawing on concrete specimens since any concrete pavement utilized in this region would be subjected to such harsh effects. Length change of the hardened concrete was also examined as well as the compressive and splitting tensile strengths of the various replacement mixtures. The findings of this research indicate that the substitution of the steel slag aggregate for natural aggregate in the specified ODOT Class C paving mixture does not alter the characteristics of the concrete. It is the conclusion of this research team that testing on a larger scale be conducted as the next step in the process.

104 CLIMATIC ADAPTATION OF *SCENEDESMUS DIMORPHUS*

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In order to combat political liabilities and become self-sustainable fuel sufficient countries, there has been a large push to find a fuel source from biomasses in varying ecosystems across the world. Oils produced from micro-algae, unicellular organisms which can double biomass within 24 hours, are a viable solution for the fuel crisis. Micro-algae are considered by many to be the most suitable alternative biomass for biofuels because of their ability to process environmental carbon dioxide along which will increase their photosynthetic efficiency, then increasing biomass, and finally producing more oxygen. *Scenedesmus dimorphus*, a type of freshwater algae, is an algae of interest in the microalgae to biofuels field, with a 26% dry weight as lipid content. If this algae could be climatically adapted to survive in salt water conditions, it could have the potential to be grown in various ecosystems around the world without competing with freshwater resources. Current results for climatic adaptation of the species in a semi-batch growth experiment have reached sea level salt conditions of 1.010 true specific gravity (TSG) while still obtaining average lipid content percentages.

105 REDUCING NONPOINT SOURCE POLLUTION: THE ECONOMIC DILEMMA

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The United States Environmental Protection Agency (USEPA) has had great success in reducing point source pollution since the 1970's. In contrast, nonpoint source pollution (NPS) has increased dramatically and is now considered the "largest source of water quality problems in the United States" (USEPA 2011). The USEPA has consequently shifted its focus to reducing NPS and currently offers economic assistance in the form of grants to aid in creating solutions to the NPS problem. Recreation facilities owned by municipalities and private entities, specifically outdoor sports fields and golf courses, have proven to be a major contributor to the current water quality problems in the U.S. and are a target for NPS reduction. Currently, there are no policies in place to force a landowner, whether public or private, to eliminate NPS related to their property. Furthermore the private sector has no incentive and therefore neglects implementing measures to control NPS associated with their property since grant programs are only available to municipalities and non-profit organizations. Current findings result in the need for further research regarding the formation of public/private partnerships that can result in economic aid to private entities interested in reducing NPS associated with properties under their control.

106 CHEMICAL AND ISOTOPIC COMPOSITIONS OF SURFACE WATER FROM WEST CREEK, NORTHEASTERN OHIO

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West Creek, a nine-mile-long tributary to the Cuyahoga River, receives water from a drainage area of 14 square miles. Like many urban streams in the Greater Cleveland area, the ecohydrological integrity of West Creek has been adversely affected as a result of urban development. In order to better understand the hydrological system of this creek, we performed a series of field surveys, including six water sampling campaigns across the creek in summer 2011 and a high-frequency sampling exercise near the bridge on Ridgewood Dr (Parma, Ohio) in winter 2012. Chemical and isotopic compositions of water were measured on samples collected, using an ion chromatograph unit (ICS-1500) and a liquid water isotope analyzer (Picarro L2120-i). Our preliminary results indicate water quality of the creek changes greatly in response to human disturbances. For example, concentrations of sulfate and chloride of stream waters were significantly higher in the upper and lower reaches than in the middle reaches during the summer. Values of $\delta^{18}\text{O}$ and δD of stream water also change greatly, ranging from -12.1 to -3.8‰ and from -82 to -20‰, respectively. More interestingly, the chemical and isotopic responses to snowmelt and rainfall were different in that there was a delayed positive excursion of chloride concentration after a snowmelt event, suggesting the apparent difference in the flow path and associated water residence time.

107 EXAMINATION OF BIRD SONG DEVELOPMENT

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Through examination of bird song development, it has been demonstrated that the proximate mechanisms that control song development correlate to increased fitness. As a result of examination and investigation of experimental results set forth by Peter Marler and Michael Beecher, the interconnectedness of proximate and ultimate mechanism controlling bird song development has been demonstrated. This was accomplished by showing how the developmental mechanisms of bird songs, such as social eavesdropping and dialect as a way to convey information about the developmental history of the individual, developed and have been selected over time leading to the refinement and persistence in the relative species. Changing their environment, either by deforestation, introduction of invasive species or through continuing urbanization will alter the way in which these mechanisms interact, could have catastrophic consequences on local populations of songbirds.

108 STIMULATION OF α_1 -ADRENERGIC RECEPTORS POSTISCHEMICALLY PROVIDES PROTECTION FROM CELL DEATH AND MAY BE RELATED TO MODULATION OF AUTOPHAGY

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Methods of cardioprotection aim to decrease the amount of cell death following an ischemic insult and in turn preserve functional tissue of the myocardium. A more recent development in the field of cardioprotection is the phenomenon of ischemic postconditioning which occurs when alternating short episodes of ischemia and reperfusion are applied following a prolonged episode of ischemia. Although useful in a clinical setting, not all patients are able to undergo such a procedure. Therefore pharmacological mimics of ischemic postconditioning would be invaluable. There are a number of known postconditioning agents, most of which center around blocking the opening of the mitochondrial permeability transition pore. Unfortunately, those agents are currently not specific enough to be used clinically. Our study focused on determining the effectiveness of α_1 -adrenergic receptor (α_1 -AR) agonists in postconditioning cardiac myocytes. Although α_1 -ARs have been implicated in cardioprotection, they have not yet been linked to postconditioning. Significantly lower amounts of cytosolic lactate dehydrogenase were released into the media when α_1 -ARs were stimulated postischemically. This protection is consistent with the beneficial effect of a known postconditioning agent adenosine. To investigate possible mechanisms of this protection we examined known markers of autophagy. Autophagy is a cellular process in which protein aggregates, long lived proteins, and aging organelles are degraded by being encased in autophagosomes which fuse with lysosomes for degradation. It has been suggested that an increase in autophagy following an ischemic insult is protective. Our results suggest that α_1 -AR stimulation causes an increase in autophagy when added at the time of reperfusion which may contribute to protection from cell death in this system.

109 LIQUID CHROMATOGRAPHY TANDEM MASS SPECTROMETRY ASSAY FOR DETERMINATION OF TRIAPINE IN HUMAN PLASMA

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Triapine (also known as 3-aminopyridine-2-carboxaldehyde thiosemicarbazone, or 3-AP) is a novel anticancer drug, belonging to the family of drugs referred to as ribonucleotide reductase (RNR) inhibitor. Preclinical study showed that triapine significantly decreased RNR activity and enhanced radiation-mediated cytotoxicity in cervical and colon cancer cells by impairing DNA repair process that rely on the production of deoxyribonucleotides, thereby sensitized the radiation therapy of human cancers. These preliminary findings warrant further clinical study of this compound.

In this work, we have developed and validated a sensitive and simple LC-MS/MS method for direct determination of triapine in human plasma using 2-[(3-fluoro-2-pyridinyl)methylene]-hydrazinecarbothioamide (NSC# 266749) as the internal standard (IS). Plasma samples were prepared by deproteinization with acetonitrile. Triapine and the IS were separated on a Waters Xbridge Shield RP 18 column (3.5 μ m; 2.1 \times 50 mm) using 25.0% methanol and 75.0% ammonium bicarbonate buffer (10mM, pH 8.5) (v/v) as mobile phase. The column eluate was monitored by the positive turbo-ion-spray tandem mass spectrometry, and quantitation was carried out by multiple-reaction-monitoring (MRM) mode. The method developed had a linear calibration range of 0.250–50.0 ng/mL with correlation coefficient of 0.999 in human plasma, and the lower limit of quantitation (LLOQ) at 0.250 ng/mL. The recovery of triapine and the IS normalized matrix effect in human plasma ranged 101–104% and 1.03–1.06, respectively. The accuracy expressed as percent error (%RE) and precision expressed as coefficient of variation (%CV) were $\leq \pm 15\%$ and $\leq 15\%$, respectively. This is the first validated LC-MS/MS method for the determination of triapine in human plasma. It has been successfully applied to the measurement of triapine in human blood samples.

110 ASSESSING THE SEASONAL FATE OF CHLORIDE IN A TYPICAL URBAN PARCEL IN CLEVELAND, OHIO

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Cleveland, Ohio has experienced a massive population outmigration in the last decade, leaving up to ten percent of available residential units unoccupied. Costs to maintain these parcels are prohibitive. Efforts are being taken to acquire and re-purpose the lands. Among the re-purposing options are greenspace creation, stormwater management infrastructure, and urban agricultural uses. Since these lands are wholly within a heavily urbanized environment, they are often subjected to excessive inputs of chlorides from municipal de-icing operations, as well as inputs of heavy metals from the adjacent roadways. How much road salt can be expected to be deposited on the land adjacent to the roadway, as a function of distance from said roadway? Is there any significant correlation between chloride ion and heavy metal cation concentrations as a function of distance from the roadway? Such information will be helpful for urban and ecological planners to decide the most appropriate land-use for these re-purposed parcels.

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