

2014

Undergraduate Research
and Creative Projects Conference



November 14 — McGregor Memorial Conference Center

The Academy of Scholars

The WSU Academy of Scholars was founded in 1979 to promote and recognize sustained excellence in scholarship and creative achievement. The academy provides support to promising young scholars and periodically hosts special programming for the campus community.

Election to the Academy of Scholars is the highest recognition that may be bestowed upon a Wayne State University faculty member by his or her colleagues. Membership in the academy is for life.

The Undergraduate Research Opportunities Program (UROP) would like to thank the following members of the Academy of Scholars for their participation as judges:

Dr. Joyce Benjamins
Professor, Neurology

Dr. Paul Karchin
Professor, Physics

Dr. John F. Dolan
Distinguished Professor, Law

Arthur Marotti
Professor Emeritus, English

Dr. Paula Dore-Duffy
Professor, Neurology

Dr. Yaddanapudi Ravindranath
Professor, Pediatrics

Dr. Robert N. Frank
Professor, Ophthalmology

Dr. Robert A. Sedler
Distinguished Professor, Law

Dr. Donald Haase
Associate Dean,
College of Liberal Arts and Sciences

Dr. Seetha Shankara
Professor, Pediatrics

Dr. Gloria Heppner
Associate Vice President for Research

Dr. Gang George Yin
Professor, Mathematics

Friday, November 14, 2014

McGregor Memorial Conference Center

8:15 a.m. **Registration and continental breakfast** — Atrium

9 a.m. **Welcome** — Room B/C
Monica Brockmeyer, Associate Provost
for Student Success

9:30 a.m. **Oral Session I** — Multiple locations;
listed on session pages

10:30 a.m. **Poster Session** — McGregor Atrium and
Community Arts lobby

Noon **Oral Session II**

1 p.m. **Luncheon** — Room L/M

Greeting

Margaret E. Winters, Provost and Senior Vice
President for Academic Affairs

Introduction of guest speaker

Matthew Orr, Program Coordinator,
Undergraduate Research Opportunities Program

Guest speaker

Eranda Nikolla, Assistant Professor, Wayne State
University Department of Chemical Engineering

Awards

Introduction: Matthew Orr

Presentation: Wayne State University Libraries

Presentation: WSU Academy of Scholars

Closing statement

Monica Brockmeyer

Resource Fair

Alumni House

9:30 a.m.-12:30 p.m.

Oral Session I

9:30-10:30 a.m.

Session 1: **Genetics** Room B/C
Moderator: **Dr. Rong Liu**

Ahila Manivanna: *Combined Technological Improvements for High Efficiency Genotyping of Genetically Modified Mice*

Nathan Vengalil: *Sequencing Lactate Dehydrogenase A (LDHA) and Analyzing its Adaptive Evolution Among Primates*

Session 2: **Improving Health Outcomes** Room E
Moderator: **Dr. Caroline Maun**

Maricruz Moya: *Relationship between Psychological Distress and Inflammation in Pregnant African American Women*

Mukund Mohan: *Physician Perception in Predicting Good Neurological Outcomes in Patients Resuscitated from Cardiac Arrest*

Session 3: **Neurobiological and Sociocultural Frameworks for Disease and Disability** Room F
Moderator: **Dr. Talia Weltman-Cisneros**

Kristy Abraham: *Involuntary Interference in Emotion Dysregulation: Amygdala Hyper-modulation of Brain Networks*

Jacob Wilson: *Investigating Social and Cultural Frameworks that Contribute to Educational Barriers for Chinese Students with Disabilities*

Session 4: **Role of Public Information** Room G
Moderator: **Dr. Stephanie Tong**

Gergana Sivrieva: *The Institutionalization of Right to Information Laws*

Brandon Burbank: *Online Credibility*

Session 5: **From Outerspace to Innerspace** Room H
Moderator: **Dr. Matthew Allen**

Zachary Elledge: *Finding the Effect of Different States of Neutron Stars on Inner Accretion Disk Radius*

Han Soul Lee: *Guide, Focus and Alignment System for DESI*

Devin Mills: *Physical Variation in Lanthanide-Containing N-[1-(2, 3-dioleoyloxy)propyl]-N,N,N-trimethylammonium Chloride Complexes Across the Series and Their Impact on Chemical Exchange Saturation Transfer*

Session 6: **Detroit** Room I
Moderator: **Dr. Andrew Newman**

David Prince: *Freemasonry and Urban Resilience in Detroit*

Andre Gilford II: *For the Betterment of the Race: The Efforts of the Detroit Urban League in Assimilating Black Families during the Early Great Migration, 1916-17*

Bridget Franz: *From Detroit to San Francisco: A Cultural Link with the Diego Rivera Frescoes*

Session 7: **Music** Room J
Moderator: **Dr. Jeffrey Abt**

Stephen Dueweke: *playCAGE*

Christian Shaum: *New Music — When Opera and Slam Poetry Meet*

Oral Session II

Noon-1 p.m.

Session 1: **Computing** Room B/C
Moderator: **Xingbo Wu**

Michael Moore: *A Three-Dimensional Approach to Cache Replacement*

Jason Shepherd: *Vehicle-to-Vehicle Communications: A Software Approach to Develop Cluster-based DSRC Safety*

Alyssa Wilkins: *Comparison of R-Implemented Topology-based Pathway Analysis Tools using Target Pathways*

Session 2: **Materials and Systems** Room E
Moderator: **Dr. R. Darin Ellis**

Olamide Alabi: *Edge-cracking and its Effect on Formability in Advanced High-Strength Steels (AHSS)*

Kayla Jordan: *Arduino Banking System*

Camille Williams: *Enhancing Liquid Lens using Electrowetting and Graphene Material*

Session 3: **Cancer** Room F
Moderator: **Dr. Q. Ping Dou**

Nikhil Adapa: *Increased Sensitivity of Disulfiram on Cadmium-Enriched Prostate Cancer Cells*

Tayson Lin: *Immunohistochemistry of Breast Cancer Microenvironment Immunology as a Prognostic Tool*

Bhavana Tetali: *Determination of Tumor Manganese Content Using a Ratiometric and Colorimetric Method*

Session 4: **Biochemical Approaches to Drug Targeting** Room G
Moderator: **Dr. Robert Akins**

Ashi Arora: *Deletion Analysis of a Novel Regulatory Gene in Candida Albicans that Switches its Target Pathways*

Harjot Mann: *Studies on Reaction Mechanism and Product Characterization of Oplatin and Cytidine*

Jasmine Vickery: *Investigation of Mechanisms of Antifungal Resistance in Candida Albicans*

Session 5: **Exploring the Meaning of Place** Room H
Moderator: **Dr. Caroline Maun**

Jihad Fahs: *The World Cup Runneth Over*

Jason Huyghe: *Exploring Turkey: A Secular Society in Transition*

Vincent Perrone: *A Poetic Investigation of the Modernists in Paris*

Session 6: **Biomolecules: Organization and Synthesis** Room I
Moderator: **Dr. Matthew Allen**

Joshua Fischer: *Adaptation of Water-Tolerant Asymmetric Precatalysts to the Michael Reaction*

Fariha Ghazi: *Functional Significance of Lipid Droplet and Organelle Interactions in Brown Adipose Tissue*

Sanjana Kulkarni: *Glucose-Stimulated Insulin Secretion in Cells Reconstituted with the Insulin-Secreting Porosome Complex*

Session 7: **Injury and Treatment** Room J
Moderator: **Dr. Andrew Newman**

Shobi Mathew: *Comparison of Quantitative EEG with Current Clinical Decision Rules for Head CT Utilization in Acute Mild Traumatic Brain Injury in the Emergency Department*

Tahsin Rahman: *Safety and Efficacy of Emergency Department Antihypertensive Prescription*

Atika Singh: *Prescription Patterns of Analgesics in Mild Traumatic Brain Injury in the Emergency Department*

Poster Session 10:30 a.m.

Poster

- 41 Tazeen Abbas:** *Marital Conflict from a Child's Perspective and Emotional and Physical Health in Youth With Asthma*
- 42 Ryan Abbott:** *Visual Memory in Children and Adults: The Impact of Category Similarity and Assessment Method*
- 43 Rizwan Ahmed:** *Gray and White Matter Density Changes in Middle Adulthood Predict Changes in Learning Proficiency*
- 2 Yasir Altamimi:** *Interaction Between Arterial Baroreflex and Muscle Metaboreflex During Dynamic Exercise*
- 21 Muhammad Amin:** *How Nano Particles and Molecules Approach a Cell Membrane — Exploring the Effect of Water Structure*
- 3 Rohit Anand:** *Role of Inflammatory Cytokines in Glioma Progression*
- 22 Nicholas Ancona:** *Development of N4Py Caging Ligand and Other TPA Derivatives to Form Ruthenium Caging Complexes*
- 44 William Angell:** *Neural Development Supporting Memory Formation in Young Children and Adults*
- 4 Charbel Barrak:** *Regulation of Human Placental Trophoblast Cell Survival at Low Oxygen*
- 59 Matthew Brown:** *Synthesis, Characterization and Cellular Internalization of Mitochondrial Targeting Nanocarriers*
- 23 Yasiel Cabrera:** *Searching for D0 -> K-pi+eta0 in Belle Data*
- 45 Colin Colter:** *Understanding Risk and Resilience Factors Associated With Fathering in an Urban Sample of Men Preparing to Parent a New Baby*

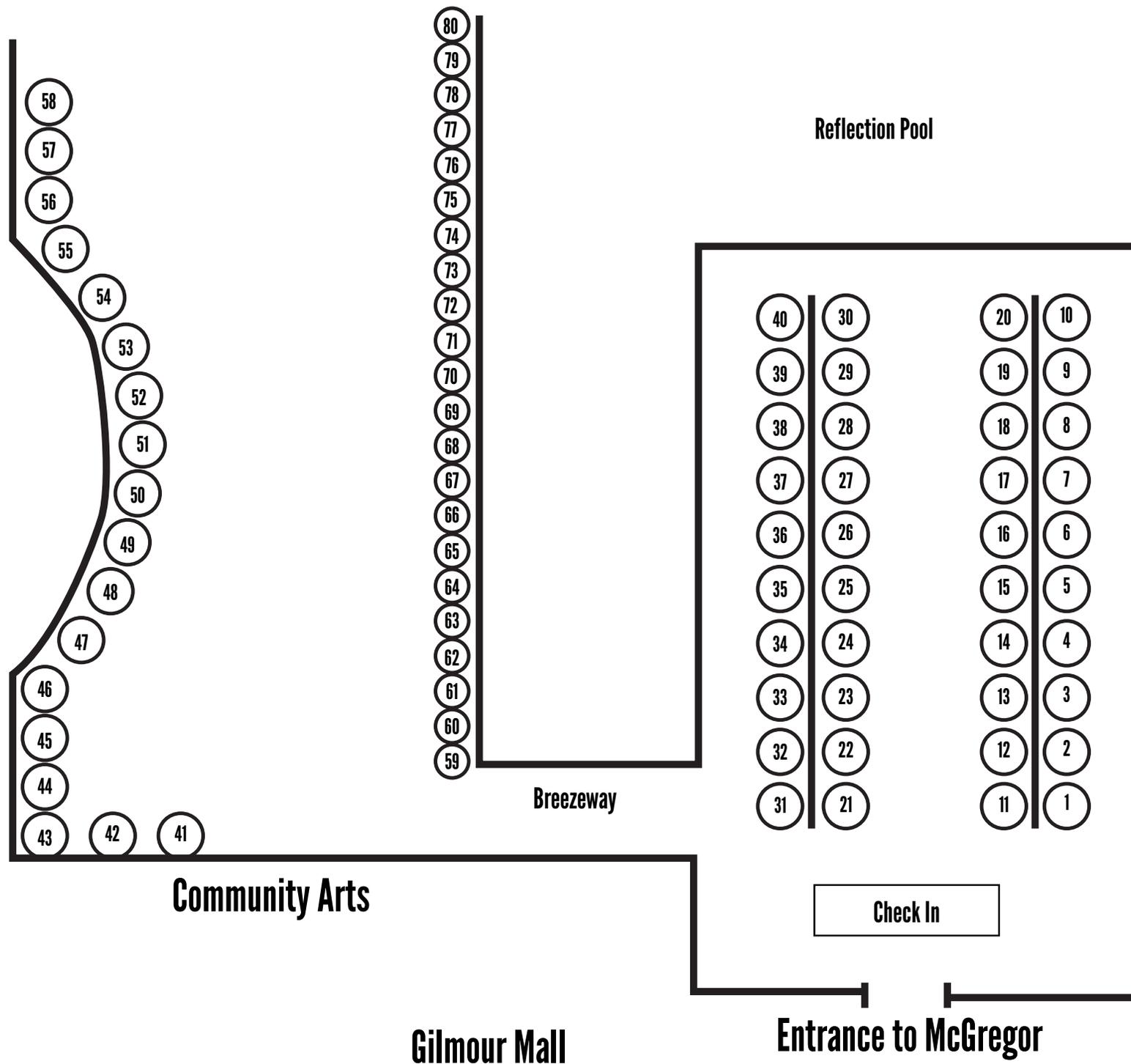
- 60 Jack Dischler, Allan Brazier, Joseph Brazier:** *Identifying Ventricular Arrhythmias in an Electrocardiograph Signal*
- 24 Jiayin Dong:** *Measuring the Interaction of DDR Cell Receptors and Extracellular Matrix Collagen in Breast Cancer Cells*
- 25 Jacob Elledge:** *Jet Quenching in Heavy Ion Collisions*
- 26 Ahmad El-Moussa:** *Applications of DNAzymes on Studies of 23S rRNA*
- 46 Shaun Frey:** *Moderators of a Gratitude Meditation Exercise on Student Undergraduate Well-Being*
- 61 Alexander Gagliardi:** *Development of Chitosan-GAG Fibers as a Modular Tissue Engineering Platform*
- 47 Donovan Garmo:** *Modeling Posttraumatic Stress Disorder and its Treatments*
- 48 Sadia Ghazi:** *Socioeconomic Status and Hippocampal Volume*
- 49 Felicia Ghrist:** *Evaluating PICCOLO Scores Against the Crowell: Is the PICCOLO Valid with Parents of Maltreated Children in the Child Welfare System?*
- 5 Taania Girgla:** *Human Olfactory Mucosal Stem Cells Delivered into The Nose Home to Regions of Damage in the Spinal Cord Injured Rats*
- 27 Michael Golfetto:** *Aerogel Synthesis via Template Sublimation*
- 6 Aamna Hafeez:** *DMBA/TPA-Induced Skin Carcinogenesis in Mice with Over-Expression of MicroRNA-150*
- 28 Nathaniel Hardin:** *Platinum(II) Complexes With Sulfur-Containing Peptide Building Blocks for Use in RNA Binding Studies*
- 62 Douglas Harriman:** *Investigation of the Ignition Delay of Surrogate Fuels in a Constant Volume Ignition Quality Tester*
- 50 Danielle Hicks:** *Meditation and Well-Being: Religion and Spirituality as Moderators*
- 29 Thinh Hoang:** *Titanium Mediated Cyclopropanation of N-Acyl Sulfonamides*
- 63 Ahmedul Islam:** *An Improvement to the Standard Micro Pillar Design to Quantify Contraction Forces Produced by Cardiac Myocytes*
- 7 Chelsea Jaskot:** *Examination of the Removal of Cyanotoxins by Drinking-Water Plants*
- 64 Albert Jose:** *Hardware Design of Smart Irrigation Techniques Based on Wireless Sensor Network to Manage pH Level Systems*
- 8 Nikita Khetarpal:** *Oxidative Stress and Light-evoked Responses of the Posterior Segment in a Mouse Model of Diabetic Retinopathy*
- 65 Trevor Kirsch:** *Longitudinal Analysis of Traffic Fatalities Considering Socioeconomic and Demographic Factors*
- 51 Gaia Klotz:** *Perceptions of Gender's Influence in Chinese Senior Secondary Education*
- 30 Alexandra Lemieux:** *Investigation of the Occurrence of Cyanotoxins in Source Water from Drinking-Water Plants across the United States*

Poster Session cont'd.

- Poster #**
- 31** **Veronica Lewalski:** *Synthesis of TQA(NO₂)₃ Caging Ligand and Ruthenium Caging Complex for the Light Activation of Enzyme Inhibitors*
- 66** **Genan Ling:** *Validation of Soot Emissivity Models in Flames*
- 32** **Renee Ludlam:** *Re-Approaching the Spin Estimate GX 339-4*
- 9** **Mia Ma:** *Early Caffeine Therapy is Not Associated with Mortality Within 48 Hours of Life in Very-Low-Birth-Weight Newborns*
- 67** **Aniruddh Mannari:** *Potential for Enhanced Differentiation of Bone Marrow Mesenchymal Stem Cells via Controlled Release of rh-BMP2 from Heparin-modified Collagen Microspheres In Vitro*
- 33** **Tyler May:** *Errors in Single Nucleotide Incorporations Using a Y-Family DNA Polymerase*
- 10** **Samia Mazumder:** *3D In Vitro Evaluation of BPD as a Treatment for Breast Cancer Cells*
- 34** **Rebecca Meerschaert:** *Novel Experimental Methods to Resolve Nanoscale Membrane Organization and Curvature*
- 52** **Erica Montgomery:** *Optimizing Computer-Delivered Brief Interventions for Alcohol Use Among University Students*
- 53** **Zeinab Moussa, Raquael Williams, Kristine Vichinsky, Alina Raza, Karen Ruth Kandel:** *Behavioral Reactions of Detroit Mothers and Fathers Participating in the Baby Cry Protocol: Preliminary Findings*
- 35** **Kenneth Nash:** *Sorption Characteristics of Radium Isotopes (224Ra, 226Ra, 228Ra) in a Freshwater System: Implications to Groundwater-Surface Water Exchange Studies*
- 54** **Rohan Patel, Vincent Rubino, Patricia Knockenhauer:** *Understanding the Intergenerational Transmission of Music in a Sample of Detroit Families*
- 55** **Damaris Pop:** *Changes in Brain Norepinephrine and Serotonin levels in an Animal Model of Posttraumatic Stress Disorder*
- 68** **Alisha Punjabi:** *Targeting Polymeric Nanocarriers: A Therapeutic Approach for Prostate Cancer Bone Metastasis*
- 11** **Archanna Radakrishnan:** *Investigating the Role of SIN3 in Tolerance to Acute Oxidative Stress*
- 12** **Amulya Rajagopal:** *Proteome of the Insulin-Secreting Min6 Cell Porosome Complex: Involvement of Hsp90 in its Assembly and Function*
- 13** **Alexandra Ranski:** *Characterization of the Müller Glial Response During Adult Retinal Regeneration*
- 71** **Samantha Russell:** *Neo-plastic: The Re-envisioning of Materials Past*
- 56** **Priya Sam:** *Age-Related Differences in Free Recall and Mnemonic Strategy Use*
- 36** **Madhumeeta Sanam:** *Determination of Ideal Meningioma Cell Lines for Invasion/Migration Studies*
- 69** **Marcela Sanchez:** *Comparing the Tradeoffs Between Disassembly Sequencing and Buy-back Incentives for High and Low Value End-of-Life Products*

Poster Session cont'd.

- 37** **Aryana Sharrak:** *Mechanism for Inhibiting Pain Pathways with Leu-Enkephalin via Ruthenium Caging Complexes and Release With Visible Light*
- 14** **Jaipal Singh, Kristal Kay Takac:** *Desmoplastic Pancreatic Cancer Model for Novel Therapeutic Screening and Translation*
- 15** **Michael Sobolic:** *SIN3 220 Degradation: HA Tag and TAP Tag Cloning*
- 16** **Preethi Sriranga:** *Effect of Inflammatory Cytokines on the Growth and Stem Cell Properties of Primary Gliomas*
- 17** **Ellen Strawsine:** *Probing Neurochemical Effects of High Frequency Deep Brain Stimulation on Serotonin in the Dorsal Raphe*
- 57** **Mrunalini Tankasala:** *Evaluation of Peer Mentor Educational Programs For Transplant Patients In Hospital Setting: Transplant Living Community (TLC) at Henry Ford Hospital*
- 38** **Garrett VanHecke:** *Synthesis of Clickable Glutathione*
- 18** **Kaushik Varadarajan:** *Tryptophan Metabolic Enzymes in Meningiomas and Gliomas*
- 19** **Gautham Vellaichamy:** *STZ-Induced Diabetes in Mice With Loss of MicroRNA*
- 20** **Kashmira Wani:** *Effects of Recreational Substances and Prescription Medications on the Caloric Content and Fat Levels in Human Breast Milk*
- 58** **Jolin Yamin:** *Cognitive Behavioral Therapy and Emotional Exposure Therapy for Fibromyalgia, Do They Differ in Their Processes?*
- 39** **Jerold Young:** *Model Independent Extraction of the Axial Mass Parameter in CCQE Anti-Neutrino-Nucleon Scattering*
- 70** **Ao Yu:** *An Innovative Exercise Adherence Monitoring (EXAM) Device to Improve Therapeutic Gains in Home Exercise Programs*



Presenters

Tazeen Abbas

Faculty mentor: **Dr. Richard Slatcher**

"Marital Conflict from a Child's Perspective and Emotional and Physical Health in Youth With Asthma"

Research over the years has demonstrated that family hostility, especially in the form of marital conflict, is associated with poorer health outcomes in children. Our study investigated the associations between marital conflict present in homes and emotional and physical health in children with asthma. Specifically, we examined marital conflict from the child's perspective and its links between daily mood, asthma symptoms and overall child health.

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Ryan Abbott

Faculty mentor: **Dr. Noa Ofen**

"Visual Memory in Children and Adults: The Impact of Category Similarity and Assessment Method"

Visual memory is an important cognitive ability that improves with age. This study compared visual memory of within-category (e.g. two cars) versus across-category (e.g. flower vs. football) objects in children aged 5-6 years and adults. Participants viewed 140 objects and then were tested using a two-alternative-forced-choice (2AFC) task (studied item and non-studied item shown simultaneously) and a yes-no recognition task (test items shown individually). Results showed that adults had better memory than children, and that the 2AFC task was easier than the yes-no recognition task. Adults were also disproportionately better than children in remembering within-category objects, suggesting that adults are better than children at remembering rich, detailed information, which is required for making accurate within-category object distinctions.

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Kristy Abraham

Faculty mentor: **Dr. Vaibhav Diwadkar**

"Involuntary Interference in Emotion Dysregulation: Amygdala Hyper-Modulation of Brain Networks"

Emotion dysregulation disorders including borderline personality disorder (BPD) are characterized by emotional instability and impulsive behavior. BPD tends to express emotional reactivity, particularly to negative affective context. It is unclear whether involuntary emotional reactivity impacts brain network function that may ultimately impede cognitive processing. In this framework, hyper-modulatory effects of the amygdala, a core region at the center of the limbic system, may selectively impede brain network function. To investigate this novel question, we adapted the classic Go-No-Go paradigm, using affective stimuli, where the response characteristics were gated by the affective and driven by whether the stimulus was consistent with affective context. In our analyses, we were interested in whether BPD were characterized by inappropriately increased amygdala modulation of cortical structures.

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Nikhil Adapa

Faculty mentor: **Dr. Q. Ping Dou**

"Increased Sensitivity of Disulfiram on Cadmium-Enriched Prostate Cancer Cells"

A study conducted by the CDC determined that 18.1 percent of the American population smokes cigarettes daily and thereby deposits numerous harmful compounds including nicotine, carbon monoxide, tar, arsenic, ammonia and cadmium into their lungs and bodies. Research from our lab and others has found that cadmium increases cancer cell growth and could contribute to the carcinogenic properties of cigarette smoking. However, the combination of 1 uM Disulfiram (antabuse) — a drug currently available for the treatment of alcoholism — with 1 nM Cadmium resulted in a 97 percent reduction in the cell viability of the prostate cancer cell lines. This data offers the hope that Disulfiram may serve a therapeutic role for smokers who have increased levels of cadmium in their blood and currently suffer from prostate cancer.

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Rizwan Ahmed

Faculty mentor: **Dr. Vaibhav Diwadkar**

"Gray and White Matter Density Changes in Middle Adulthood Predict Changes in Learning Proficiency"

While it is very well-understood that brain atrophy occurs in late adulthood and elderly age, brain volume changes and associated cognitive performance are less understood in post-adolescence and middle-adulthood. We addressed this question by exploring changes in brain morphometry in brain structures associated with learning and comparing learning performance in post-adolescent adults. In this cross-sectional sample, we demonstrate that gray and white matter density reductions in middle adulthood are associated with decrements in learning and memory performance. This data provides information on the integrated dynamics of brain and cognitive changes in middle adulthood, underlining enduring patterns of lifelong brain plasticity.

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Olamide Alabi

Faculty mentor: **Dr. Xin Wu**

"Edge-Cracking and its Effect on Formability in Advanced High Strength Steels (AHSS)"

Advanced high strength steels (AHSS) have many advantages in the auto industry. Unfortunately, these materials are subject to edge-cracking during autobody stamping deformation that is difficult to predict. This project studied the plastic behaviors of dual phase-steels through uniaxial tension and punch stretch forming with digital image correlation (DIC) technique, the metallurgical microstructure analysis of martensite distribution patterns, the topologies of mechanically sheared edges from blanking operation prior to sheet forming, and the topology of fractured surfaces. The results indicate that edge-cracking and the overall formability of dual phase steels are affected by several factors including the severe pre-deformation and edge damage from blanking operation, the two-phase microstructure distribution pattern, and the strain paths.

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Yasir Altamimi

Faculty mentor: **Dr. Donal S. O’Leary**

“Interaction Between Arterial Baroreflex and Muscle Metaboreflex During Dynamic Exercise”

Arterial baroreceptors constrict blood vessels when they sense the blood pressure has dropped. The muscle metaboreceptors are activated when low oxygen is coming to that muscle. In order to increase the oxygen levels coming to the muscle, these receptors increase heart function so that blood pressure increases. We tested the interaction of these receptors when both are activated at the same time to see if that would heighten the pressor response. We did this by reducing the blood going to the hind limbs to activate the muscle metaboreflex and then reducing the blood going to the carotid arteries to activate the baroreflex.

Muhammad Amin

Faculty mentor: **Dr. Peter Hoffmann**

“How Nano Particles and Molecules Approach a Cell Membrane — Exploring the Effect of Water Structure”

Future therapy, with special interest in cancer, requires targeted drug delivery into cells. Particles must interact with the cell’s membrane in order to enter the cell. Atomic force microscopy (AFM) uses a cantilever tip that represents the particle approaching the membrane. AFM can generate force curves, which are analyzed to set an upper limit on the rate at which particles can approach the cell membrane in a specific environment. Water is not a passive medium, behaving differently when compressed, and may be just as resistant in an environment similar to the human body. Understanding the relationship between a particle and its environment, we have used synthesized lipid bilayer as models and are measuring the force between the tip and the bilayer using an AFM.

Rohit Anand

Faculty mentor: **Dr. Prahlad Parajuli**

“Role of Inflammatory Cytokines in Glioma Progression”

Recently, there has been an increasing body of evidence to suggest that inflammation plays a crucial role in the progression of tumors. Gliomas are one of the most prevalent and aggressive types of cancers, affecting more than 22,000 Americans each year. In this study, we examined the role of the inflammatory cytokine IL-17 in the progression of patient-derived glioma samples as well as the glioma cell line U251. We tested our hypothesis using cytokine/chemokine analysis, western blotting techniques, immunohistochemistry, flow cytometry and in-vivo experimentation. The results of this study provide insight into the role of inflammatory cytokines in the progression of gliomas and can potentially lead to the development of clinical interventions and therapies to treat patients with this lethal form of cancer.

Nicholas Ancona

Faculty mentor: **Dr. Jeremy Kodanko**

“Development of N4Py Caging Ligand and Other TPA Derivatives to Form Ruthenium Caging Complexes”

Metal caging complexes are actively being developed as therapeutics. Ruthenium-caging complexes have been shown to be able to cage varying inhibitors and selectively release them in the presence of directed light. By controlling the cage and release of inhibitors, we gain spatial control over enzyme inhibition. N4Py is a derivative of the well-known TPA ligand. This new ligand is meant to develop a pentadentate ruthenium-caging complex with new, specialized properties. The new caging complex can potentially cage and release a different class of inhibitors, providing new therapeutic. My project is to synthesize N4Py and bind it, along with a known inhibitor of an enzyme that upregulates disease, to a ruthenium center. Then I can test and observe the caging complex’s chemical and photochemical properties.

William Angell

Faculty mentor: **Dr. Noa Ofen**

“Neural Development Supporting Memory Formation in Young Children and Adults”

Medial temporal lobe (MTL) and prefrontal cortex (PFC) have been implicated in successful memory encoding in both children and adults. Previous research has shown that children exhibit less memory-related activation in the PFC compared to adults, whereas memory-related activation in the MTL is comparable across age. Previous studies, however, only tested children age 8 and above; therefore, the neural circuitry supporting successful memory in younger children is largely unknown. We used functional magnetic resonance imaging (fMRI) to assess the neural basis of memory formation in children (ages 5-7) and young adults. Our findings suggest that stronger reliance on MTL activation in young children might serve as a compensatory mechanism in place of reliance on medial PFC activation to support successful memory formation.

Ashi Arora

Faculty mentor: **Dr. Robert Akins**

“Deletion Analysis of a Novel Regulatory Gene in Candida Albicans That Switches its Target Pathways”

Candida albicans acquires resistance to antifungals as they are exposed during treatment of infected patients. Although several resistance genes and their mutations have been characterized, many resistant isolates have no known mechanism. Also, most clinical failures to respond to antifungals occur with isolates that are not stably resistant. For these reasons, we wish to understand more about regulation of pathways that might be induced to create transiently resistant phenotypes, without mutation.

Charbel Barrak

Faculty mentor: **Dr. David Randall Armant**

“Regulation of Human Placental Trophoblast Cell Survival at Low Oxygen”

Preeclampsia is a perilous disorder that arises during pregnancy and is characterized by the mother’s sudden increase of blood pressure. Preeclampsia is associated with poor trophoblast survival and differentiation during the first trimester. I studied the molecular mechanisms that are unique to embryonic cells that permit them to thrive in an O2-deprived environment. It is known that heparin-binding EGF-like growth factor (HBEGF) protects trophoblast cells against apoptosis during hypoxia. In placentas delivered from mothers diagnosed with preeclampsia, there was a significantly lower amount of HBEGF compared to that from a normal pregnancy, suggesting that the lack of HBEGF plays a significant role in trophoblast apoptosis during the first trimester of pregnancies that develop preeclampsia. I studied the HBEGF pathway and its order of chronological events.

Matthew Brown

Faculty mentor: **Dr. Sandro da Rocha**

“Synthesis, Characterization and Cellular Internalization of Mitochondrial Targeting Nanocarriers”

Lung cancer resulted in more deaths in the United States than colon, breast and prostate cancer combined in 2012. Mitochondria-targeted drug therapy has emerged as a means to target lung cancer because mitochondria of cancer cells are more permeable and structurally different than those in healthy cells. In this work, mitochondrial targeting agents were conjugated to PAMAM dendrimers via a poly(ethylene glycol) (PEG) linker that directs them to mitochondria within a lung cancerous cell line (A549). The conjugates were found to be effectively internalized by the cell and to target the mitochondria, while not being significantly more toxic than bare dendrimer. The results suggest that this conjugation system may be a viable strategy to deliver anti-cancer therapeutics to the mitochondria for treating lung cancer.

Brandon Burbank

Faculty mentor: **Dr. Stephanie Tong**

“Online Credibility”

A further look into how online credibility is perceived through impression formation by students observing raters’ comments on the website RateMyProfessor.com — a site dedicated to reviewing professors on classes they’ve taught at their respective universities.

Yasiel Cabrera

Faculty mentor: **Dr. David Cinabro**

“Searching for D0 -> K-pi+eta0 in Belle Data”

Mixing has been established in charm decays by comparing the lifetime of D0 decaying to CP+ and CP neutral modes. We are studying a CP- D0 decay to cross-check the observed mixing signal and to search for CP-violating effects by comparing the CP-, and CP-neutral, and CP+ decay lifetimes. The level of CP-violation in charm decays is sensitive to physics beyond the SM.

Colin Colter

Faculty mentor: **Dr. Carolyn Dayton**

“Understanding Risk and Resilience Factors Associated With Fathering in an Urban Sample of Men Preparing to Parent a New Baby”

Using qualitative analysis, this study gathered data regarding expectant fathers’ previous life experiences and their views and aspirations for parenting. (N= 43). Three themes emerged from the data: 1) Men experienced positive and negative relationships with their own fathers and understood these relationships according to how they want to parent their child. 2) Men described their parenting support systems now and in some situations turned to maternal figures for their primary parenting support. 3) Fathers described what they believe to be examples of good fathering, especially in terms of activity they would like to engage in with their child. Many past studies have relied on maternal understandings of fathering. This study interviewed fathers directly and data point to themes of risk as well as resilience.

Jack Dischler

Faculty mentor: **Dr. Mohammad R.N. Avanaki**

“Identifying Ventricular Arrhythmias in an Electrocardiograph Signal”

Our project was to design a code to reduce noise and decipher signal abnormalities, such as ventricular arrhythmias, when given a signal from an electrocardiograph. The code is also responsible for immediately informing the user of any potentially dangerous abnormalities in a given signal to quicken the process of identifying possible heart problems.

Jiayin Dong

Faculty mentor: **Dr. Peter Hoffmann**

“Measuring the Interaction of DDR Cell Receptors and Extracellular Matrix Collagen in Breast Cancer Cells”

Transmembrane proteins detect extracellular changes and send signals to inside the cells. Discoidin domain receptors (DDR1 and DDR2) are the special transmembrane receptor proteins that play a role in cancer progression and metastases. DDRs bind to and are activated by extracellular matrix (ECM) collagens, and DDR-collagen interactions are considered to play a key role in the signaling pathway in cancer progression. We examined such interactions in live cells using an atomic force microscope (AFM). We measured mechanical forces of the interaction to analyze the strength of the bonds and studied the structure of collagen interacting with DDR. By comparing cancer cells and normal cells, we hope to shine some light on the mechanism of cancer progression and contribute to new cancer therapies.

Stephen Dueweke

Faculty mentor: **Dr. Jeffrey Abt**

“playCAGE”

As John Cage prepared a piano, so playCAGE ravages a guitar. Inspired by the first Detroit exhibition of the visual art of the American avant garde composer John Cage, playCAGE asks: Can an art exhibit exist once the works of art have left the exhibition? Introducing the concept of readymedia, configuring commonplace materials into a performance installation physically interactive in real time, in our “real world”, that conforms to its exhibition spaces. As part of the Undergraduate Research Program, playCAGE had its first test performance on May 2, 2014, at Center Galleries on the campus of Detroit’s College of Creative Studies, and was the grateful recipient of a Seed Grant from the Frey Foundation to fund its appearance in ArtPrize SIX in Grand Rapids.

Zachary Elledge

Faculty mentor: **Dr. Edward Cackett**

"Finding the Effect of Different States of Neutron Stars on Inner Accretion Disk Radius"

I was trying to find the reasoning behind the variability in neutron stars. What I was testing was the theory that inner accretion disk radius is the thing that drives the changes in state of the neutron stars.

Jacob Elledge

Faculty mentor: **Dr. Abhijit Majumder**

"Jet Quenching in Heavy Ion Collisions"

I participated in the Wayne State University Research Experience for Undergraduates this past summer, where I worked on Theoretical Nuclear Physics research under Dr. Abhijit Majumder. I used FORTRAN to calculate different properties of Heavy Ion Collisions that take place at the LHC and RHIC. My summer primarily consisted of a series of computer programming projects, followed by the task of coming up with an efficient way to implement my code into a much larger master code. I then compared the results of the new code with experimental results to verify the accuracy of my contribution.

Ahmad El-Moussa

Faculty mentor: **Dr. Christine S. Chow**

"Applications of DNAzymes on Studies of 23S rRNA"

Helix 69 (H69) of 23S rRNA plays a central role in ribosome structure and function. Our main interest lies in post-transcriptional modification of H69, which leads to more efficient growth of bacterial culture. Chemical modifications of H69 are expensive and difficult to perform, and there are currently no known proteins capable of isolating H69 from 23S rRNA to perform model studies. In this project, we designed a specific DNAzyme that will be applied to cleave the 5' terminus of H69 from 23S rRNA. Selectively developing a DNAzyme to obtain H69 from natural sources would potentially disrupt bacterial protein synthesis, thus creating a novel antibiotic.

Jihad Fahs

Faculty mentor: **Dr. Elena Past**

"The World Cup Runneth Over"

A qualitative/quantitative look at the positives and negatives of hosting the World Cup, with a focus on the 2014 World Cup in Brazil. This project also looks at past examples of hosting the world's largest event and asks the question, "Is the beautiful game really worth it?"

Joshua Fischer

Faculty mentor: **Dr. Matthew Allen**

"Adaptation of Water-Tolerant Asymmetric Precatalysts to the Michael Reaction"

Many biological processes are sensitive to the three-dimensional arrangement of molecules and their constituents. This sensitivity can cause bioactive molecules composed of the same constituents in the same order (but in a different three-dimensional arrangement) to perform less effectively, if at all. Therefore, when synthesizing bioactive molecules (such as pharmaceuticals), control over the arrangement of the products is imperative. This control can be achieved with the use of a catalyst. I report the adaptation of a previously successful lanthanide-based precatalyst to a water-tolerant Michael addition, a powerful method used to form the carbon-carbon bonds necessary for the fabrication of complex bioactive molecules.

Bridget Franz

Faculty mentor: **Dr. Mary Margaret Weir**

"From Detroit to San Francisco: A Cultural Link with the Diego Rivera Frescoes"

This research project is a chronicle of my journey to San Francisco to visit the Diego Rivera mural, "The Building of a City from the Ground Up," in order to make a cultural link with the Diego Rivera "Detroit Industry" mural at the Detroit Institute of Arts. Detroit is no longer the industrial titan depicted in the "Detroit Industry" mural, but a city being built from the ground up as portrayed in his mural, which resides on the opposite coast of the Rust Belt. It was my hope to act as a bridge, a connector, between these two informative pieces of art history.

Shaun Frey

Faculty mentor: **Dr. Annmarie Cano**

"Moderators of a Gratitude Meditation Exercise on Student Undergraduate Well-Being"

My research involved examining whether baseline gratitude plays a moderating role in undergraduate students' positive and negative affect after a brief 10-minute meditation exercise. This was compared to a control group in which the meditation did not emphasize gratitude. Participant baseline levels of life satisfaction, psychological mindedness and compassionate love for humanity were also examined as potential moderators.

Alexander Gagliardi

Faculty mentor: **Dr. Howard Matthew**

"Development of Chitosan-GAG Fibers as a Modular Tissue Engineering Platform"

Modular tissue engineering is the science of using sub-units of viable cell-suspensions as a building block for synthesizing a tissue. Sub-units called modules are assembled strategically to encourage the interaction between modules for the purpose of tissue generation. Cell-suspensions are handled within a suitable biomaterial, which fosters an environment favorable for cell activity. This research focuses on the possible application of using cell-suspensions encapsulated within fibers generated from choice biomaterials as a novel way for assembling tissues via fibrous modules.

Donovan Garmo

Faculty mentor: **Dr. Shane Perrine**

"Modeling Post-Traumatic Stress Disorder and its Treatments"

Our lab conducted a set of experiments in mice to study the disruptive effects of trauma on recognition memory and to determine how Paroxetine reduces the effects of traumatic stress exposure on cognition.

Fariha Ghazi

Faculty mentor: **Dr. James Granneman**

“Functional Significance of Lipid Droplet and Organelle Interactions in Brown Adipose Tissue”

Growing data indicates that dysregulation of fatty acid (FA) metabolism is a key event that links excessive adipose tissue with disease to other organs. In this regard, lipid droplets (LD) in brown adipose tissue (BAT) sequester excess toxic FA in the form of neutral lipids such as triacylglycerols, and may manage FA combustion within the abundant mitochondria surrounding the LDs that are the sites of FA storage. The mobilization of stored lipids within and outside the adipose tissue requires precise regulation. BAT has multiple intracellular LDs, which dramatically increases the LD surface area and allows efficient supply of FA for mitochondrial thermogenesis. Hence, we hypothesize that there are structural and molecular mechanisms for efficient distribution and channeling of FAs for oxidation.

Sadia Ghazi

Faculty mentor: **Dr. Noa Ofen**

“Socioeconomic Status and Hippocampal Volume”

Environmental factors, as assessed by socioeconomic status (SES), have been shown to impact brain development. In particular, childhood SES has been linked to hippocampal volume (HCV) in adulthood. Both SES and HCV have been shown to relate to learning and memory, but the extent of SES impact on HCV during development is largely unknown. Here, we investigated the relationship between SES and HCV during child development. Higher SES correlated with larger HCV in children and adolescents, but SES was unrelated to HCV in adults. These findings suggest that during childhood, SES is related to hippocampal volume and this relationship may be minimized in adulthood. Additionally, that SES can affect memory development through its impact on hippocampal volume.

Felicia Ghrist

Faculty mentor: **Dr. Ann Stacks**

“Evaluating PICCOLO Scores Against the Crowell: Is the PICCOLO Valid with Parents of Maltreated Children in the Child Welfare System?”

Judges presiding over child welfare cases want objective measures when making a decision about whether or not it is safe to send a child home. Currently, there is no objective and practical measure used for community intervention programs or in the courtrooms. We investigated if a brief measure of parenting (PICCOLO) is a valid assessment for parents whose children are under court jurisdiction as a result of maltreatment by comparing it to a gold-standard research measure (Crowell). From data obtained from the Wayne County Baby Court Initiative, we observed a positive correlation in scores between hypothesized subscales. The PICCOLO may assist social workers in understanding their clients’ strengths and limitations in order to target interventions and to report changes in parent-child interactions to the court.

Andre Gilford II

Faculty mentor: **Dr. David Goldberg**

“For the Betterment of the Race: The Efforts of the Detroit Urban League in Assimilating Black Families During the Early Great Migration, 1916-17”

This paper attempts to understand the role that the Detroit Urban League (DUL) played in the migration of African American families during its first year, 1916-17. African American families came to Detroit looking for a better life and the promise of higher-wage jobs. Often they came without a place to stay or a sustainable job. The DUL assumed the role of helping families with these and other issues. However, often the DUL took the role of police to discredit the black rural tendencies of these individuals, while using the rhetoric of improving image for White benefactors. In this way, the DUL perpetuated a notion of race betterment that was narrowly focused in whiteness and middle-class values.

Tania Girgla

Faculty mentor: **Dr. Jean Peduzzi-Nelson**

“Human Olfactory Mucosal Stem Cells Delivered into The Nose Home to Regions of Damage in the Spinal Cord-Injured Rats”

This project investigates a novel stem cell delivery method using human stem cells obtained from the olfactory mucosa located in the upper nasal cavity in an animal model of contusive spinal cord injury. The 30 nude RNU male rats were injured at the T9 spinal cord level and received intranasal saline or stem cells with and without exercise and enrichment. The stem cell treatment combined with an exercise and enrichment program showed the most improvement. I worked primarily with the sectioning tissue and immunohistochemistry of the spinal cord sections to determine if the cells migrated to the injury site of the spinal cord. The human stem cells reached the spinal cord injury site after intranasal delivery that may be contributed to the functional recovery.

Michael Golfetto

Faculty mentor: **Dr. Stephanie L. Brock**

“Aerogel Synthesis via Template Sublimation”

I tested new methods of aerogel synthesis that utilize cost-effective strategies and can improve production time.

Aamna Hafeez

Faculty mentor: **Dr. Qing-Sheng Mi**

“DMBA/TPA Induced Skin Carcinogenesis in Mice With Over-Expression of MicroRNA-150”

In recent years, a substantial number of reports on individual microRNA (miRNA) have been published, providing strong evidence that miRNAs play an important role in cancer development and progression. This project investigates the role of miRNA-150 genes in tumor growth in mice. The effects of treating knock in (KI) and knock out (KO) miR-150 mice with a chemical carcinogen in order to induce skin tumors were investigated in vivo. MiRNA-150KO mice showed a significant increase in tumor incidence and number compared to wild-type (WT) mice, while miRNA-150KI mice demonstrated a decrease in tumor incidence and mimicked WT mice in average tumor number. Based on these results, it is hypothesized that miRNA-150 target genes regulate oncogenes that play a predominant role in DMBA-initiated skin carcinogenesis.

Nathaniel Hardin

Faculty mentor: **Dr. Christine Chow**

“Platinum(II) Complexes with Sulfur-Containing Peptide Building Blocks For Use in RNA Binding Studies”

With the help of my advisor, I am synthesizing Pt(II) complexes with sulfur containing amino acids. These complexes are going to be used with DNA and RNA binding studies. The hope is to use these complexes in RNA probes.

Douglas Harriman

Faculty mentor: **Dr. Marcis Jansons**

“Investigation of the Ignition Delay of Surrogate Fuels in a Constant Volume Ignition Quality Tester”

A Scheffé polynomial is used to predict an outcome when more than one independent variable determines the output. This research was developed to determine a Scheffé polynomial that can be used to determine the percentage of compounds from a given palette to make fuel surrogates. Fuel surrogates mimic the properties of the fuel they represent, such as JP8.

Danielle Hicks

Faculty mentor: **Dr. Annmarie Cano**

“Meditation and Well-Being: Religion and Spirituality as Moderators”

This study examined the Positive-Activity Model of religious and spiritual variables of meditation within 100 Wayne State University undergraduate students. The participants completed an in-lab session consisting of multiple measures, a seven-minute meditation and further measures upon completion of the meditation. Results indicated that negative affect decreased from pre-meditation to post-meditation ($F [1, 97] = 1.493, p = .225$). Results also indicated that both high and low levels of daily spiritual experiences were associated with the decrease in negative affect ($p=.042$), but this decrease was more significant for those with low daily spiritual experiences ($t = 7.817$) rather than those with high daily spiritual experiences ($t = 5.226$). These results suggest that religious or spiritual variables have a significant effect on meditation outcomes.

Thinh Hoang

Faculty mentor: **Dr. Jin K. Cha**

“Titanium-Mediated Cyclopropanation of N-Acyl Sulfonamides”

Herein, we report the use of N-acyl sulfonamides in the synthesis of cyclopropanols. The N-acyl sulfonamides were subjected to two different reactions to yield cyclopropanols. One reaction implements Kulinkovich’s method of cyclopropanation. The other method takes advantage of ligand-exchange between the reaction intermediate and a terminal alkene. A variety of N-acyl sulfonamides, olefins and Grignard reagents were investigated for their respective yield of cyclopropanols.

Jason Huyghe

Faculty mentor: **Dr. Saeed Khan**

“Exploring Turkey: A Secular Society in Transition”

This project is a study of the Hizmet Movement, a religious movement rooted in Turkey. I looked at the idea of citizenship and how the development of the movement fits within that construct. I traveled to Turkey three times within 13 months. Two of the times, I was part of a trip partially funded by the Hizmet movement. The third time, I traveled alone, with the intention of gaining an outsider’s perspective. This paper consists of my experiences both with and without the group, as well as an academic approach intended to answer the question of citizenship.

Ahmedul Islam

Faculty mentor: **Dr. Mark Cheng**

“An Improvement to the Standard Micro Pillar Design to Quantify Contraction Forces Produced by Cardiac Myocytes”

This project’s aim was to build a device that can measure the force produced by heart muscle cells as they contracted. The device itself was made from a transparent, flexible material called polydimethylsiloxane (PDMS) that made it ideal for the application. The device composed of two PDMS layers. The bottom layer had pillars and the top layer was a very thin layer that was permanently bonded to the pillars. The muscle cells were placed on the top layer of the device and once the cells contracted, the top sheet and the pillars would deform. By measuring this deflection of the pillars using white light interferometry, I will be able to know the force produced.

Chelsea Jaskot

Faculty mentor: **Dr. Judy Westrick**

“Examination of the Removal of Cyanotoxins by Drinking Water Plants”

The basis of my project was to study water samples from across the country and examine them for traces of algal toxins. From there, the most effective methods of toxin deactivation were deduced.

Albert Jose

Faculty Mentor: **Dr. Lubna Alazzawi**

“Hardware Design of Smart Irrigation Techniques Based on Wireless Sensor Network to Manage pH Level Systems”

Due to the continuing development in technology, irrigation systems must continue to grow in efficiency and productivity. Monitoring soil pH level is important to receive maximum crop yield. The use of the wireless DFRobot sensors in coalition with the open source Arduino will lower expenditure and generate capability compared to the previous system used. A variety of wireless sensor network testing in multiple weather conditions will be performed to ensure these sensors are accurate and durable. Testing will be done between four types of soil: sand, silt, loam and clay to provide validity in any condition. In this project, the Arduino microcontroller is utilized to develop the system maintaining crops at the ideal pH level from 6 to 7.5.

Kayla Jordan

Faculty mentor: **Dr. Umer Khalid**

“Arduino Banking System”

A banking system was designed using a software known as Arduino. It involved building a circuit on a breadboard and sensor components. Sounds, light and touch were all used in the system to engage it to go into certain modes.

Nikita Khetarpal

Faculty mentor: **Dr. Bruce Berkowitz**

“Oxidative Stress and Light-Evoked Responses of the Posterior Segment in a Mouse Model of Diabetic Retinopathy”

Diabetic retinopathy is the leading cause of vision loss and blindness in people under the age of 45. How diabetic retinopathy develops remains unclear, although there is now evidence that oxidative stress generated from dysfunctional rod photoreceptor cells is a major contributor to this disease. In this study, we develop and apply a new MRI method for measuring the impact of oxidative stress on both rod cells and their main circulation, the choroid, in an experimental model of diabetic retinopathy. Because our new MRI method exploits an endogenous contrast mechanism, its translational potential to people is promising. Our data supports a link between diabetes-related oxidative stress and rod, but not choroidal, pathophysiology.

Trevor Kirsch

Faculty mentor: **Dr. Peter Savolainen**

“Longitudinal Analysis of Traffic Fatalities Considering Socioeconomic and Demographic Factors”

This project involved searching the existing transportation research literature to find useful information about traffic crashes and fatalities, as well as supportive data on factors that are expected to be related to recent safety trends (e.g., travel patterns, economic factors, demographic characteristics, etc.). Ultimately, this analysis aims to examine how demographic and socioeconomic characteristics relate to traffic safety as determined by an analysis of annual statewide traffic fatalities. Given the plethora of important factors that are expected to influence traffic crashes and resultant injuries/fatalities, this comprehensive study includes a multivariate analysis of population factors.

Gaia Klotz

Faculty mentor: **Dr. Kelly M. Young**

“Perceptions of Gender’s Influence in Chinese Senior Secondary Education”

This qualitative investigation seeks to understand Chinese perceptions of gender in Chinese high school or senior secondary education. In order to conduct a series of three hour-long interviews, the primary investigator, Gaia Klotz, traveled to China with the Wayne State University Confucius Institute from July 1 to July 29. Intensive cross-cultural training, basic language training, and a week of fieldwork of ancient Chinese civilizations and modern Chinese history helped develop the cultural relativism necessary to conduct successful interviews. Data was amassed from interviews transcribed by hand and relevant research articles. This is the first undergraduate research project the PI has had the opportunity to participate in.

Sanjana Kulkarni

Faculty mentor: **Dr. Bhanu Jena**

“Glucose-Stimulated Insulin Secretion in Cells Reconstituted With the Insulin-Secreting Porosome Complex”

The Porosome structure is known to help with transient intravesicular secretion in cells. Therefore, the porosome is involved in many vital regulatory processes in our body such as insulin secretion, neurotransmitter release ect. Throughout the years, many studies have been conducted to determine the composition and the role of other proteins on the Porosome structure. Now, the reconstitution of the porosome structure in live MIN-6 is being studied. Ultimately, we will be able to determine the potency and efficiency of the porosome structure after being reconstituted into MIN-6 cells. This can further help us understand the functional role of the porosome structure. In addition, it would help us gain more knowledge on diseases associated with cell secretion.

Han Soul Lee

Faculty mentor: **Dr. David Cinabro**

“Guide, Focus and Alignment System for DESI”

The conducted research was for calibration of the Dark Energy Spectroscopic Instrument. The instrument will be mounted on the Mayall Telescope in Kitt Peak Observatory.

Alexandra Lemieux

Faculty mentor: **Dr. Judy Westrick**

“Investigation of the Occurrence of Cyanotoxins in Source Water From Drinking Water Plants Across the United States”

Cyanobacteria are microscopic organisms that live in aquatic environments and sometimes produce harmful metabolites, known as cyanotoxins. They can be detrimental to human life, as seen in the recent cyanobacterial bloom that caused many in Ohio and Southeast Michigan to lose ready access to drinkable water. My research project focused on perfecting a method that would allow us to analyze water samples for cyanotoxins, and analyzing water samples from source waters across the United States.

Veronica Lewalski

Faculty mentor: **Dr. Jeremy Kodanko**

“Synthesis of TQA(NO2)3 Caging Ligand and Ruthenium Caging Complex for the Light Activation of Enzyme Inhibitors”

Metal caging complexes are growing in popularity in their use as potential anticancer treatments with their ability to render bioactive chemicals inert until activated with light. The organic molecules, ligands, attached to these complexes determine at what wavelength of light they are activated. My project focuses on the development of a modified version of a known ligand that should shift the activation of Ruthenium-centered complexes out of the ultraviolet light region into the visible light region.

Tayson Lin

Faculty mentor: **Dr. Lawrence Lum**

“Immunohistochemistry of Breast Cancer Microenvironment Immunology as a Prognostic Tool”

The immune system plays a critical role in cancer protection. However, tumors still develop despite the body’s defenses. Recent research has suggested that the tumor microenvironment facilitates cancer progression through suppressing anti-tumor immune response. Here, we examined the immunology behind the tumor microenvironment of breast cancer as a prognostic tool. Tissue sections from breast cancer biopsies, along with auxiliary lymph nodes, were stained for cancer-infiltrating lymphocytes as well as IFN-g and IL-10, which can stimulate or suppress anti-tumor immune mechanisms, respectively. The objective is to determine if there is a measurable immune response in the tumors and lymph nodes of patients with lymph node positive or negative breast cancer. This information is then used to predict patient prognosis by comparing T cell infiltration and activation.

Genan Ling

Faculty mentor: **Dr. Marcis Jansons**

“Validation of Soot Emissivity Models in Flames”

Combustion devices are one of the most widely used ways to produce power for everyday transportation and industrial applications. Current combustion devices, including internal combustion engines and external combustion devices, need to be optimized for more efficiency and less emissions, and are regulated by the U.S. Environmental Protection Agency. This project is validating soot emissivity models by measuring the temperature field over a standardized flat-flame burner using the classic two-color method.

Renee Ludlam

Faculty mentor: **Dr. Edward Cackett**

“Reapproaching the Spin Estimate GX 339-4”

We systematically reanalyze two previous observations of the stellar mass black hole within GX 339-4 in the very high and intermediate state. We utilize the recently developed model for X-ray reflection and relativistic ray tracing to properly fit the disk’s reflection spectrum. We find GX 339-4 to be consistent with a near maximally spinning black hole with a spin parameter that is greater than 0.91. Constraining the spin of black holes has consequences on other areas of research in astronomy and physics. It offers insight into the mechanisms for jet production and the intrinsic properties of supernovae and/or gamma-ray bursts that created the black hole. The extreme warping of space near a spinning black hole itself provides an environment to test theories of general relativity.

Mia Ma

Faculty mentor: **Dr. Nitin Chouthai**

“Early Caffeine Therapy is Not Associated with Mortality Within 48 Hours of Life in Very-Low-Birth-Weight Newborns”

The objective of this study was to describe the caffeine usage in very-low-birth-weight (VLBW) newborns that did not survive. 145 VLBW newborns were divided into three groups based on timing of caffeine therapy. Early caffeine therapy was within first 48 hours of life. Late caffeine therapy was after 48 hours of life. No caffeine group did not receive any caffeine. Higher of percentage of newborns in no caffeine group [n (%)] [86 (69.9)] died within first 48 hours of life as compared to early group [7 (46.7)], while none of the newborns in the Late group (p<0.0001). In conclusion, early caffeine therapy is not associated with a higher percentage of deaths in VLBW newborns within 48 hours of life.

Ahila Manivannan

Faculty mentor: **Dr. Jian-Ping Jin**

“Combined Technological Improvements for High-Efficiency Genotyping of Genetically Modified Mice”

Although PCR (polymerase chain reaction) is a mature technology, methodological improvements can be made to significantly increase the effectiveness of PCR in the genotyping of genetically modified mice, a time- and material-consuming procedure, especially when being carried out in large scales. The contents of my research training are demonstrations of a combination of advanced molecular biological techniques to facilitate large-scale mouse genotyping applicable in a standard research laboratory. The methodology modifications discussed in my proposal have significant advantages in raising work efficiency and the reliability of results, as well as lowering the cost. My proposed research training will take place in Dr. J.P. Jin’s laboratory at Wayne State University’s School of Medicine, where I am gaining hands-on laboratory experiences.

Harjot Mann

Faculty mentor: **Dr. Christine S. Chow**

“Studies on Reaction Mechanism and Product Characterization of Oplatin and Cytidine”

Cisplatin and its derivatives form inter-strand and intra-strand adducts with DNA and is believed to contribute to the anti-cancer activity of the compounds. Adenosine and guanosine are shown to be the preferred targets for platination, but adducts with pyrimidines were also observed. To explore the reaction mechanism between cisplatin derivatives and pyrimidines, we investigated the reaction between platinum ornithine (Oplatin), a derivative of cisplatin, and cytidine by nuclear magnetic resonance and high performance liquid chromatography. The reaction kinetics were monitored by NMR and the products were purified and characterized with HPLC and mass spectrometry.

Aniruddh Mannari

Faculty mentor: **Dr. Howard Matthew**

“Potential for Enhanced Differentiation of Bone Marrow Mesenchymal Stem Cells via Controlled Release of Rh-BMP2 from Heparin-Modified Collagen Microspheres In Vitro”

Bone defects and injuries affect nearly 500,000 patients annually in the United States. The traditional “gold standard” approach of bone grafts (replacements bone tissue), although effective, presents many undesirable effects including chronic pain and low graft availability in the body. This presents the tissue engineering discipline with an exciting opportunity to design regenerative models of bone repair. This study investigates the ability and efficacy of collagen microspheres to deliver BMP2 (a growth factor protein) to bone stem cells, while maintaining tissue integrity and allowing for controlled release. Through modification, these microcarriers can also demonstrate enhanced drug delivery in a variety of biomedical applications.

Shobi Mathew

Faculty mentor: **Dr. Brian J. O’Neil**

“Comparison of Quantitative EEG With Current Clinical Decision Rules for Head CT Utilization in Acute Mild Traumatic Brain Injury in the Emergency Department”

We compared the performance of a hand-held Quantitative Electroencephalogram (QEEG) acquisition device to New Orleans Criteria (NOC), Canadian CT Head Rule (CCHR) and National Emergency X-Radiography Utilization Study II (NEXUS II) Rule in predicting intracranial lesions on Head CT in acute mild TBI in the ED. Adult patients who presented to the ED with acute blunt head trauma were enrolled in this study. QEEG discriminant score of > 31 was found to be a good cut-off (AUC=0.84, 95% CI 0.76-0.93) to classify patients with positive head CT. At a sensitivity of greater than 90 percent, QEEG discriminant score had better specificity than NOC and NEXUS II. Only CCHR had better specificity than QEEG discriminant score but at the cost of low (<50%) sensitivity.

Tyler May

Faculty mentor: **Dr. Louis J. Romano**

“Errors in Single Nucleotide Incorporations Using a Y-Family DNA Polymerase”

After DNA replication has been initiated, DNA polymerases will bind and incorporate new nucleotides across from the templating strand. Multiple DNA polymerases can be used to replicate DNA sequences, but there are important differences between them. For instance, higher fidelity polymerases can replicate a relatively large number of bases in a single binding event, making very few replication errors. Y-family polymerases have the ability to bypass DNA damage sites. Because these enzymes have a less constrained active site they are much more prone to making replication errors. The experiments described in this report were performed with a Y-family polymerase, DNA polymerase IV (Dpo4) isolated from the thermophilic bacteria *Sulfolobus solfataricus*.

Samia Mazumder

Faculty mentor: **Dr. Bonnie Sloane**

“3D In Vitro Evaluation of BPD as a Treatment for Breast Cancer Cells”

Breast cancer is one of the most common and lethal cancers among American women, second only to lung cancer. Inflammatory breast cancer (IBC) is the most aggressive form of breast cancer, with a five-year survival rate of only 34 percent. The conventional methods of treatment, including surgery, radiation therapy or chemotherapy, are not highly effective due to the complex structures IBC makes in the human body. Photodynamic Therapy (PDT) is an alternative treatment that can be used to treat cancer cells. This study examines the efficiency of BPD, a PDT drug, on IBC cells grown in 3D culture and evaluates the advantages of BPD over other, commonly used PDT drugs.

Rebecca Meerschaert

Faculty mentor: **Dr. Christopher V. Kelly**

“Novel Experimental Methods to Resolve Nanoscale Membrane Organization and Curvature”

The structures and functions of cell membranes are regulated by their diverse compositions, distinctive intermolecular interactions and dynamic organization. The complexity of membrane organization leads to their higher-level functions. Hypotheses concerning the redistribution of membrane components in response to curvature are unanswered due to the limitations of current optical imaging techniques. We aim to resolve this curvature and the redistribution by inducing curvature on vesicles and through novel microscopy methods. When a vesicle is pressed against a curved surface, distinctive components respond differently to curvature. Having the capability to resolve these previously irresolvable details allows us to better understand membrane dynamics and molecular sorting, in addition to exploring vital biological and disease related processes that are sensitive to membrane curvature.

Devin Mills

Faculty mentor: **Dr. Matthew Allen**

“Physical Variation in Lanthanide-Containing N-[1-(2, 3-dioleoyloxy)propyl]-N,N,N-Trimethylammonium Chloride Complexes Across the Series and Their Impact on Chemical Exchange Saturation Transfer”

Magnetic Resonance Imaging using specialized contrast agents has been an expanding field in recent years, as higher strength magnets are becoming more readily available. The contrast agent I am synthesizing is to provide contrast enhancement that will help to identify the specific chemicals that are perfusing the tissues being studied. The ability to determine the reduction status of tissue may help us devise more specialized treatment.

Mukund Mohan

Faculty mentor: **Dr. Brian J. O’Neil**

“Physician Perception in Predicting Good Neurological Outcomes in Patients Resuscitated from Cardiac Arrest”

Optimizing outcomes in cardiac arrest patients remains one of the principal goals at the forefront of emergency medicine (EM). Currently, EM physicians make decisions regarding care of these patients using unstandardized bedside perception. This study looks at whether this unstructured perception can be a reliable ultra-early predictor of neurological outcomes in patients resuscitated from cardiac arrest. Subjects included were non-traumatic cardiac arrest patients who were successfully resuscitated. The EM physician managing the patient’s care rated their probability of leaving the hospital in good neurological condition from 0-100. Good neurological outcome was a Cerebral Performance Category score of 1 or 2 at discharge, and linear regression modeling analyzed the results. The results showed that EM physician perception is indeed a reliable ultra-early predictor of neurological outcomes.

Erica Montgomery

Faculty mentor: **Dr. Steven Ondersma**

“Optimizing Computer-Delivered Brief Interventions for Alcohol Use Among University Students”

Brief motivational interventions for alcohol use have demonstrated efficacy in multiple studies, but several recent studies have been negative. Thus, it’s important to examine brief intervention components to optimize efficacy and examine differences in intervention content as a possible factor of above-noted inconsistency. The FOTI (Factorial Optimization for Technology Interventions) study uses a factorial design, testing most efficacious intervention components, using Multiphase Optimization Strategy (MOST) to identify key active component combinations within the computer-delivered brief alcohol intervention for university students. This study randomly assigns participants to different groups including empathy (yes/no) and talking narrator (yes/no), evaluating which elements or combinations are most associated with motivation change. Results are expected to determine which factors influence participant motivation and readiness to decrease drinking most.

Michael Moore

Faculty mentor: **Dr. Song Jiang**

“A Three-Dimensional Approach to Cache Replacment”

This study will look to improve performance time of computer systems by reducing the time it takes to retrieve certain types of data. Specifically, data that is hard to reproduce, frequently accessed and/or small in size should be stored in a location that can be accessed almost instantaneously. Since this location will have a finite size, research must be done to determine the most optimal data to keep in this location, improving overall computing performance as a result.

Zeinab Moussa

Faculty mentor: **Dr. Carolyn Joy Dayton**

“Behavioral Reactions of Detroit Mothers and Fathers Participating in the Baby Cry Protocol: Preliminary Findings”

In early infancy, parents spend a great deal of time soothing and calming their infant to help them maintain, or return to, a regulated biobehavioral state. This process is crucial due to the significant developmental need for entraining the infant’s capacity for self-regulation. Using an innovative protocol, the “Baby Cry Protocol” (BCP), parents expecting a baby (third trimester) were observed independently interacting with a crying life-like baby doll and their soothing behaviors were recorded. Preliminary examination of the behavioral data suggests that there may be both similarities and differences in the way in which mothers and fathers approach soothing a crying infant.

Maricruz Moya

Faculty mentor: **Dr. Carmen Giurgescu**

“Relationship between Psychological Distress and Inflammation in Pregnant African American Women”

African American women are more likely to have preterm birth compared with white women. Preterm birth is a major risk for neonatal mortality and child health problems, including developmental delays and chronic illness. Psychological distress may increase systemic inflammation and, ultimately, risk for preterm birth. The purpose of this study was to examine the relationships among psychological distress, inflammation and gestational age at birth in a sample of 114 pregnant African American women. Higher levels of psychological distress were related to higher levels of pro-inflammatory cytokines of IL-6 and IL-8. Knowledge of the social context of African American women’s lives will generate new perspectives for future research and contribute to the development of interventions to improve birth outcomes.

Kenneth Nash

Faculty mentor: **Dr. Mark Baskaran**

“Sorption Characteristics of Radium Isotopes (224Ra, 226Ra, 228Ra) In a Freshwater System: Implications to Groundwater-Surface Water Exchange Studies”

Radium isotopes are extensively utilized as tracers to determine nutrient fluctuation in groundwater-surface water exchange in saltwater systems; however, few studies have been carried out in freshwater systems utilizing radium. In order to fill this knowledge gap, lake sediments were subjected to two different experiments. One experiment takes the lake sediments and adds a known amount of excess radium (224Ra, 226Ra, 228Ra) and mixed within an amount of water at 0 to 35 parts per thousand salinity. The other method mixes lake sediments in various saline water without addition of (224Ra, 226Ra, 228Ra). The solids and solutions of both experiments were separated and analyzed using radioactive counting techniques to assess if radium remains in the solution phase or solid phase at varying salinity.

Rohan Patel

Faculty mentor: **Dr. Carolyn Dayton**

“Understanding the Intergenerational Transmission of Music in a Sample of Detroit Families”

Music can have powerful effects in the everyday lives of people. Understanding the process of transmission of music across generations may help in understanding elements of the family, such as a parent’s engagement and involvement with music, expectations of their child’s music engagement, association with family activities, and preference of using music with their child. Little is known about the ways in which parents make decisions about how to use music and what music to use with their infants and young children. Therefore, the study investigates the ways in which a group of expectant parents in Detroit makes these musical preference decisions. This study sheds light on how the intergenerational transmission of music may have an effect on the well-being of the entire family.

Vincent Perrone

Faculty mentor: **Dr. Caroline Maun**

“A Poetic Investigation of the Modernists in Paris”

“A Poetic Investigation of the Modernists in Paris” involved reaching an understanding of modernist authors such as Pound, Eliot and Hemingway through their biography, creative work, and the experience of seeing and visiting the Paris that they called their home. The research culminates in a collections of poems that are both reflective and reflexive in content and process.

Damaris Pop

Faculty mentor: **Dr. Shane Perrine**

“Changes in Brain Norepinephrine and Serotonin Levels in an Animal Model of Posttraumatic Stress Disorder”

Posttraumatic Stress Disorder (PTSD) is a debilitating psychiatric disorder that occurs in an individual who has experienced a traumatic event, and continues to experience the heightened emotions in the absence of the stimulus. Although preclinical and clinical research studies have implicated neurochemical changes in certain brain regions affected by PTSD, these changes are not fully understood. This study used single prolonged stress (SPS), an animal model of PTSD, to study the neurochemical levels changes that occur in brain regions involved in regulating emotional states in response to environmental stimuli.

David Prince

Faculty mentor: **Dr. Andrew Newman**

“Freemasonry and Urban Resilience in Detroit”

This research explores the role that the 300-year-old Freemasonic fraternity plays in the urban environment of Detroit. The presence and public knowledge of Freemasonry is often shrouded in misunderstanding and this research aims to demystify Freemasonry and present Detroit Freemasonry as a previously unknown influence in the lives of not only those that belong to the order, but in the lives of the citizens of Detroit. This research studies 15 Freemasons from three different affiliated Freemasonic bodies. Interviews were conducted with them to construct a broader understanding of what influence Freemasonry has in the members’ lives and communities, as well as discover what the members and their lodges do to address urban issues that Detroit faces.

Alexandra Ranski

Faculty mentor: **Dr. Ryan Thummel**

“Characterization of the Müller Glial Response During Adult Retinal Regeneration”

We use zebrafish to study human diseases that result in loss of vision. The zebrafish retina is similar to the human retina, yet zebrafish maintain a remarkable ability to regenerate their retina following damage. This is accomplished by resident stem cells, the Müller glia. Human retinas also possess Müller glia. However, following retinal damage, these cells fail to act as stem cells and instead exhibit a gliotic, scar-like response. The conventional view is that zebrafish Müller glia do not exhibit a gliotic response, but here we provide evidence that they have the potential to become gliotic and act as stem cells. We are ultimately interested in revealing what regulates the switch between these two fates in order to induce regeneration response in human retinas.

Samantha Russell

Faculty mentor: **Dr. John Richardson**

“Neo-plastic: The Re-envisioning of Materials Past”

My project is a sculptural exploration of silk and resin that will be displayed in a fine art fashion at the McGregor Memorial Conference Center. I will answer questions personally as the present themselves.

Priya Sam

Faculty mentor: **Dr. Noa Ofen**

“Age-Related Differences in Free Recall and Mnemonic Strategy Use”

Memory is important in everyday activities, such as recalling a grocery list. Recall can benefit from a mnemonic strategy such as grouping similar items together. While both mnemonic strategy use and recall increase with age, it is unclear how they interact across development and whether children and adults similarly benefit from mnemonic strategy use. This study looked at age-related differences in recall and mnemonic strategy use. Participants (N=105, ages 5-25) studied a list of words from three semantic categories, repeated five times with a recall phase after each repetition. Semantic strategy use and recall were correlated and improved with age. Moreover, semantic strategy use mediated age-related increase in recall, but children benefit from increased strategy use through repetition similarly to adults.

Madhumeeta Sanam

Faculty mentor: **Dr. Sandeep Mittal**

“Determination of Ideal Meningioma Cell Lines for Invasion/Migration Studies”

Meningiomas are the most common primary brain tumors and are categorized into three main categories: grade I, grade II and grade III. A strong relationship is beginning to emerge between cancers and microRNAs. MicroRNAs are small, noncoding RNA molecules, involved in post-transcriptional gene regulation. In this study, we examined the role of a couple of microRNAs on multiple meningiomas. We selected miR-155 and miR-221 because of their documented behavior in other cancers. Our results showcase grade 2 and 3 meningiomas, producing significant differential expression for further invasion/migration studies. The microRNAs studied suggest the immunosuppressive nature of these high-grade meningiomas. Through this project, we laid down a foundation for meningioma microRNA research and obtained the most suitable meningioma samples for future studies.

Alisha Punjabi

Faculty mentor: **Dr. Sandro da Rocha**

“Targeting Polymeric Nanocarriers: A Therapeutic Approach for Prostate Cancer Bone Metastasis”

Prostate cancer, characterized by high incidence of metastasis to bone and lymph nodes, is not yet curable in patients with metastatic disease. Due to specific targeting and delivery, nanomaterials can be used as a therapeutic. This study uses nano materials to improve the efficiency of anticancer drug delivery by increasing bone-targeting — including synthesis of the nanocarrier, and in vitro and in vivo bone binding assays. The targeting potential of the nanocarrier can be a candidate delivery system of anticancer therapeutics against bone metastasis from prostate cancer.

Archanna Radakrishnan

Faculty mentor: **Dr. Lori Pile**

“Investigating the Role of SIN3 in Tolerance to Acute Oxidative Stress”

To understand development and aging during adulthood, it is important to study genes related to stress resistance. One particular gene of great importance is SIN3. Although it has been shown that SIN3 is essential for mitochondrial activity, which includes tolerance to oxidative stress, little is known about the role of SIN3 during adulthood, where a majority of cell development has taken place. In this study, the fruit fly, *drosophila melanogaster*, was used to understand the biology of genes that influence the aging process and aging related diseases in humans. By knocking down SIN3 and studying its effect, we were able to show that SIN3 is very important for the maintenance of a healthy adulthood as well as the aging process.

Tahsin Rahman

Faculty mentor: **Dr. Phillip Levy and Dr. Aaron Brody**

“Safety and Efficacy of Emergency Department Antihypertensive Prescription”

The study explores the effects of starting antihypertensive therapy for at-risk patients that present in the emergency department (ED) with elevated blood pressure readings. The goal was to set standards for the ED in treating hypertensive patients by taking a retrospective look at two studies. The data suggested that antihypertensive therapy is both safe and effaceable to start in the ED.

Amulya Rajagopal

Faculty mentor: **Dr. Bhanu Jena**

“Proteome of the Insulin-Secreting Min6 Cell Porosome Complex: Involvement of Hsp90 in its Assembly and Function”

Secretion is a cellular process that occurs in all organisms. Following a meal, secretion of digestive enzymes from the pancreas helps digest food. Consequent elevation of blood glucose following digestion triggers secretion of insulin from β -cells of the endocrine pancreas. While secretion may occur by the complete collapse of secretory vesicles at the cell plasma membrane, the release of portions of the contents from within secretory vesicles requires an alternate mechanism of precisely regulated transient vesicle docking, fusion and fractional release via supramolecular secretory portals at the cell plasma membrane called porosomes. In the present study, the proteome of the porosome in mouse insulinoma Min6 cells was determined and results suggest the involvement of Hsp90 in the assembly and function of the Min6 porosome complex.

Marcela Sanchez

Faculty mentor: **Dr. Jeremy Rickli**

“Comparing the Trade-Offs Between Disassembly Sequencing and Buy-Back Incentives for High and Low Value End-of-Life Products”

The remanufacturing process disassembles items and recovers, repairs or replaces components of that item; then uses the components to manufacture new items. A huge problem with remanufacturing is the uncertainty around the buy-back quality and quantity. To help solve this problem, the student modified a genetic algorithm that simulated the disassembly process for remanufactured items. The modifications investigated the tradeoffs between an item’s disassembly sequence and its consumer acquisition incentive. It also established a low-value item and high-value item. The results and impact of this research helped identify where the critical areas are in disassembly.

Aryana Sharrak

Faculty mentor: **Dr. Jeremy Kodanko**

“Mechanism for Inhibiting Pain Pathways with Leu-Enkephalin via Ruthenium Caging Complexes and Release with Visible Light”

Aryana Sharrak’s project consists of the synthesis and characterization of various neuropeptides, such as Leu-Enkephalin, that bind to the opioid receptor in the brain. Photoliable compounds are used to cage the neuropeptides in order to render them inert. Previous studies show that irradiation of photoliable compounds with ultraviolet (UV) light release neuropeptides. However, UV light does not allow researchers to release neuropeptides in the brain in vivo because UV light is harmful to viable tissue. Aryana’s project focuses on using photoliable compounds that will allow successful caging and release of neuropeptides upon irradiation with light at a higher wavelength in the visible spectrum, rather than with UV light. Further development of caging methods, as in this project, is needed for studying neuropeptides in the future.

Christian Shaum

Faculty mentor: **Dr. Jon Anderson**

“New Music — When Opera and Slam Poetry Meet”

The first goal of this project is to create a new form of opera, in which spoken-word slam poetry and modern opera singing merge into one cohesive musical composition. The composition will involve the commissioning of a new opera libretto that will be used as the basis for the musical composition incorporating modern compositional techniques, spoken-word prose poetry and modern opera singing, altogether building an entirely new operatic style. The proposed project will exclusively use student musicians from Wayne State University’s Department of Music and will be performed in the fall semester of 2014. This project develops an opera in one act, around 45 minutes in length, set to a libretto that will be commissioned from fellow Wayne State student author Katherine Faddol.

Jason Shepherd

Faculty mentor: **Dr. Ece Yaprak**

“Vehicle-to-Vehicle Communications: A Software Approach to Develop Cluster-Based DSRC Safety”

In this project, we take a look into the research that some industry professionals have and are currently conducting on the scope of vehicle-to-vehicle communications. Also discussed is the relevancy of their work to this experiment, by combining elements of their work to use as a basis for this experiment. We attempt to design a new protocol using a software-based approach.

Atika Singh

Faculty mentor: **Dr. Claire Pearson**

“Prescription Patterns of Analgesics in Mild Traumatic Brain Injury in the Emergency Department”

Over 85 percent of the 1.5 million traumatic brain injuries that occur in the United States annually are considered mild. Emergency department (ED) physicians often do not treat headache after a mild traumatic brain injury (mTBI) because of the fear that analgesics can mask the symptoms of rising intracranial pressure or bleeding. The objective of this study is to evaluate the analgesic prescribing patterns of ED physicians in isolated mTBI. 295 adult patients with isolated mTBI and complaints of pain were enrolled at two urban EDs. A significant number of patients (41.6%) did not receive any analgesia. Opiate prescription rate in mild isolated TBI in our departments (33.8%) is significantly higher than the national average (<5%).

Jaipal Singh

Faculty mentor: **Dr. Joshua James Reineke**

“Desmoplastic Pancreatic Cancer Model for Novel Therapeutic Screening and Translation”

Fabrication of pancreatic cells as 3D spheroids with desmoplastic characteristics to create a more biologically relevant and efficient approach for testing the efficacy of various anti-fibrotic agents in disrupting desmoplastic properties to enhance nanoparticle transit.

Gergana Sivrieva

Faculty mentor: **Dr. Sharon F. Lean**

“The Institutionalization of Right-to-Information Laws”

Although Right-to-Information (RTI) laws have existed for nearly 250 years, state efforts to institutionalize transparency have evolved considerably over the past few decades with the emergence of new democracies. This research explores the key dimensions that have a bearing on the effectiveness of RTI legislation. The existence of RTI laws does not necessarily guarantee a more transparent government; rather, effectiveness depends on oversight and capacity building mechanisms. In order to establish the factors that facilitate institutionalization, a comparison between RTI legislation in Mexico and Bulgaria is useful. Mexico and Bulgaria are relatively new cases of countries that have adopted a national RTI law; yet the success of implementation varies between the two, allowing for inquiries to be made regarding the cause of discrepancy.

Michael Sobolic

Faculty mentor: **Dr. Lori Pile**

“SIN3 220 Degradation: HA Tag and TAP Tag Cloning”

The human body is made up trillions of living units called cells. Each cell has a nucleus, which contains DNA, the carrier of genetic information. DNA is wound around proteins called histones, which are regulated by other proteins like SIN3. SIN3 keeps DNA wound around histones, such that genes along that region of DNA cannot be expressed. Loss of regulation of SIN3 is associated with several cancers, so we would like to understand how this protein is regulated. It was found that when the amount of one form of SIN3 is increased in the cell, the amount of another form decreases, indicating regulation. To study this interaction, we created several SIN3 constructs with identifying “tags” of various types at different locations to monitor protein degradation.

Preethi Sriranga

Faculty mentor: **Dr. Prahlad Parajuli**

“Effect of Inflammatory Cytokines on the Growth and Stem Cell Properties of Primary Gliomas”

Glioma stem cells play a role in the progression of gliomas, cancers that originate from glial cells in the brain/spine. Our investigation studies the role that inflammatory cytokines (specifically IL-17 and IL-6) play on the growth and development of glioma stem cells. We hypothesized that IL-17 receptor was co-expressed with stem cell markers on glioma cells, and therefore was influential in tumor growth. We found that the IL-17 to IL-17R interaction is important for the release of other relevant cytokines by glioma stem cells, and that this interaction works via several cell signaling pathways, such as the STAT-3 pathway. From this study, we can better understand the role of the immune system in tumor progression.

Ellen Strawsine

Faculty mentor: **Dr. Parastoo Hashemi**

“Probing Neurochemical Effects of High Frequency-Deep Brain Stimulation on Serotonin in the Dorsal Raphe”

This study was completed to understand the effects and mechanism of a medical procedure performed on patients with depression. In order to mimic this procedure, stimulation was applied to the same region of the brain as is applied to humans. Resulting serotonin concentration was then measured in a region that is home to a majority of serotonin cell bodies. As a result of this treatment, serotonin was cleared from the brain at a faster rate and back into storage.

Mrunalini Tankasala

Faculty mentor: **Dr. David Merolla**

“Evaluation of Peer Mentor Educational Programs For Transplant Patients In Hospital Setting: Transplant Living Community (TLC) at Henry Ford Hospital”

Organ transplant is a common surgical process for patients with chronic diseases. Patients who have been through organ transplant have to learn to live a new normal life adhering to specific after-care regimen. While the organ transplant care team at the hospital is able to help patients understand the medical aspect of transplant life, they are not able to provide information on lifestyle beyond the hospital. One such program that addresses transplant lifestyle is the Transplant Living Community (TLC) affiliated with Henry Ford Hospital, which is created by patients for patients. This research evaluates the TLC program to determine the level of patient satisfaction among TLC program participants and whether there are any differences on the level of satisfaction based on demographic factors.

Bhavana Tetali

Faculty mentor: **Dr. Rod D. Braun**

“Determination of Tumor Manganese Content Using a Ratiometric and Colorimetric Method”

Calcium channels play a key role in the progression of many types of cancer, making these channels potential therapeutic targets. Mn2+ is a surrogate for Ca2+ and enters cells via many of the same pathways. We are currently investigating the use of Mn2+ uptake in tumor cells as a biomarker of the presence of Ca2+ channels. Since Mn2+ is paramagnetic, its presence can be detected in vivo following MnCl2 injection using a technique called manganese-enhanced magnetic resonance imaging (MEMRI). To correlate MEMRI signals with actual Mn2+ content, we need an assay to quantify Mn2+ concentration in tumors. The purpose of this project is to develop a ratiometric and colorimetric method using standard laboratory equipment for detecting Mn2+ levels in tumor tissue samples using absorption spectrophotometry.

Garrett VanHecke

Faculty mentor: **Dr. Young-Hoon Ahn**

“Synthesis of Clickable Glutathione”

All cells must regulate the various processes occurring within them, and when these processes become unregulated anything from diseases such as cancer or death may take hold. Cells regulate their processes by signaling certain functions to stop, start, accelerate or slow down. Some of these signaling pathways have been extensively studied and others have not. Redox signaling has recently been recognized as an important signaling pathway, although there is still a need for approaches which will allow for elucidation of proteins involved in this pathway. This project aims to provide an approach to study this signaling pathway.

Kaushik Varadarajan

Faculty mentor: **Dr. Sandeep Mittal**

“Tryptophan Metabolic Enzymes in Meningiomas and Gliomas”

Investigated the expression of tryptophan metabolic enzymes in different grades of brain cancer. Examined tissue-level expression to determine appropriate treatment targets.

Gautham Vellaichamy

Faculty mentor: **Dr. Qing-Sheng Mi**

“STZ Induced Diabetes in Mice With Loss of MicroRNA”

Type I diabetes is an autoimmune disease characterized by lack of efficient glucose uptake. Recent studies have linked miRNAs, short-noncoding RNA sequences with post-transcriptional functions, with the regulation of immunological pathways. We developed a method to determine the regulatory role of two miRNAs in question, miR-146a and the miR-17-92 cluster, in the onset and progression of Type I diabetes. Using Multiple Low Dose Streptozotocin (MLDS), we induced diabetes in all mice and observe the results. Our analysis reveals little to no significance in the results for miR-17-92. However, our data indicates a slightly accelerated rate of diabetes incidence in mice with miR-146a ablated, suggesting a possible regulatory function of the RNA sequence in beta cell apoptosis.

Nathan Vengalil

Faculty mentor: **Dr. Derek Wildman**

“Sequencing Lactate Dehydrogenase A (LDHA) and Analyzing its Adaptive Evolution Among Primates”

We looked to compare the evolution of the sequence of Lactate Dehydrogenase A (LDHA) gene in hibernating and non-hibernating primates.

Jasmine Vickery

Faculty mentor: **Dr. Robert Akins**

“Investigation of Mechanisms of Antifungal Resistance in Candida Albicans”

Pathogenic fungi are the cause of many life-threatening infections. The resistance of these fungi to antifungal drugs is becoming a major problem in the management of several diseases. By up-regulating genes of C. albicans, we observed changes in its resistance to many antifungal drugs. A fragment of DNA that caused this antifungal resistance was copied and inserted into C. albicans cells. The cell then selected for a terminal deletion in the amino acid sequence, which caused a different resistance profile. By reinserting the same gene at a high copy number, we can compare the original C. albicans with the deletion to the new C. albicans cells and make conclusions about each resistance profile and the cause of deletion.

Kashmira Wani

Faculty mentor: **Dr. Nitin Chouthai**

“Effects of Recreational Substances and Prescription Medications on the Caloric Content and Fat Levels in Human Breast Milk”

There are many factors that affect the content of human breast milk, including stress, dietary habits, medication and recreational substances. Over a six-month period, mothers were consented to provide breast milk and were given a questionnaire that allowed us to collect information on her medications and substance use during pregnancy. Results showed the average calories/oz. was significantly lower in the breast milk from mothers who had consumed alcohol during pregnancy than from mothers who did not consume alcohol. Other parameters tested included mothers who had taken prenatal vitamins, other medications and no medications during pregnancy, but results were not statistically significant. This study forms preliminary data for a larger study exploring effects of recreational drugs on cytokine levels and caloric content of human breast milk.

Alyssa Wilkins

Faculty mentor: **Dr. Sorin Draghici**

"Comparison of R Implemented Topology-based Pathway Analysis Tools using Target Pathways"

Seven pathway analysis methods were compared with 24 data sets to evaluate how well each ranked the target pathway by p-value and ranking. Evaluating these methods was to start the step of evaluating how efficient each method was. This is a crucial step to have a benchmark to really test efficiency. The methods were evaluated and the results indicated that there was a lot of variance between the methods and there is room for improvement for pathway analysis.

Camille Williams

Faculty mentor: **Dr. Mark Cheng**

"Enhancing Liquid Lens Using Electrowetting and Graphene Material"

Liquid lens uses two properties of liquids within a confined space to provide magnification. This device became important for new technology such as cell phone cameras, and other small digital cameras. Liquid lenses make digital cameras appear crystal clear. In order to create a functional liquid lens, the two properties of liquids cannot mix upon introduction. This research focuses on how to change the variable focus length of the contact angle of a liquid lens. This would open new doors for liquid lenses. If the focus length of the contact angle changes, liquid lenses could maybe be used for laptop webcams.

Jacob Wilson

Faculty mentor: **Dr. Talia Weltman-Cisneros**

"Investigating Social and Cultural Frameworks that Contribute to Educational Barriers for Chinese Students with Disabilities"

Research has shown a lack of opportunity for Chinese students with disabilities to access education. This study aims to discover what social and cultural frameworks lead to this gap in education and success. Specifically, the study attempts to find a better understanding of Chinese cultural viewpoints of disabilities, and how they influence the opportunities available in life for disabled students in China. Over the past few months, the researcher has conducted on-site interviews with college students in China to gain firsthand knowledge surrounding this issue.

Jolin Yamin

Faculty mentor: **Dr. Mark Lumley**

"Cognitive Behavioral Therapy and Emotional Exposure Therapy for Fibromyalgia: Do They Differ in Their Processes?"

Fibromyalgia is a chronic disorder with physical, psychological, and emotional implications. This study examines two psychobehavioral treatments for fibromyalgia to understand how they differ in their processes and in how therapists and patients experience them.

Jerold Young

Faculty mentor: **Dr. Gil Paz**

"Model Independent Extraction of the Axial Mass Parameter in CCQE Anti Neutrino-Nucleon Scattering"

The study of neutrino oscillations depends on a consistent value for the axial mass. In order to facilitate this, a model-independent extraction of the axial mass parameter from quasielastic (anti)neutrino-nucleon scattering is needed. This poster demonstrates a model-independent description using the z-expansion of the axial form factor. Using this method on the reported mineral oil results from Fermilab's MiniBooNe experiment could lead to a consistent value for the axial mass. This poster also proposes a statistical model to be used to combine cross sections of carbon and hydrogen for future analysis of mineral oil data from MiniBoone.

Ao Yu

Faculty mentor: **Dr. Chin-An Tan**

"An Innovative Exercise Adherence Monitoring (EXAM) Device to Improve Therapeutic Gains in Home Exercise Programs"

We have developed a prototype sensor and software for monitoring physical therapy patients.

NOTES

NOTES

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