University of Missouri
Institute for Clinical and Translational Science

Health Sciences Research Day

Thursday, Nov. 12, 2015
Acuff Gallery
Acuff Auditorium

Sponsored by
MU School of Medicine
MU Sinclair School of Nursing
MU School of Health Professions
Truman Veterans Hospital
MU Institute for Clinical and Translational Science

Supported by
School of Medicine Research Council
Office of Medical Research

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Schedule of Events

9 – 11 a.m.	**Poster Session: Category I**, *Acuff Gallery* Undergraduate, Medical, Nursing and Health Professions Students
11 – 11:40 a.m.	**Student Panel**, *Acuff Auditorium* "Research in Medical School — A Student Perspective"
11 a.m. – noon	**Boxed Lunches** for Participants Attending the Student Panel and Keynote Address, *Acuff Gallery*
Noon – 1 p.m.	**Keynote Address**, *Acuff Auditorium* ***"Theranostic Nanomedicine: We've come a long way baby!"*** Gregory M. Lanza, MD, PhD, FACC, Professor of Medicine, Professor of Medicine, Biomedical Engineering and Biology and Biomedical Sciences, Cardiovascular Division, Washington University School of Medicine, St. Louis
1 – 3 p.m.	**Poster Session: Category II**, *Acuff Gallery*
1:30 – 2:30 p.m.	**Research Opportunities Fair (Speed Dating),** *first Floor, Health Sciences Library*
3 – 4 p.m.	**Break**
4 – 5 p.m.	**Awards Ceremony**, *Acuff Auditorium* **Presentation of Spurgeon Award** James L. Cook, DVM, PhD Interim Senior Associate Dean for Research, School of Medicine **Presentation of Deans' Awards** James L. Cook, DVM, PhD, School of Medicine Judith Miller, PhD, RN, FAAN, Dean, Sinclair School of Nursing Kris Hagglund, PhD, Dean, School of Health Professions **Presentation of Poster Awards** Jerry Parker, PhD, Associate Dean for Research Co-Director, MU Institute for Clinical and Translational Science R. Scott Rector, PhD, Chair, Research Council

Gregory M. Lanza, MD, PhD, FACC

Professor of Medicine, Biomedical Engineering, and Biology and Biomedical Sciences, Cardiovascular Division, Washington University School of Medicine in St. Louis

Gregory M. Lanza, MD, PhD, FACC, is Professor of Medicine and a board-certified cardiologist, with adjunctive appointments in Biomedical Engineering and Biological Sciences. He is the Oliver M. Langenberg Distinguished Professor of the Science and Practice of Medicine.

Dr. Lanza co-directs the Consortium for Translation Research in Advanced Imaging and Nanomedicine (C-TRAIN), a highly interdisciplinary research laboratory with an extensive clinical and preclinical imaging infrastructure as well as full synthetic chemistry, molecular biology, histology/morphology, and radiomedicine, and phage display laboratories occupying about 20,000 square feet at Washington University.

He is a member of the prestigious Siteman Cancer Center at Washington University and an established NIH principal investigator with over 250 peer-reviewed published manuscripts, 27 U.S. patents, and well over 130 invited presentations since the turn of the century.

He attained his PhD from the University of Georgia in 1981 in biochemical poultry genetics and then joined Monsanto Co. in St. Louis as a senior research scientist the same year. Dr. Lanza quickly advanced to Research Manager and was responsible for the biological preclinical program supporting the development a 14-day parenteral, controlled release product, which is marketed today as Posilac ® by Elanco.

Dr. Lanza attended Northwestern University Medical School in Chicago, where he received an MD degree in 1992. As a medical student, he pioneered targeted ultrasound contrast agent development for molecular imaging.

Dr. Lanza came to Washington University/Barnes-Jewish Hospital for internship and residency in Internal Medicine as well as his Cardiology fellowship. He co-invented a perfluorocarbon-based ligand-targeted contrast agent that was sublicensed to Kereos, Inc. As a scientific co-founder and CSO of Kereos, Inc., the team brought two $\alpha_v\beta_3$-targeted MR diagnostic agents to the clinic under US and ex-US INDs for cancer and atherosclerosis applications.

More recent technology development programs include the development of Sn 2 lipase labile prodrugs and lipid nanoparticle drug delivery technologies (previously licensed for clinical development), a nuclear probe effective for occult thrombus detection in ventricular assist devices, and a functional artificial hemoglobin erythrocyte mimic.

Emma Teixeiro, PhD

Assistant Professor, Department of Molecular Microbiology and Immunology, University of Missouri School of Medicine

2015 Dorsett L. Spurgeon, MD
Distinguished Medical Research Award Recipient

Emma Teixeiro, PhD, is an Assistant Professor in the Department of Molecular Microbiology and Immunology at the University of Missouri School of Medicine.

Dr. Teixeiro received her Ph.D. at Universidad Complutense in Madrid, Spain, in 2002. She completed postdoctoral training on immunology, cell signal transduction and T cell differentiation at Fundación Jiménez Díaz de Madrid in Spain and at University Hospital Basel in Switzerland.

Her research focus is on regulation of T cell immune responses against infections and tumors. Dr. Teixeiro and her lab members aim to understand the mechanisms that drive the generation of efficient memory T cells. Their interest is focused on elucidating the T Cell Receptor/antigen-dependent signals that regulate memory T cell development and on studying the role of innate immunity in modulating the quantity and quality of T cell mediated immunity.

As memory T cells are crucial in controlling infections and tumors, the goal is to use this information to improve tumor and vaccine immunotherapies.

Dr. Teixeiro recently received a five-year $1.79 million grant from the National Institute of Allergy and Infectious Diseases at the NIH to study how pathogen-derived antigenic signals govern the generation and function of these memory T cells in the context of infection.

The NIH awarded Dr. Teixeiro's research project based on its "high clinical significance due its involvement in vaccine development and autoimmune disease". Remarkably, Dr. Teixeiro's grant is based on breakthrough data generated by her team of graduate and undergraduate students in the Department of Molecular Microbiology and Immunology.

Dr. Teixeiro is also working in collaboration with Dr. Mark Daniels, PhD at the University of Missouri to apply their group's findings to improve tumor therapies. Her group also collaborates with important immunologists and bacteriologists outside of the University of Missouri. Dr. Teixeiro expects that these shared efforts will soon provide important advances in the field that can aid in the design of better vaccines and improve cancer immunotherapies.

2015 Research Day Poster Judges

Gregory Alexander, PhD, RN, FAAN
Sinclair School of Nursing

Claire Altman, PhD
School of Health Professions

Tina Bloom, PhD, MPH, RN
Sinclair School of Nursing

Hye Jeong Choi, PhD
School of Health Professions

Vicki Conn, PhD, RN, FAAN
Sinclair School of Nursing

Abdallah Dalabih, MD, MBA
School of Medicine
Child Health

Vincent DeMarco, PhD
School of Medicine
Medicine

Tim Domeier, PhD
School of Medicine
Medical Pharmacology and Physiology

Erma Drobnis, PhD
School of Medicine
Obstetrics, Gynecology, and Women's Health

Kevin Everett, MD
School of Medicine
Family and Community Medicine

Vladislav Glinskii, MD
School of Medicine
Pathology and Anatomical Sciences

Christina Goldstein, MD
School of Medicine
Orthopaedic Surgery

Trent Guess, PhD
School of Health Professions

Huatao Guo, PhD
School of Medicine
Molecular Microbiology and Immunology

Bumsuk Hahm, PhD
School of Medicine
Surgery

Alisa Hayes, MD
School of Medicine
Emergency Medicine

Catherine Jones, MD, MS
School of Medicine
Medicine

Julie Kapp, MPH, PhD
School of Medicine
Health Management and Informatics

Kevin Komes, MD
School of Medicine
Physical Medicine and Rehabilitation

George Kracke, PhD
School of Medicine
Anesthesiology

Robin Kruse, PhD, MSPH
School of Medicine
Family and Community Medicine

Mili Kuruvilla-Dugdale, PhD
School of Health Professions

Emily Leary, PhD
School of Medicine
Biostatistics and Research Design

John Lever, PhD
School of Medicine
Radiology

Jeffrey Litt, DO
School of Medicine
Surgery

Thomas Mawhinney, MD
School of Medicine
Biochemistry and Child Health

Terri Monk, MD, MS
School of Medicine
Anesthesiology

Lorraine Phillips, PhD, RN
Sinclair School of Nursing

Mihail Popescu, PhD
School of Medicine
Health Management and Informatics

R. Scott Rector, PhD
School of Medicine
Medicine

Todd Ruppar, PhD, RN, GCNS-BC
Sinclair School of Nursing

Puttur Santhoshkumar, PhD
School of Medicine
Ophthalmology

Laura Schulz, PhD
School of Medicine
Obstetrics, Gynecology, and Women's Health

Hongmin Sun, PhD
School of Medicine
Medicine

Mahesh Thakkar, PhD
School of Medicine
Neurology

Bonnie Wakefield, PhD, RN, FAAN
Sinclair School of Nursing

Karla Washington, PhD, LCSW
School of Medicine
Family and Community Medicine

Iris Zachary, PhD, MSHI, CTR
School of Medicine
Health Management and Informatics

Steven Zweig, MD
School of Medicine
Family and Community Medicine

Category I
Clinical
9 to 11 a.m. Acuff Gallery

Poster 1
RELATIONSHIP OF A METOPIC RIDGE AND ANTERIOR CRANIAL VOLUME MEASURED BY A NON-INVASIVE LASER SHAPE DIGITIZER

Nathan Applegren, M1; Chase Derrick, MD, PGY-5, Division of Plastic Surgery; Kristina Aldridge, PhD, Department of Pathology and Anatomical Sciences
Mentor: Arshad Muzaffar, MD, Division of Plastic Surgery

Poster 2
DEGREE OF SURGICAL REDUCTION OF SPONDYLOLISTHESIS AMONG A COHORT OF ONE AND TWO LEVEL FUSION PATIENTS: DO COMPLICATIONS ARISE WITH CORONAL CORRECTION?

Nathan Beckett, M2; Christina Goldstein MD, FRCSC; Caleb Smith, M2
Mentor: Theodore Choma, MD, Department of Orthopedic Surgery

Poster 3
EFFECTS OF INCREASED DIETARY PROTEIN ON MOOD STATE AND COGNITIVE FUNCTION IN HEALTHY, OVERWEIGHT WOMEN

Daija M. Buchanan, undergraduate student; Jess A. Gwin, doctoral student; Rebecca S. Shafer, M.S., NSCA-CPT, human clinical research specialist; Connor A. Roenfeldt, undergraduate research assistant; Adam Z. Zino, M.S., graduate research assistant; Chelsie B. Todd, undergraduate research assistant; Ammar Y. Alwattar, M.S., graduate research assistant
Mentor: Heather J. Leidy, PhD, Department of Nutrition & Exercise Physiology

Poster 4
ASSESSMENT OF SMOKING CESSATION INTERVENTIONS IN A STUDENT-RUN FREE CLINIC

Alyssa Bujnak, M2; Samuel Windham, M4
Mentor: Nikole Cronk, PhD, Department of Family and Community Medicine

Poster 5
RELATIONSHIP OF SELF-REPORTED AND PROXY-REPORTED QUALITY OF LIFE SCORES IN UNHEALTHY WEIGHT CHILDREN

Kelsey Clary, M2; Samantha Kurkowski, SPT; Hiba Syed, BS-biology; Brianna Corwin, BS-biology, BHS-health science

Mentors: Erin Dannecker, PhD, ATC, Department of Physical Therapy; Kiran Choudhry, MD, Department of Diabetes and Endocrinology

Poster 6
PLATELET ADENOSINE DIPHOSPHATE INHIBITION IN TRAUMA PATIENTS BY THROMBOELASTOGRAPHY CORRELATES WITH PARADOXICAL INCREASE IN PLATELET DENSE GRANULE CONTENT BY FLOW CYTOMETRY

James W. Clevenger, M2; Ashley Bartels, MD; Richard D Hammer, MD; Cory Johnson, BS; Julie Lewis, RN, BSN; Jacob Quick, MD; Stephen L Barnes, MD
Mentor: Salman Ahmad, MD, Acute Care Surgery

Poster 7
EVALUATION OF MENTAL HEALTH SCREENING AND SERVICE DELIVERY AT A STUDENT-RUN FREE HEALTH CLINIC IN COLUMBIA, MISSOURI

Julie Duncan, M2
Mentor: Erik Lindbloom, MD, Department of Family and Community Medicine

Poster 8
RELAXING EYE DROP: *IN VIVO* SAFETY AND TOXICITY TO THE EYE

Steven D. Ebers, M2; Suneel Gupta, PhD; Prashant R Sinha; Govindaraj Anumanthan, PhD; Sudhanshu Raikwar, PhD
Mentor: Rajiv R. Mohan, PhD, FARVO, Harry S. Truman Memorial Veterans' Hospital, Mason Eye Institute and Department of Ophthalmology, College of Veterinary Medicine

Poster 9
SCREENING YOUTH ATHELETES FOR HIGH RISK LANDING PATTERNS USING AN INEXPENSIVE AND PORTABLE MOTION SENSOR DEVICE

Trevor Gulbrandsen, M2; Aaron Gray, MD; Trent Guess, PhD; Marjorie Skubic PhD
Mentor: Seth Sherman, MD, Department of Orthopaedic Surgery and Department of Family and Community Medicine

Poster 10
SURVEILLANCE OF CAUSATIVE ORGANISMS IN INFLUENZA-LIKE ILLNESSES IN THE STATE OF MISSOURI

Julia Hagan, M2
Mentor: Anjali Patwardhan, MD, Child Health

Poster 11
IMPACT OF LINGUISTIC LOAD ON TONGUE MOTOR CONTROL IN OLDER ADULTS

Diana Harmata, undergraduate research assistant; Claire Custer, undergraduate research assistant; Jacob McKinley, graduate research assistant
Mentor: Mili Kuruvilla-Dugdale, PhD, Department of Communication Science and Disorders, School of Health Professions

Poster 12
A RESTROSPECTIVE COHORT STUDY OF FIVE COMMON MEDICAL DIAGNOSES IN A STUDENT-RUN FREE MEDICAL CLINIC

Alex Heck, M2; Patrick Mazi, M4; Samuel Windham, M4
Mentor: Gordon Christensen, MD, Infectious Disease

Poster 13
EFFECTS OF PACED BREATHING ON COGNITIVE FLEXIBILITY

Brianne Herriott, M2; Allison Halt, undergraduate student; Bradley Ferguson, MA, doctoral student, Interdisciplinary Neuroscience
Mentor: David Beversdorf, MD, Departments of Radiology, Neurology, Psychology, and the Thompson Center for Autism and Neurodevelopmental Disorders

Poster 14
CLINICAL FEATURES OF IDIOPATHIC ANOGENITAL PRURITIS IN ADULT MALES

Alison Huber, M2; Nora Shumway MD, Chief Resident of Dermatology
Mentor: Kristen Fernandez, MD, Dermatology

Poster 15
EFFECT OF KETROLAC ON BENIGN HEADACHE

Molly Johnson, M2; Starr-Mar'ee Bedy PharmD; Kara Goddard PharmD; John Yanos, MD
Mentor: Matthew Robinson, MD, Department of Emergency Medicine

Poster 16
RETROSPECTIVE REVIEW OF INFECTIVE ENDOCARDITIS FROM 2007-2012 AT THE UNIVERSITY OF MISSOURI

Meghan Kelly, M4; John Cascone MD
Mentor: William Roland, MD, Department of Infectious Disease

Poster 17
DOES OPTIMIZED GENERAL ANESTHESIA CARE REDUCE POSTOPERATIVE DELIRIUM IN OLDER PATIENTS UNDERGOING HIP FRACTURE REPAIR?

Elan Krojanker, M2; Stephanie Nill, M2

Mentor: Terri G. Monk, MD, MS, Department of Anesthesiology and Perioperative Medicine

Poster 18
AN UNDERAPPRECIATED LEUKOCYTE IN NECROTIZING ENTEROCOLITIS

Kelly K. Lacey, M2; Lila S. Wahidi, M4; Jeffrey M. Shuler, M2; Jan Sherman, RN, NNP, PhD
Mentor: Michael P. Sherman, MD, Department of Child Health

Poster 19
COMPASS: A LONGITUDINAL COURSE ADDRESSING MEDICINE, PATIENT, SELF AND SOCIETY

Jared Lammert, M2; Joseph Pauly, M2; John Schneider, M3; Kevin Kane, MD, MSPH, Clinical Family and Community Medicine; Sarah Swofford, MD, MSPH, Clinical Family and Community Medicine
Mentor: Joe Donaldson, PhD, Office of Medical Education

Poster 20
INCIDENCE OF ANKLE FUSION AFTER PILON FRACTURE

Lauren Massey, M2; James L. Cook, DVM, PhD
Mentor: Brett D. Crist, MD, FACS, Department of Orthopedic Surgery

Poster 21
CYTOKINE PROFILE ANALYSIS OF JUVENILE IDIOPATHIC ARTHRTIS PATIENTS

Alex McDonald, M2
Mentor: Anjali Patwardhan, MD, Division of Pediatric Rheumatology

Poster 22
DOES AN ELECTRONIC MEDICAL RECORD IMPROVE PROVISION OF DIABETES QUALITY-OF-CARE INDICATORS IN A STUDENT-RUN FREE CLINIC?

Colin McDonald, M2
Mentor: Richelle Koopman, MD, Department of Family and Community Medicine

Poster 23
COMPARISON OF ANTERIOR CRUCIATE LIGAMENT RUPTURE RATES IN MEN'S AND WOMEN'S HIGH SCHOOL SOCCER

Scott M. Miller, M2; Jeffrey M Marks, M4; Emily Leary, PhD assistant research professor

Mentor: Aaron Gray, MD, Family and Community Medicine and Orthopedic Surgery

Poster 24
RECONSTRUCTION OF A COMPLEX DENTOSKELETAL DEFORMITY IN A PATIENT WITH SEVERE MACROGLOSSIA IN THE CONTEXT OF MUSCULAR DYSTROPHY

Emily Naclerio, M2; Dana Rioux-Forker, MD, PGY3
Mentor: Arshad Muzaffar, MD, FACS, FAAP, Plastic and Reconstructive Surgery

Poster 25
DOES CIRCADIAN RHYTHM CONTRIBUTE TOWARDS SLEEP INERTIA: A META-ANALYSIS

Sachin Nair, UMKC M2; Pradeep Sahota, MD
Mentor: Mahesh Thakkar, PhD, Harry S. Truman Memorial Veterans' Hospital/Research, Department of Neurology

Poster 26
DOES PRE-OPERATIVE COGNITIVE STATUS PREDICT THE DEVELOPMENT OF POST-OPERATIVE DELIRIUM IN OLDER PATIENTS UNDERGOING HIP FRACTURE REPAIR?

Stephanie Nill, M2; Elan Krojanker, M2; Stephanie Reid-Arndt, PhD, ABPP, School of Health Professions
Mentor: Terri G. Monk, MD, MS, Department of Anesthesiology and Perioperative Medicine

Poster 27
HORSES WORKING IN THERAPEUTIC RIDING PROGRAMS: CORTISOL AND BEHAVIOR STRESS INDICATORS

Taryn Parker, undergraduate student; Philip Johnson, BVSc, MRCVS, ACVIM; James Marzoif, MD, MPH; Cathy Vogelweid, DVM, PhD, DACLAM; Jessica Bibbo, PhD(c)
Mentor: Rebecca Johnson, PhD, RN, FAAN, FNAP, Research Center for Human and Animal Interaction, College of Veterinary Medicine and Sinclair School of Nursing

Poster 28
DOG PRESENCE AND CHILDREN'S STRESS DURING FORENSIC INTERVIEWS FOR CHILD ABUSE

Chyan Pascua, undergraduate
Mentor: Rebecca A. Johnson, RN, PhD, FAAN, FNAP, Research Center for Human-Animal Interaction, College of Veterinary Medicine, Sinclair School of Nursing

Poster 29

ROLE OF PRN AND SCHEDULED MEDICATIONS IN SECLUSION AND RESTRAINT USE IN CHILDREN AND ADOLESCENTS IN PSYCHIATRY

Vera Prisacari, M2
Mentors: Jusleen Kendhari, MD; Ravi Shankar, MD; Niels Beck, PhD, Department of Psychiatry

Poster 30
DECREASED AIRWAY COMPLICATIONS WITH GLYCOPYRROLATE PROPHYLAXIS FOR PEDIATRIC ENDOSCOPY: A PROSPECTIVE TRIAL

Megan Prunty, M2; Patricia Wankum, MD; Esma Birisci, MA; Jordan Anderson, BCPS, PharmD
Mentor: Abdallah Dalabih, MD, MBA, Pediatric Critical Care Medicine

Poster 31
RADIOSURGERY TO THE POST-OPERATIVE TUMOR BED FOR METASTATIC CARCINOMA VERSUS WHOLE BRAIN RADIATION

Kristen M. Scheitler-Ring, M2; Greg Petroski, PhD, Research Assistant Professor; Bin Ge, MD, MA, Statistician
Mentor: N. Scott Litofsky, MD, Professor and Chief, Division of Neurological Surgery

Poster 32
SURFACTANT WARS: CLINICAL TRIAL COMPARING TWO SURFACTANTS TO TREAT RESPIRATORY DISTRESS SYNDROME (RDS) IN PRETERM INFANTS

Jeffrey M. Shuler M2; Naomi Lauriello MD; John Pardalos MD; Kelly Lacey M2; Lila S. Wahidi M4; Tiffany Lane MSN, NNP-BC; Jan Sherman RN, NNP-BC, PhD
Mentor: Michael P. Sherman, MD, Department of Child Health

Poster 33
CORRELATING MOTION ANALYSIS SYSTEMS AND CLINICAL TESTING TO ESTABLISH AN APPROPRIATE RETURN TO SPORT PROTOCOL FOLLOWING ACL RECONSTRUCTION IN ATHLETES

Nathan Siesener, M2 ; Pat Smith, MD; Trent Guess, PhD; Aaron Gray, MD; Kyle Blecha, ATC
Mentor: Seth Sherman, MD, Department of Orthopaedic Surgery

Poster 34
VERTICAL GROUND REACTION FORCES IN HEALTHY AND KNEE OSTEOARTHRITIS POPULATIONS

Morgan Sloan, undergraduate; Portia Flowers, PhD
Mentor: Trent M. Guess, PhD, Department of Physical Therapy

Poster 35
AN INVESTIGATION OF REOPERATION RATES FOLLOWING SURGICAL FUSION FOR ADULT SPINAL DEFORMITY

Caleb J Smith, M2; Christina L Goldstein, MD
Mentor: Theodore J Choma, MD, Orthopaedic Surgery

Poster 36
PREDICTORS OF OCULAR INVOLVEMENT IN GIANT CELL ARTERITIS

Kellyn Smith, M4
Mentor: Geetha Davis, MD, Department of Ophthalmology

Poster 37
DILUTE PROPARACAINE: A POTENTIAL TREATMENT FOR ACUTE CORNEAL INJURY

TJ Smolik, M4; Michael Fink, DVM, third-year resident; Evan Olson, MD; Merryl Terry, MD PGY1; Suneel Gupta, PhD; Prashant R. Sinha
Mentor: Rajiv R. Mohan, PhD, Harry S. Truman Memorial Veterans' Hospital, Departments of Ophthalmology, School of Medicine and College of Veterinary Medicine

Poster 38
POST-ACUTE CARE (PAC): UNDERSTANDING PATIENT FLOW, CARE, AND COSTS

Travis Smoot, MHA, M2; Murdock, Fred, PhD
Mentor: Worsowicz, Greg, MD, Physical Medicine and Rehabilitation

Poster 39
PATIENT EDUCATION AND PERCEPTIONS ON CARE TRANSITIONS

Antonio Spates, M2; Fred Murdock, PhD
Mentor: Gregory Worsowicz, MD, Physical Medicine and Rehabilitation

Poster 40
SURVEY OF ADULT ANKLE FOOT ORTHOTIC USE IN CEREBRAL PALSY

Devin St. Clair, M1
Mentor: Rez Farid, MD, Physical Medicine and Rehabilitation

Poster 41
HEMISPHERIC DIFFERENCES IN EEG SPECTRAL POWER IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA

Derek Su, M2; Pradeep Sahota, MD
Mentor: Mahesh Thakkar, PhD, Harry S. Truman Memorial Veterans' Hospital/Research, Department of Neurology

Poster 42
EFFECT OF INSULIN RESISTANCE ON FAT/GLUCOSE UTILIZATION IN HUMANS

Tyler Sutphen, undergraduate; Miriam Jacome-Sosa, PhD, postdoctoral fellow; Qiong Hu PhD, postdoctoral fellow; Camila Manrique MD, assistant professor
Mentor: Elizabeth Parks PhD, Nutrition and Exercise Physiology

Poster 43
PATIENTS WITH OBSTRUCTIVE SLEEP APNEA DISPLAY AN INCREASE IN EEG ALPHA POWER, AN INDICATOR OF COGNITIVE DECLINE

Kavi Thakkar, M3; Pradeep Sahota, MD
Mentor: Mahesh Thakkar, PhD, Harry S. Truman Memorial Veterans' Hospital, Department of Neurology

Poster 44
INVESTIGATION OF RATE CONTROL THERAPY FOR TREATMENT OF ATRIAL FIBRILLATION IN THE EMERGENCY DEPARTMENT

Lauren Tucker, M2; Tim Buff, MD
Mentor: Christopher Sampson, MD, Department of Emergency Medicine

Poster 45
COMPARISON OF COST AND HOSPITAL OUTCOMES FOR PATIENTS UNDERGOING A CUSTOMIZED INDIVIDUALLY MADE TOTAL KNEE REPLACEMENT VS. OFF-THE-SHELF BRANDS

John Worley, M3; Dominic Zanaboni, M4; John Worley, M3; Samuel Thompson, M4
Mentor: B. Sonny Bal, MD, JD, MBA, Department of Orthopaedic Surgery

Poster 46
A NEEDS ASSEMENT OF A STUDENT-RUN DERMATOLOGY CLINIC FOR UNINSURED INDIVIDUALS

Elizabeth Worsowicz, M2; Krystal Brady, M4
Mentor: Karen Edison, MD, University of Missouri Dermatology Department

Category I

Basic

9 to 11 a.m. Acuff Gallery

Poster 47
A SURGICAL MOUSE MODEL OF IATROGENIC LARYNGEAL NERVE INJURY

Jakob Allen, M2; Christopher Newberry, M4; Aaron Thiessen, MD
Mentor: Teresa Lever, PhD, Department of Otolaryngology

Poster 48
DEVELOPMENT & VALIDATION OF A NOVEL REAL-TIME PCR PROCEDURE FOR QUALITATIVE DETECTION OF HSV-1 & HSV-2

Thomas Andrews, M3; Simone Camp, MT
Mentor: Michael Wang, MD, PhD, Department of Pathology and Anatomical Sciences

Poster 49
REGULATION OF NEUROPROTECTIVE MYELOID CELL LEUKEMIA 1 (MCL-1) BY RAPAMYCIN AND NP-6A4, A NEW AT2R AGONIST, IN DOPAMINERGIC NEURONAL CELL LINE

Jamal Bajwa, undergraduate researcher; Abuzar Mahmood, undergraduate researcher; Madhavi Gavini, researcher, Novopyxis, Boston, Massachusetts
Mentor: Lakshmi Pulakat, PhD, Departments of Medicine and Nutrition and Exercise Physiology, Research, Harry S. Truman Memorial Veterans' Hospital

Poster 50
CORTICOTROPIN RELEASING FACTOR ELEVATES CYTOSOLIC CALCIUM IN NUCLEUS TRACTUS SOLITARUS NEURONS

Emily Bamberger, M3; Heather A. Dantzler; David Kline, PhD
Mentor: Luis-Polo-Parada, PhD, Department of Medical Pharmacology and Physiology

Poster 51
ASSESSING THE MISSOURI OSTEOCHONDRAL ALLOGRAFT PRESERVATION SYSTEM FOR PRESERVATION OF GLENOID OSTEOCHONDRAL ALLOGRAFT TISSUE

Charles A. Baumann, undergraduate student; Kamryn S. Chastain, undergraduate student; Elliott E. Voss, undergraduate student; Aaron M. Stoker, PhD; James L. Cook, DVM, PhD
Mentor: Matthew Smith, MD, Department of Orthopaedic Surgery

Poster 52
INFLAMMATORY MEDIATED CORTICAL STIFFNESS IN ENDOTHELIAL CELLS

Mike Birkhead M2; Hon Yu, master's student
Mentor: Ted Kalogeris, PhD; Ronald Korthuis, PhD, Department of Medical Pharmacology and Physiology

Poster 53
ROCK INHIBITOR, HA1077, FOR TREATING CORNEAL FIBROSIS

Ethan Crider, M4; Suneel Gupta, PhD; Michael Possin, MD; Govindaraj Anumanthan, PhD; Sudhanshu Raikwar, PhD
Mentor: Rajiv R. Mohan, PhD, Farvo, Harry S. Truman Memorial Veterans' Hospital, Mason Eye Institute and Department of Ophthalmology College of Veterinary Medicine

Poster 54
EXTRAVILLOUS TROPHOBLAST CELLS DERIVED FROM IPS CELLS OF PREECLAMPTIC PATIENTS AND THE POTENTIAL INVASION DEFECT IN PREECLAMPSIA

Trieu Do, M2; Ying Yang, post-doctoral fellow; Megan Sheridan, graduate student
Mentor: Michael Roberts, PhD, Department of Biochemistry

Poster 55
HYPERMETHYLATION COMMONALITIES IN HUMAN AND CANINE ACUTE LYMPHOBLASTIC LEUKEMIA

Justin Ehrhardt M2; Darren Hawkins; Alexi Stuckel; Jeffrey Bryan DVM, PhD
Mentor: Kristen Taylor, PhD, Department of Pathology and Anatomical Sciences

Poster 56
RECOMBINANT PRODUCTION OF A PLA2 INHIBITOR: IMPLICATIONS FOR PRODUCTION OF VENOM INHIBITORS

Hady Elmashhady, undergraduate; Chin Yi Loh, undergraduate; Chris Michael, undergraduate; Minh Ma, undergraduate; Sydney Sahudin, undergraduate; Victoria Schutz, undergraduate
Mentor: Mario Pennella, PhD, Department of Biochemistry

Poster 57
THE DIFFERENTIAL EFFECTS OF PLASMINOGEN ACTIVATOR INHIBITOR-1 (PAI-1) ON VASCULAR ENDOTHELIAL GROWTH FACTOR PRODUCTION IN CULTURED MURINE ADIPOCYTES

Philip Fish, M2; Jianbo Wu, PhD; Yan Ji, PhD; Tammy Strawn
Mentor: William P. Fay, MD, Department of Cardiology

Poster 58

EXERCISE INDUCES APPROPRIATE CARDIOVASCULAR ADAPTIONS IN NSML ASSOCIATED HYPERTROPHIC CARDIOMYOPATHY

James Hart, M2; Christopher Wilson, M2; Diana Douglas, Dalton Cardiovascular Research Center
Mentor: Maike Krenz, PhD, Department of Medical Pharmacology & Physiology

Poster 59
ENDOTHELIAL ENaC INHIBITION ATTENUATES WESTERN DIET-INDUCED ENDOTHELIAL DYSFUNCTION IN FEMALE MICE

Amy G. Johnson, M2; Francisco I. Ramirez-Perez, MSc, PhD student; James. R. Sowers, MD
Mentor: Luis A. Martinez-Lemus, DVM, PhD, Department of Medical Pharmacology and Physiology

Poster 60
MODULATION OF JCV REPLICATION BY NF1/CTF TRANSCRIPTION FACTORS

Kirtan Joshi, senior undergraduate; Alexander Kenzior, PhD
Mentor: William Folk, PhD, Department of Biochemistry

Poster 61
WATER-SOLUBLE GELATINASE INHIBITOR *O*-PHOSPHATE PRODRUG AND ITS METABOLITE *P*-HYDROXY SB-3CT AMELIORATE MOTOR FUNCTIONS AGAINST BRAIN DAMAGE AFTER SEVERE TRAUMATIC INJURY IN MICE

María Juárez, senior undergraduate[1]; Zhenzhou Chen, Ph.D. [1]; Mijoon Lee, Ph.D. [2]; Brittany Tomlinson, MS[1]; Major Gooyit[2]; Rasheeq Nazim, junior undergraduate[1]; Dusan Hesek, Ph.D. [2]; Bill Boggess, Ph.D. [2]; Valerie A. Schroeder, AAS[2]; William R. Wolter, BS[2]; Mark A. Suckow, BS[2]; Jiankun Cui, MD, Ph.D. [1]; Shahriar Mobashery, PhD. [2]; Mayland Chang, Ph.D[2]
Mentor: Zezong Gu[1], Department of Pathology and Anatomical Sciences – MU[1], in conjunction with the Department of Chemistry and Biochemistry – University of Notre Dame[2])

Poster 62
IMPROVED SURVIVAL OF NUTRIENT-STARVED HUMAN AND MOUSE CARDIOVASCULAR CELLS BY A NOVEL AT2 RECEPTOR AGONIST NP-6A4

Abuzar Mahmood, undergraduate student
Mentor: Lakshmi Pulakat, PhD, Departments of Medicine Nutrition and Exercise Physiology, Research, Harry S. Truman Memorial Veterans' Hospital

Poster 63

A MOUSE MODEL OF ASPIRATION FOR TRANSLATIONAL DYSPHAGIA RESEARCH

Murphy R. Mastin, MI; Brett Blake, biomedical engineering undergrad; Bridget Hopewell, MD
Mentor: Teresa Lever, PhD, Department of Otolaryngology

Poster 64
MOLECULAR MECHANISMS CONTROLLING BLOOD VESSEL REGRESSION

Danielle Meyer, undergraduate student; Stephanie L. K. Bowers, PhD
Mentor: George E. Davis, MD, PhD, Department of Medical Pharmacology and Physiology

Poster 65
ASSESING HYPOXIC-ISCHEMIC DAMAGE OF THE NEONATAL THALAMUS USING NOVEL HISTOGRAM IMAGING ANALYSIS IN A MOUSE MODEL

Joseph D. Pauly, M2; Jiangyang Zhang, PhD; Matthias W. Wagner, MD; Frances J. Northington, MD
Mentor: Andrea Poretti, MD, Departments of Pediatric Radiology and Neonatology Johns Hopkins University School of Medicine

Poster 66
ABLATION OF NLRP3 PROTECTS MICE FROM WESTERN DIET-INDUCED ARTERIAL STIFFENING BUT NOT ADIPOSE TISSUE INFLAMMATION AND GLYCEMIC DYSREGULATION

Rebecca E. Ringling, M2; Victoria J. Vieira-Potter, assistant professor
Mentor: Jaume Padilla, assistant professor, Department of Nutrition and Exercise Physiology

Poster 67
SOY PROTEIN ISOLATE IN THE PREVENTION OF HEPATIC STEATOSIS IN OBESE OLETF RATS

Colin M. Schuster, M2; Kathryn E. Phillips, undergraduate; Grace ME Meers, senior research specialist; Dustie N. Butteiger, BSc, DuPont Nutrition & Health; Elaine S. Krul, PhD, DuPont Nutrition & Health; John P. Thyfault, PhD, KUMC
Mentor: R. Scott Rector, PhD, Departments of Medicine — Gastroenterology and Hepatology, and Nutrition and Exercise Physiology; Harry S. Truman Memorial Veterans' Hospital

Poster 68
EXPLORING THE EFFECTS OF SEROTONIN DEFICIENCY ON SWALLOWING AND OTHER LARYNGEAL REFLEXES

Joseph Sinnott, M1; Kevin Cummings, PhD
Mentor: Teresa Lever, PhD, Department of Otolaryngology-Head and Neck Surgery

Poster 69
INGENUITY PATHWAY ANALYSIS OF THE EFFECT OF SUTHERLANDIA FRUTESCENS ON GENE EXPRESSION

Aaron M. Smith, undergraduate; Melissa Markham, undergraduate; Hailong Song, graduate student; Zezong Gu, PhD; Grace Sun, PhD; Dennis Lubahn, PhD
Mentor: William R. Folk, PhD, Department of Biochemistry, MU Center for Botanical Interaction Studies

Poster 70
TWIST2 IN THE AGING KIDNEY

Ross Smith, M2; Elizabeth Grunz-Borgmann; LaNita Nichols
Mentor: Alan Parrish, PhD, Department of Medical Pharmacology and Physiology, University of Missouri School of Medicine

Poster 71
DEGENERATIVE MYELOPATHY: A POTENTIAL DISEASE MODEL FOR AMYOTROPHIC LATERAL SCLEROSIS

Jeffrey Student, undergraduate; Joan Coates, DVM; Cheryl Jensen, senior research technician; Lauren Gillespie, BS
Mentor: Martin Katz, PhD, Department of Ophthalmology, Mason Eye Institute

Poster 72
CHARACTERIZATION OF UPPER MOTOR NEURON AND MUSCLE PATHOLOGY PROGRESSION IN A CANINE MODEL OF AMYOTROPHIC LATERAL SCLEROSIS

Jacob Taylor, M2; Jeffrey Student, undergraduate senior; Cheryl Jensen, technician, Department of Ophthalmology
Mentor: Martin Katz, PhD, Department of Ophthalmology and Neurodegenerative Diseases

Poster 73
DETERMINING THE ROLE OF INTEGRIN SIGNALING IN THE DEVELOPMENT OF POST-TRAUMATIC OSTEOARTHRITIS

Elliott Voss, undergraduate; Charles Baumann, undergraduate; Nicole Walden, undergraduate; Aaron Stoker, MS, PhD; Jimi Cook, DVM, PhD
Mentor: Gregory Della Rocca, MD, PhD, Department of Orthopaedic Surgery

Poster 74
COMPARISON OF SYNOVIAL AND INFRAPATELLAR FAT PAD TISSUE RESPONSES TO CYTOKINE STIMULATION USING AN IN VITRO CO-CULTURE MODEL

Nicole Walden, undergraduate; Aaron Stoker, MS, PhD
Mentor: James Cook, DVM, PhD, Department of Orthopaedic Surgery

Poster 75
DOES INTENSE EXERCISE ALTER THE ENZYMATIC FUNCTION OF THE PROTEIN TYROSINE PHOSPHATASE SHP2 IN THE HEART?

Christopher Wilson, M2
Mentor: Maike Krenz, PhD, Department of Medical Physiology and Pharmacology and Dalton Cardiovascular Research Center

Category II
Clinical
1 to 3 p.m. Acuff Gallery

Poster 76
GRILL WIRE BRUSH INJURY IN THE UNITED STATES

Tiffany Baugh, MD PGY-3; Jamie Hadley, MS3
Mentor: David Chang, MD, Otolaryngology

Poster 77
HEALTH BENEFITS OF DOG WALKING FOR OLDER ADULTS

Jessica Bibbo PhD(C); Angela L. Curl, PhD
Mentor: Rebecca A. Johnson, PhD, RN, FAAN, FNAP, Millsap Professor of Gerontological Nursing, Sinclair School of Nursing

Poster 78
THE EFFECTIVENESS OF CARES® DEMENTIA TRAINING MODULES ON DELIVERY OF PERSON CENTERED CARE INSIDE A MEMORY CARE UNIT: UTILIZING THE CARES® OBSERVATIONAL TOOL

Erin Cattoor RN, MSN, PhD (c)
Mentor: Marilyn Rantz, PhD, RN, FAAN, Sinclair School of Nursing

Poster 79
ASSOCIATIONS BETWEEN CYTOKINES, ENDOCRINE STRESS RESPONSE, AND GASTROINTESTINAL SYMPTOMS IN AUTISM SPECTRUM DISORDER

Bradley J. Ferguson, MA, Doctoral Student, MU Interdisciplinary Neuroscience Program; Kaitlyn Hartnett, MU Undergraduate Research Assistant; Aaron McLaughlin, MD, Pediatric Resident, Saint Louis University; Sarah Marler, MA, Vanderbilt University Medical Center; Lily Altstein, PhD, Massachusetts General Hospital Biostatistics Center; Evon Batey Lee, PhD, Departments of Pediatrics, Psychology, and Psychiatry, Vanderbilt University; Micah O. Mazurek, PhD, MU Thompson; MU Department of Health Psychology; Eric A. Macklin, PhD, Massachusetts General Hospital Biostatistics Center; Harvard Medical School; Erin McDonnell, Massachusetts General Hospital Biostatistics Center; Daniel Davis, PhD Candidate, Department of Veterinary Pathobiology; Anthony M. Belenchia, PhD Candidate, MU Nutrition & Exercise Physiology; Catherine Hagan, DVM, PhD, Department of Veterinary Pathobiology; Catherine Peterson, PhD, MU Nutrition & Exercise Physiology; Margaret A. Bauman, MD, Boston University School of Medicine; Kara Gross Margolis, MD, Department of Pediatrics, Division of Pediatric Gastroenterology, Hepatology, and Nutrition, Columbia University; Jeremy Veenstra-VanderWeele, MD, Department of Psychiatry and Sackler Institute for Developmental Psychobiology, Columbia University; New York State Psychiatric Institute; New York Presbyterian Hospital Center for Autism and the Developing Brain
Mentor: David Q. Beversdorf, MD, Director, Center for Translational Neuroscience; Departments of Radiology, Neurology, Psychology; MU Thompson Center

Poster 80
KINEMATIC COMPARISION OF MARKER-BASED AND MARKERLESS MOTION CAPTURE SYSTEMS

Portia Flowers, postdoctoral fellow; Swithin Razu, graduate student; Kaylin Bean, research assistant
Mentor: Trent M. Guess, PhD, Department of Physical Therapy

Poster 81
SAGITTAL KNEE ANGLES IN HEALTHY AND KNEE OSTEOARTHRITIS POPULATIONS

Portia Flowers, postdoctoral fellow
Mentor: Trent M. Guess, PhD, Department of Physical Therapy

Poster 82
REDUCTION OF FALLS AND FALL-RELATED INJURIES IN HIGHLY ENGAGED, LOW PERFORMING HOSPITALS

Rebekah Flynn, BSN, RN
Mentor: Deidre Wipke-Tevis RN, PhD, Sinclair School of Nursing

Poster 83
USING I2B2 FOR QUALITY IMPROVEMENT

Tim A. Green, PhD student; Abu Mosa, PhD student
Mentors: Stevan Whitt, MD, School of Medicine, Pulmonary and Critical Care; Jerry Parker, PhD, School of Medicine, Dean's Office

Poster 84
EFFECTS OF INCREASED DIETARY PROTEIN ON DAILY APPETITE CONTROL, SATIETY, & FOOD INTAKE IN HEALTHY, OVERWEIGHT WOMEN

Jess A. Gwin, doctoral student; Rebecca S. Shafer, MS, NSCA-CPT, human clinical research specialist; Connor A. Roenfeldt, undergraduate research assistant; Adam Z. Zino, MS, graduate research assistant; Chelsie B. Todd, undergraduate research assistant; Ammar Y. Alwattar, MS, graduate research assistant
Mentor: Heather J. Leidy, PhD, assistant professor, Department of Nutrition & Exercise Physiology

Poster 85
QUANTITATION OF DIETARY FAT INCORPORATION INTO INTRAMUSCULAR LIPID SPECIES IN HUMANS

Qiong Hu[1], postdoctoral fellow; Phillip E Sanders[2], MS; Miriam Jacome-Sosa[1], postdoctoral fellow; Ming-Shang, Kuo[2], PhD; Sudha S Shankar[2], MD
Mentor: Elizabeth J Parks[1], PhD
[1]Nutrition and Exercise Physiology, University of Missouri
[2]Lilly Research Laboratories, Indianapolis, Indiana

Poster 86
Biomechanical Analysis of the Anterolateral Ligament (ALL) Using in vivo Musculoskeletal Model

Amirhossein Jahandar, graduate student; Seth L. Sherman, MD
Mentor: Trent M. Guess, PhD, Physical Therapy and Orthopaedic Surgery

Poster 87
EXPLORING WHAT MOTIVATES INDIVIDUALS TO SEEK NON-EMERGENT MEDICAL TREATMENT FROM THE EMERGENCY DEPARTMENT

Karen Mollus, DNP Student
Mentor: Maithe Enriquez, PhD, APRN, FAAN, Sinclair School of Nursing

Poster 88
LOUDNESS EFFECTS ON TONGUE MOTOR CONTROL IN TALKERS WITH AMYOTROPHIC LATERAL SCLEROSIS

Katherine Nielson, graduate student; Abby Isabelle, undergraduate student; Mackenzie Greis, undergraduate student

Mentor: Mili Kuruvilla-Dugdale, PhD, Department of Communication Science and Disorders

Poster 89
LEISURE TIME PHYSICAL INACTIVITY (LTPIA), OBESITY AND TYPE 2 DIABETES (T2DM) RATES IN THE SOUTHERN UNITED STATES (US)

Jennifer O'Connor, MS, RN, CFCN, CNE, nursing PhD student; Jane Scharff, MSN, RN, nursing PhD student
Mentor: Deidre Wipke-Tevis, PhD, RN, School of Nursing

Poster 90
A SURVEY OF WOMEN WITH BREAST CANCER-RELATED LYMPHEDEMA (BCRL): TO IDENTIFY THE NEED FOR SUPPORT

Pamela L. Ostby, PhD(c), RN, OCN®
Mentor: Jane M. Armer, PhD, RN, FAAN, CLT, Sinclair School of Nursing

Poster 91
WHAT IS THE EFFECT OF PEER SUPPORT INTERVENTIONS ON GLYCEMIC CONTROL? - A SYSTEMATIC REVIEW AND META-ANALYSIS

Sonal Patil, MD, academic fellow; Erik Lindbloom, MD, MSPH, associate professor; Todd Ruppar, PhD, RN, GCNS-BC, assistant professor; Susan Elliott, MLS, medical librarian; Vicki Conn, PhD, RN, FAAN, Potter-Brinton professor; David R. Mehr, MD, MS, William C. Allen professor
Mentor: Richelle Koopman, MD, Family and Community Medicine

Poster 92
COMPARITIVE EVALUATION OF THE MICROSOFT KINECT WITH THE VICON MOTION CAPTURE SYSTEM TO OBTAIN 3D HIP AND KNEE ANGLES

Swithin S. Razu, graduate student
Mentor: Trent M. Guess, PhD, Physical Therapy and Orthopaedic Surgery

Poster 93
SIMULATING THE EFFECT OF SULCUS ANGLE ON PATELLOFEMORAL CONTACT PRESSURES DURING GAIT

Swithin S. Razu, graduate student
Mentor: Trent M. Guess, PhD, Physical Therapy and Orthopaedic Surgery

Poster 94
DISSEMINATION AND IMPLEMENTATION OF THE MISSOURI MATERNAL, INFANT, AND EARLY CHILDHOOD HOME VISITING PROGRAMS: THE COMPLEXITY OF THE COORDINATION OF SERVICES

Sara E. Schlemper, graduate student; Eduardo J. Simoes, MD, MSc, DLSHTM, MPH, principal investigator
Mentor: Julie M. Kapp, MPH, PhD, Health Management and Informatics

Poster 95
SLOWER RATE OF FAT ABSORPTION AT DINNER VERSUS LUNCH IS ASSOCIATED WITH LOWER CONCENTRATIONS OF TRIACYLGLYCEROLS (TG) THE FOLLOWING MORNING

Miriam Jacome-Sosa PhD, postdoctoral fellow; Qiong Hu PhD, postdoctoral fellow; Camila Manrique MD, assistant professor
Mentor: Elizabeth Parks PhD, Nutrition and Exercise Physiology

Poster 96
WOMEN'S CONCERNS OF MAMMOGRAPHY FOR BREAST CANCER SCREENING

April Yuanlu Sun, graduate student, Sinclair School of Nursing
Mentor: Allison Kabel, assistant professor, Department of Health Sciences

Poster 97
PERCEPTIONS REGARDING ADOLESCENT PREGNANCY AMONG A GROUP OF THAI ADOLESCENTS IN SWEDEN

Tipparat Udmuangpia, PhD, nursing student; Elisabet Häggtröm- Nordin, PhD, nursing; Chiraporn Worawong, PhD, nursing; Kamonthip Tanglakmankhong, PhD, nursing
Mentor: Tina Bloom, PhD, Sinclair School of Nursing

Poster 98
TOWARD DEVELOPING A MOBILE APPLICATION TO IMPROVE DIABETIC PATIENTS' SELF-CARE BEHAVIORS: A FUNCTIONALITY ANALYSIS

Qing Ye, PhD student of University of Missouri Informatics Institute; Suzanne A. Boren, MHA, PhD, associate professor of Health Management and Informatics; Uzma Khan, MD, associate professor of Medicine
Mentor: Min Soon Kim, PhD, Department of Health Management and Informatics, School of Medicine

Poster 99
GLOBAL AND SUBNETWORK RESTING STATE TOPOLOGY IN AUTISM, PHENYLKETONURIA, AND TRAUMATIC BRAIN INJURY

Rachel M. Zamzow, doctoral candidate, MU Interdisciplinary Neuroscience Program; John P. Hegarty II, PhD, postdoctoral fellow, Stanford University; Jeffrey D. Johnson, PhD, faculty, Department of Psychological Sciences; Gary Yao, PhD, faculty,

Department of Bioengineering; David Q. Beversdorf, MD, faculty, Departments of Radiology, Neurology, & Psychology
Mentor: Shawn E. Christ, PhD, Department of Psychological Sciences

Category II

Basic

1 to 3 p.m. Acuff Gallery

Poster 100
ADVERSE HEALTH OUTCOMES OF ENDOCRINE DISRUPTING CHEMICALS PRESENT IN HYDRAULIC FRACTURING FLUIDS

Victoria D. Balise, PhD candidate; Christopher D. Kassotis, PhD; Jennifer N. Cornelius-Green; Chunxia Meng
Mentor: Susan C. Nagel, Obstetrics, Gynecology and Women's Health

Poster 101
A NOVEL DELTA METHOD FOR CLINICAL GRADING OF CORNEAL NEOVASCULARIZATION IN A MOUSE MODEL

Suneel Gupta, PhD; Mike Fink, DVM, third-year resident; Prashant R Sinha; Mahesh Thakkar, PhD
Mentor: Rajiv R. Mohan, PhD, FARVO, Harry S. Truman Memorial Veterans' Hospital, Departments of Ophthalmology, School of Medicine and College of Veterinary Medicine

Poster 102
INTRAVENOUS DELIVERY OF A NOVEL AAV-9 MICRO-DYSTROPHIN VECTOR PREVENTED MUSCLE DETERIORATION IN YOUNG ADULT DUCHENNE MUSCULAR DYSTROPHY DOGS

Chady H. Hakim[1] (postdoctoral research fellow); Xiufang Pan[1] (postdoctoral research fellow); Thais Blessa[1] (graduate student); Hsiao T Yang[2] (research professor); Gary Yao[4] (professor); Stacey Leach[3] (assistant teaching professor); Craig Emter[2] (assistant professor); Yongping Yue[1] (research assistant); Keqing Zhang[1] (research assistant); Sean X Duan[1] (research assistant); Gregory Jenkins[1] (research assistant); Jeffrey S Chamberlain[5] (professor)
Mentor: Dongsheng Duan[1], PhD
[1]Department of Molecular Microbiology and Immunology, MU School of Medicine
[2]Department of Biomedical Sciences, MU College of Veterinary Medicine
[3]Department of Veterinary Medicine and Surgery, MU College of Veterinary Medicine
[4]Department of Bioengineering, MU College of Engineering
[5]Department of Neurology, School of Medicine, University of Washington, Seattle WA

Poster 103

A PROCESS MINING APPROACH TO UNDERSTANDING CLINICAL FLOW AT MEDZOU

Riyad Haq, MHA/MSHI; Travis Smoot, M2
Mentors: Mihail Popescu, PhD, Julie Kapp, MPH, PhD, Department of Health Management and Informatics

Poster 104
TRPV4 ALTERS INTRACELLULAR CALCIUM TRANSIENTS IN CARDIOMYOCYTES OF AGED MICE

John L. Jones, graduate student; Michelle Lambert, research specialist; Justin Whitfield, undergraduate
Mentor: Timothy L. Domeier, PhD, Department of Medical Pharmacology and Physiology

Poster 105
RAPID CARDIAC MRI WITH ULTRASHORT TE AND COMPRESS SENSING

Li E. Lee, second-year PhD student; Xiahan Yang, graduate student; Y. Rosa Zheng, PhD
Mentors: Ping Yu, PhD, Department of Physics and Astronomy; Lixin Ma, PhD, Department of Radiology

Poster 106
SEX DIFFERENCES IN CARDIOPROTECTIVE AT2R EXPRESSION IN DIABETIC RATS AND ITS CORRELATION WITH MYOCARDIAL DAMAGE

Kelly Lum-Naihe, graduate student; Abuzar Mahmood, undergraduate; Jamal Bajwa, undergraduate; Craig A. Emter, assistant professor, Biomedical Sciences
Mentor: Lakshmi Pulakat, PhD, Department of Medicine, Division of Cardiovascular Medicine

Poster 107
TELEHEALTH RESOURCE CENTER - LISTSERV: ANALYSIS OF USAGE AND EFFICIENCY

Omer Malik, third-year dual master's degree student, MHA, HMSI; Mirna Becevic, PhD, MHA, associate research professor, Department of Dermatology; Rachel Mutrux, BS, Senior Director, University of Missouri, Missouri Telehealth Network
Mentor: Winfred Phillips, MS, BS, MBA, PhD, M.Phil, M.A., M.Div., Health Management and Informatics

Poster 108
PERINATAL BPA EXPOSURE EXACERBATED POSTNATAL CATCH-UP GROWTH, BUT NEITHER PROGRAMMED ADULT OBESITY NOR INSULIN RESISTANCE IN MICE

Chun-Xia Meng, postdoctoral fellow; Julia Taylor, research assistant professor; Christopher D. Kassotis, graduate student; Victoria D. Balise, graduate student; Chiamaka J. Isiguzo, PREP scholar; Katelyn M. Cinnamon, undergraduate student; Anne R. Maas, undergraduate student; Jennifer Sommerfeld-Sager, research specialist; Fred vom Saal, professor
Mentor: Susan C. Nagel, PhD, Department of Obstetrics, Gynecology and Women's Health

Poster 109
DEVELOPMENT OF A NOVEL DECELLULARIZED MENISCAL SCAFFOLD FOR USE IN TISSUE ENGINEERING

Farrah A. Monibi, DVM, PhD-3, pathobiology; Aaron M. Stoker, MS, PhD, research associate professor; Ferris M. Pfeiffer, PhD, assistant professor; Keiichi Kuroki, DVM, PhD, associate professor; Seth L. Sherman, MD, assistant professor
Mentor: James L. Cook, DVM, PhD, professor, Department of Orthopaedic Surgery

Poster 110
EXERCISE OR CALORIC RESTRICTION INCREASES BONE FORMATION RELATIVE TO RESORPTION AND IMPROVES INTRINSIC BONE STRENGTH IN OBESE, TYPE 2 DIABETIC OLETF RATS

Laura C. Ortinau, doctoral candidate; Mathew W. Richard, master's student; Melissa A. Linden, PhD, postdoctoral fellow; R. Scott Rector, PhD, faculty
Mentor: Pamela S. Hinton, PhD, Department of Nutrition and Exercise Physiology and Medicine; Truman VA

Poster 111
LOSS OF FUNCTION IN αA-CRYSTALLIN MUTANT G98R IS RESCUED BY A COMPENSATORY MUTATION IN THE N-TERMINAL OF THE PROTEIN

Ashutosh S. Phadte, graduate student
Mentor: K. Krishna Sharma, MSc, PhD, Department of Ophthalmology

Poster 112
A QUANTIFICATION OF THE CHANGES IN ARTICULAR CARTILAGE MATERIAL PROPERTIES DURING THE ONSET OF OSTEOARTHRITIS USING STRESS RELAXATION TESTING

Joe Rexwinkle, PhD student; Nikki Werner, MS student; Andrew Polk, undergraduate student
Mentor: Ferris M. Pfeiffer, PhD, Department of Orthopaedic Surgery

Poster 113

A SOY-PROTEIN-BASED DIET DOES NOT ALTER SERUM MARKERS OF BONE FORMATION AND RESORPTION IN OVARIECTOMIZED, LOW-FIT RATS

Matthew W. Richard, master's student; Laura C. Ortinau, doctoral candidate; Terese Z. Zidon, doctoral candidate; Victoria Viera-Potter, PhD, faculty
Mentor: Pamela S. Hinton, PhD, Department of Nutrition and Exercise Physiology

Poster 114
STING SIGNALING REGULATES PROTECTIVE IMMUNITY

Vikas Saxena, postdoctoral fellow; Karin Knudson, postdoctoral fellow; Mark A. Daniels, assistant professor; Peter M. Lauer, associate director; Daniel A. Portnoy, professor
Mentor: Emma Teixeiro, PhD, assistant professor, Department of Molecular Microbiology & Immunology

Poster 115
ROLE OF CHOLINERGIC BASAL FOREBRAIN IN NICOTINE AND ALCOHOL CO-ABUSE

Rishi Sharma, postdoctoral fellow; Aishwary Kumar, BS; Samuel Stahly, BS; Imran Rice, BS; Pradeep Sahota, MD
Mentor: Mahesh Thakkar, PhD, Harry S. Truman Memorial Veterans' Hospital/Research, Department of Neurology

Poster 116
eNOS IS EXPRESSED BY PRIMARY MURINE HEPATOCYTES AND REGULATES FATTY ACID OXIDATION *IN VITRO*

Ryan D. Sheldon, doctoral candidate; E. Matthew Morris, PhD, research associate, KUMC; Melissa A. Linden, PhD, postdoctoral fellow; Grace M. Meers, senior research specialist; John P. Thyfault, PhD, associate professor, KUMC; M. Harold Laughlin, PhD, professor
Mentor: R. Scott Rector, PhD, assistant professor, Medicine, Nutrition and Exercise Physiology, Biomedical Sciences; Harry S. Truman Memorial Veterans' Hospital

Poster 117
QUANTITATIVE PROTEOMIC ANALYSIS OF DIETARY EFFECTS OF SUTHERLANDIA AND ELDERBERRY ON TRANSIENT CEREBRAL ISCHEMIA IN MICE

Hailong Song, graduate student; Hui Zhou, postdoctoral fellow; Zhe Qu, postdoctoral fellow; Jilong Li, graduate student; Shuwei Li, assistant professor; Jiankun Cui, research assistant professor; Agnes Simonyi, research assistant professor; Victoria A. Engel, graduate student; Shanyan Chen, graduate student; Jianlin Cheng, associate professor

C. Michael Greenlief, professor; Andrew L. Thomas, research assistant professor; Kevin L. Fritsche, professor; William R. Folk, professor; Dennis B. Lubahn, professor; Grace Y. Sun, professor
Mentor: Zezong Gu, PhD, associate professor, Department of Pathology and Anatomical Sciences

Poster 118
METABOLIC RESPONSES OF ANNULUS FIBROSIS AND NUCLEUS PULPOSUS TO PRO-INFLAMMATORY STIMULI

James T. Stannard, PhD Student 3; Aaron M. Stoker MS PhD; James L. Cook DVM PhD
Mentor: Theodore J Choma, MD, Department of Orthopaedic Surgery

Poster 119
EX VIVO GENE THERAPY FOR RETINAL DEGENERATION IN A CANINE MODEL OF CLN2 NEURONAL CEROID LIPOFUSCINOSIS

Christopher J. Tracy, PhD candidate; Rebecca E.H. Whiting, PhD; Lauren E. Gillespie, BS; Jeffrey Bryan, DVM; Baye G. Williamson, DVM; Jacqueline W. Pearce, DVM
Mentor: Martin L. Katz, PhD, Genetics Area Program and Department of Ophthalmology

Poster 120
CORRELATION OF BIOMARKER PRODUCTION TO BIOMECHANICAL, BIOCHEMICAL, AND HISTOLOGICAL PROPERTIES OF OSTEOARTHRITIC OSTEOCHONDRAL TISSUE OBTAINED FROM PATIENTS UNDERGOING TOTAL KNEE REPLACEMENT

Nicole C. Werner, MS student; Aaron M. Stoker, MS, PhD; Ferris M. Pfeiffer, PhD; James T. Stannard, PhD student; Chantelle C. Bozynski, DVM, MS; Sonny Bal, MD, JD, MBA, MS
Mentor: James L. Cook, DVM, PhD, Department of Orthopaedic Surgery

Poster 121
BIMODAL MRI/FLUORESCENCE IMAGING CONTRAST AGENT TARGETING HUMAN PROSTATE CANCER

Hang Xu, PhD student; Rajendra P Bandari, PhD; Ping Yu, PhD; Li Lee, PhD student; Charles J Smith, PhD; Michael R Aro, MD; Amolak Singh, MD; Timothy J Hoffman, PhD
Mentor: Lixin Ma, PhD, Department of Radiology

POSTER 1

RELATIONSHIP OF A METOPIC RIDGE AND ANTERIOR CRANIAL VOLUME MEASURED BY A NON-INVASIVE LASER SHAPE DIGITIZER

Nathan Applegren, M1
Chase Derrick, MD, PGY-5, Division of Plastic Surgery
Kristina Aldridge, PhD, Department of Pathology and Anatomical Sciences
(Arshad Muzaffar, MD)
Division of Plastic Surgery

Background & Purpose: To determine whether there is a relationship between the presence of a metopic ridge and the anterior cranial volume measured using a non-invasive laser shape digitizer (STARscanner) in infants presenting with abnormal head shape.

Method: We performed an IRB-approved retrospective review of 322 patients less than 1 year of age presenting to our craniofacial anomalies clinic with abnormal head shape. Patients were categorized according to presence or absence of a metopic ridge. Patients with metopic ridge were characterized further by trigonocephaly (mild/moderate) or no trigonocephaly. Patients with severe trigonocephaly (surgical candidates) were excluded. Head shape data were captured and quantified using the STARscanner, which employs four lasers to create a circumferential line around the surface of the cranium while eight cameras reconstruct the three-dimensional surface. Groups were statistically compared using a series of analyses of variance (ANOVA).

Results: 211 patients met inclusion criteria; 96 had a metopic ridge. Of these, 19 had mild and 8, moderate, trigonocephaly. Anterior cranial volume was significantly greater in patients without a metopic ridge than patients with a ridge ($p=0.040$). Of patients with metopic ridge, those with trigonocephaly had reduced anterior cranial volume ($p =0.032$) and cephalic ratio ($p=0.002$) compared to those without trigonocephaly.

Conclusions: This study has identified an association between the presence of a metopic ridge and reduced anterior cranial volume in patients who are not typically considered surgical candidates. Patients with metopic ridge and less severe manifestations of trigonocephaly had smaller anterior cranial volume measurements than those without trigonocephaly.

POSTER 2

DEGREE OF SURGICAL REDUCTION OF SPONDYLOLISTHESIS AMONG A COHORT OF ONE AND TWO LEVEL FUSION PATIENTS: DO COMPLICATIONS ARISE WITH CORONAL CORRECTION?

Nathan Beckett, M2
Christina Goldstein MD, FRCSC
Caleb Smith, M2
(Theodore Choma MD)
Department of Orthopedic Surgery

Introduction: Reported complication rate for the reduction of vertebral slipping during coronal correction procedures vary widely within the literature, ranging from 0-75%. Patients with symptomatic spondylolisthesis may improve with lumbar fusion, but the benefit of axial column restoration may be outweighed by potential unintentional neurologic insult during the reduction maneuver. The purpose of this study was to test the hypothesis that reduction significantly impacts complication rates.

Methods: This retrospective study used ICD-9 codes to identify a cohort of 104 University of Missouri Orthopedics patients who underwent spinal surgery for symptomatic spondylolisthesis between 2006 and 2012. Inclusion criteria included: >18 years old, previous diagnosis of isthmic or degenerative spondylolisthesis, and underwent lumbar or lumbosacral fusion. Exclusion criteria included: patients lacking required preoperative and postoperative radiographic studies, fusion procedures >2 levels, radiographic follow-up of <1 year, and Meyerding <0 or >1. All anatomical approaches to instrumented fusion were included. Complications included infection, implant failure, spinal disease progression, pseudarthrosis, and perioperative complications. Data was analyzed using Pearson Chi square calculations and was presented with odds ratios, 95% confidence intervals and corresponding P values [OR (95% CI)]. A P value <0.05 was considered significant.

Results: No significant correlation between complication and degree of reduction was found amongst any subdivision of patients (one or two levels fused, no reduction or Meyerding change of 1), nor for the cohort as a whole.

Conclusion: Surgical correction of spondylolisthesis does not significantly reduce or increase risk of associated complications.

POSTER 3

EFFECTS OF INCREASED DIETARY PROTEIN ON MOOD STATE AND COGNITIVE FUNCTION IN HEALTHY, OVERWEIGHT WOMEN

Daija M. Buchanan, undergraduate student
Jess A. Gwin, doctoral student
Rebecca S. Shafer, M.S., NSCA-CPT, human clinical research specialist
Connor A. Roenfeldt, undergraduate research assistant
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Background: Limited scientific evidence illustrates improvements in mood state and cognitive function with increased protein consumption. However, the majority of these studies were single-meal acute trials. Thus, it is unclear as to whether the daily consumption of increased dietary protein, provided at each meal, influences these outcomes.

Purpose: To investigate the effects of consuming normal-protein (NP) vs. higher-protein (HP) meals across the day on daily mood state and cognitive function in healthy, overweight women during energy balance (EB).

Methods: Seventeen women (age: 34±2y; BMI: 27.8±0.4kg/m^2) completed the following randomized, full-feeding, crossover design study. The participants randomly consumed an EB diet (2000kcal/d) containing NP (76g pro/d) or HP (125g pro/d) for 7 days/treatment. On day 6 of each pattern, participants completed a tightly-controlled 11-h testing day consisting of questionnaires assessing daily mood state and cognition.

Results: No differences in any mood state or cognitive function across the day were detected following the HP treatments.

Conclusions: The consumption of increased dietary protein had no impact on mood state or cognitive function in overweight, healthy women during energy balance.

POSTER 4

ASSESMENT OF SMOKING CESSATION INTERVENTIONS IN A STUDENT-RUN FREE CLINIC

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Introduction: Student-run clinics are health care delivery programs in which medical students manage the entirety of clinic operations under the supervision and guidance of faculty physicians. Student-run free clinics typically provide health care services for the uninsured and homeless members of the community. Patients that utilize the care of student-run free clinics are at increased risk for smoking, as adults that live at or below the federal poverty level have a higher prevalence of cigarette smoking than adults living above the poverty level, and 30% of uninsured individuals smoke. Cigarette smoking is the leading cause of preventable disease and death in the United States, and with a patient population at heightened risk for cigarette smoking at student-run free clinics and the increasing prevalence of student-run free clinics, it is essential that smoking cessation programs be not only employed, but effective at such clinics.

Purpose: This study evaluates the smoking cessation program at one student-run free clinic, MedZou Clinic of the University of Missouri-Columbia SOM. This study will determine the prevalence of cigarette smoking among MedZou patients and identify among the current smokers which types of patients decide to partake in the smoking cessation program and which patients do not partake. The study also aims to evaluate the efficacy of the program as a whole and between different cohorts. The findings will highlight areas for intervention to increase the number of patients that seek smoking cessation services and to change the program itself to enhance its efficacy among certain groups of patients.

POSTER 5

RELATIONSHIP OF SELF-REPORTED AND PROXY-REPORTED QUALITY OF LIFE SCORES IN UNHEALTHY WEIGHT CHILDREN

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Purpose/Hypothesis: The purpose of this study is to determine whether caregivers' perceptions and children's self-reported quality of life scores are correlated in unhealthy weight children overall and in the four subscales of the Pediatric Quality of Life Inventory (PedsQL): physical functioning, emotional functioning, social functioning, and school functioning. Based on previous studies, we expected to find no significant correlations.

Methods: Forty-nine child-caregiver dyads were recruited based on BMI and age by telephone and during regular appointments at the University of Missouri, Women's and Children's Specialty Clinic. Those dyads willing to return for a separate study visit were recruited. During the study visit, the caregivers and children were interviewed separately and quality of life was assessed using the PedsQL. Spearman's correlations were analyzed overall and on the four subscales between children's responses and caregivers' responses as a proxy.

Results: We found the caregivers' PedsQL scores were significantly correlated to the children's scores for the subscales of physical and school functioning and for the total score ($r=0.415$, $p=0.010$; $r=0.367$, $p=0.003$; and $r=0.352$, $p=0.018$, respectively). The correlations for the subscales of social and emotional functioning were not significantly correlated ($r=0.248$, $p=0.069$ and $r=0.268$, $p=0.300$ respectively).

Conclusions: By analyzing the four subscales of the PedsQL separately, we found correlations suggesting that caregivers appear to be somewhat aware of their unhealthy weight children's quality of life in physical and school functioning. However, these correlations were not found for emotional and social functioning. Future studies should investigate what factors affect these correlations.

POSTER 6

PLATELET ADENOSINE DIPHOSPHATE INHIBITION IN TRAUMA PATIENTS BY THROMBOELASTOGRAPHY CORRELATES WITH PARADOXICAL INCREASE IN PLATELET DENSE GRANULE CONTENT BY FLOW CYTOMETRY

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Background: The mechanism of platelet dysfunction in traumatic brain injury (TBI) as seen on Thromboelastography with Platelet Mapping (TEG-PM) is largely unknown. We tested the hypothesis that trauma activates and exhausts platelets of their dense granules thereby explaining their dysfunction.

Methods: Class 1 trauma patients were prospectively divided into the TBI group and the non-TBI trauma group (N-TBI). Healthy volunteers who were age and gender matched to the trauma patients served as controls (NORM). All had a TEG-PM study performed on admission to determine functional platelet inhibition with ADP as well as flow cytometry with mepacrine (quinacrine) uptake in unstimulated platelets to quantify platelet dense granule content using median fluorescent intensity (MFI) analysis.

Results: Twenty-five Level One trauma patients were enrolled in the study — 12 TBI and 13 N-TBI. All showed significant ADP inhibition (>30%). The NORM group consisted of 8 healthy volunteers; there was no significant ADP inhibition on TEG-PM. Mepacrine flow cytometric assay showed an average MFI for all trauma patients to be 4259.32 ± 1341.26. The average MFI in normal controls was 3143.63 ± 709.45 (Table 1).

Conclusion: Our analysis of mepacrine uptake in platelet dense granules by flow cytometry demonstrates that patients with traumatic brain injuries maintain their dense granules, disproving the theory of platelet granule exhaustion as the etiology for platelet dysfunction in trauma. Further investigation will analyze platelet ADP receptor function as well as search for possible platelet inhibitors in trauma.

POSTER 7

EVALUATION OF MENTAL HEALTH SCREENING AND SERVICE DELIVERY AT A STUDENT-RUN FREE HEALTH CLINIC IN COLUMBIA, MISSOURI

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Background: The MedZou Community Student-Run Free Clinic is a primary health clinic that works with uninsured patients in Central Missouri. As depression and anxiety are known to disproportionately impact low-income individuals and negatively impact health outcomes, I wanted to determine the effectiveness of mental health screening and services at the student-run free clinic.

Methods: A retrospective chart review was performed on all patients seen at the MedZou Clinic from May 1, 2014 to June 1, 2015. Data was extracted on patient demographics and income status, vital signs, diagnoses, and mental health screening, follow-up and treatment. Data was entered using RedCap® software. Analysis was completed using excel and SPSS.

Results: Of the 204 patients seen from May 1, 2014 to June 1, 2015, 201 (98.5%) were screened for depression/anxiety using a four-question screening tool. 141/201 (70.1%) answered yes to one of the four screening questions. Of those who answered yes, 96 (68.1%) had a documented discussion about mental health in their chart. 73 (76.04%) were receiving pharmacologic therapy for a mental illness.

Conclusion: While MedZou has been effectively screening patients for depression and anxiety, subsequent documented follow-up with the patients during their visit has been lower than expected. This could be complicated by poor documentation, challenges in clinic flow, and limited time to address all the health concerns of the patient. This data will be used to improve systems within the clinic and expand mental health services.

POSTER 8

RELAXING EYE DROP: *IN VIVO* SAFETY AND TOXICITY TO THE EYE

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Rationale and Hypothesis: Toxicity and safety evaluations are an integral part of translational drug discovery. Recently, a new ophthalmic formulation was developed with our collaborator to treat eye infections. Because of proprietary reasons a new ophthalmic formulation has been named as the "Relaxing Eye Drop". This study aimed to define in vivo toxicity and safety of the "Relaxing Eye Drops" to the eyes using a rabbit model.

Methods: New Zealand White rabbits were used. Animals either received 3-4 drops of Balanced Salt Solution (Control group) or "Relaxing Eye Drop" (Test group) topically for 4 days (Treatment regime followed standard toxicity testing protocol). Ocular health was recorded with Slitlamp- and stereo- microscope. Draize score, McDonald-Shadduck score, and intraocular pressure (IOP) were used to determine ocular toxicity and safety. Rabbit corneas were collected on day-7, and subjected to H&E and immunofluorescence to examine tissue morphology, apoptosis and immune cell infiltration in the cornea.

Results: No differences in Draize scores (ocular irritation), IOP measurements, and McDonald-Shadduck scores (edema, opacity or inflammation) was noted on day-0, -1, -3 or -7 in the eyes of control and test groups. Also, scores were comparable to the naïve corneas. Further, no apoptosis, inflammation, edema or opacity was detected in the eyes of control and experimental groups. The corneas of each group showed normal corneal morphology without infiltrating immune cells in the stroma.

Conclusion: The "Relaxing Eye Drop" appears safe for topical application to the eye. More animal studies are warranted.

Funding: University of Missouri Ruth M Kraeuchi Endowment Fund and resources of VA Merit (1I01BX00035701) and NIH (RO1EY17294).

POSTER 9

SCREENING YOUTH ATHELETES FOR HIGH RISK LANDING PATTERNS USING AN INEXPENSIVE AND PORTABLE MOTION SENSOR DEVICE

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Background: Biochemical and neuromuscular imbalances predispose young athletes to lower extremity injuries including anterior cruciate ligament (ACL) tears. Prior work has validated Microsoft Kinect versus Vicon to detect knee-ankle separation ratio (KASR) during the drop vertical jump test (DVJ). Increasing amounts of dynamic knee valgus have been linked with increased risk of ACL injury in female athletes. Our hypothesis is that screening with the Kinect will be safe, efficient, and provide potentially useful information to screen athletes for injury risk.

Methods: 180 healthy athletes, ages 14-18 (80 males, 100 females, age: 16.9 ± 1.31, BMI: 22.8 ± 3.7) participated. Each subject performed three successful DVJ. The Kinect was used to capture the ratio of the horizontal distance between knees to the horizontal distance between ankles (KASR) for initial contact and peak flexion.

Results: Our results showed a significant difference between male and female KASR for both initial contact ($p<0.001$) and peak flexion ($p<0.001$). 22.5% of male subjects and 60% of female subjects landed with dynamic knee valgus. The average KASR for males was 1.26 (peak flexion) and 1.13 (initial contact). The average KASR for females were 1.01 (peak flexion) and 0.967 (initial contact).

Conclusion/Discussion: Our findings suggest that a portable and inexpensive motion analysis device can quickly detect dynamic valgus during the DVJ in youth athletes, while being safe and efficient. Known gender disparities between male and females for neuromuscular imbalances were identified. Potential use of this information for targeted injury prevention is appealing and requires further investigation.

POSTER 10

SURVEILLANCE OF CAUSATIVE ORGANISMS IN INFLUENZA-LIKE ILLNESSES IN THE STATE OF MISSOURI

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Flu-type illnesses are a health concern in both pediatric and adult populations, which has prompted the use of influenza vaccinations. Unfortunately, such vaccinations cannot provide coverage against every organism that causes a flu-like illness. While the organisms that are included in each year's vaccine are determined based on global and national prevalence, it has not previously been determined whether this correlates with more local prevalence of organisms, specifically within the state of Missouri.

The objective of this study was to examine the prevalence of specific viruses in pediatric patients in the state of Missouri during the 2014-2015 "flu season," in order to determine if the flu vaccine for this particular year correlated well to the specific organisms observed within the state.

This was a retrospective chart review of patients who presented to the University of Missouri Health Care System between the months of September 2014 and May 2015 for flu-like symptoms. Data, including the results of viral panels, age, gender, ethnicity and location within the state was collected on 7,221 subjects. The data was analyzed so that the results of the viral panel could be correlated to the subject's demographics and location of residence within the state.

POSTER 11

IMPACT OF LINGUISTIC LOAD ON TONGUE MOTOR CONTROL IN OLDER ADULTS

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Background and Motivation: There is compelling research on the detrimental effects of linguistic load on speech motor control in children and young adults. Prior research shows that articulatory movements become less stable when linguistically complex utterances are produced (Maner et al., 2000; Sasisekaran et al., 2010). There is no existing research on the impact of linguistic demands on the speech motor system in older adults. The proposed study addresses a significant gap in scientific knowledge on tongue motor control changes during the production of linguistically complex utterances in older adults.

Methods: Ten males between 50-70 years were recruited as participants. Tongue movements were recorded from the tongue tip, middle, and back using an electromagnetic articulograph (NDI, Canada). Each participant produced 32 words that varied in phonological and lexical complexity. Tongue motor control for each word was assessed using the spatiotemporal variability index – a measure that captures tongue movement variability (Smith & Zelaznik, 1998).

Expected outcomes: Our data on young college-aged adults shows that tongue movement variability increases with phonological and lexical complexity; therefore, we expect older participants to show greater tongue movement variability than young adults as linguistic demands increase.

Discussion and Clinical Significance: If findings similar to those for young adults are observed in older adults, it would further strengthen the current hypothesis that complex interactions exist between higher-level linguistic and lower-level speech motor processes. Such findings can be integrated into a clinical and theoretical framework that takes into account these top-down interactions to optimize speech assessment and treatment.

POSTER 12

A RESTROSPECTIVE COHORT STUDY OF FIVE COMMON MEDICAL DIAGNOSES IN A STUDENT-RUN FREE MEDICAL CLINIC

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As student-run free health clinics are becoming more prevalent, with nationwide clinics reporting more than 36,000 annual patient-physician visits, evaluating the care delivered by such clinics has gained increasing importance.[6] Student-run clinics are health care delivery programs in which medical students manage the entirety of clinic operations, including practicing diagnosing and treating patients under the supervision and guidance of faculty physicians. Student-run free clinics typically provide health care services for the uninsured and homeless members of the community. Student-run free clinics become primary care providers for these medically underserved patient populations that are at high risk for poor management of serious medical problems including substance abuse, hypertension, diabetes, mental illness, and more.

Patients that utilize the University of Missouri free medical clinic (MedZou) are most frequently treated for hypertension, COPD/asthma, mental illness, diabetes, and hyperlipidemia. To date, no analysis of 1) how effective MedZou has been at adhering to national diagnosis and treatment guidelines; and 2) how MedZou interventions have affected measureable patient outcomes. Demographic and other patient visit information including patient age, sex, family medical history, past medical/surgical history, tobacco/alcohol/drug use, medical comorbidities, vital signs, relevant medical testing, and treatment interventions (medications prescribed) was gathered. Interventions made at MedZou were compared to standard guidelines[1,2,3,4,5] and MedZou's adherence within said guidelines was assessed. Based on these outcomes, specific protocols for improving patient care were derived and implemented.

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POSTER 13

EFFECTS OF PACED BREATHING ON COGNITIVE FLEXIBILITY

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Previous studies show a decline in problem solving capacity with stress, and that propranolol, a beta-adrenergic antagonist, can decrease these effects. Further studies demonstrate that cognitive flexibility is regulated by the noradrenergic system and can be improved with propranolol, even in the absence of stressors.

In order to determine if meditation could be utilized in place of propranolol, we examined if similar cognitive improvements could result from a slowed breathing technique, an easily implemented proxy to meditation. Furthermore, we assessed if changes in heart rate variability due to slowed breathing were associated with increases in cognition.

Anagram task performance was compared in 30 participants using a within-subject design. Electrocardiogram readings, blood pressure, and stress perception were recorded during independent sessions of normal breathing and paced breathing exercise for 10 minutes respectively. After completion of a normal or paced breathing exercise, participants completed cognitive assessments. Dependent-sample t-tests assessed differences in blood pressure or heart rate.

Blood pressure was significantly different between breathing conditions only at the end of the study. No significant differences were found between heart rate, heart rate variation, or stress perception. Overall, performance on cognitive tasks was not significantly different between breathing conditions. However, linear regression revealed a significant positive association between the letter fluency change score and the standard deviation in heart rate change score, a measure of heart rate variability, suggesting inter-individual variability in response to paced breathing. Future studies may wish to investigate if daily paced breathing exercises can increase cognitive function.

Poster 14

CLINICAL FEATURES OF IDIOPATHIC ANOGENITAL PRURITIS IN ADULT MALES

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Dermatology

Anogenital pruritus, or itching localized to the scrotum and anogenital region, is a common condition in dermatology. In most cases, a cause of pruritus can be identified and appropriately treated. However, in a small subset of patients, no cause can be identified. These patients are considered to have idiopathic anogenital pruritus (IAP). For these patients, treatment options are limited and individuals often suffer chronically, considerably affected quality of life and self-image. Standard of care is limited to topical therapies and encouraging adequate hygiene. Although there is likely no one single cause for IAP, for treatment purposes, it would be ideal if there were better statistical analysis of the most likely causes.

The primary objective for this research project was to gather information from the medical chart on medical, orthopedic, and psychiatric conditions that may be associated with IAP. Study assessments included a medical chart review as well as an ItchyQoL, a survey tool used in dermatology to assess the quality of the symptoms. Only patients 18 years or older with pruritus of the anogenital area for more than six weeks were included in the study. Anyone with evidence of a primary skin disease was excluded from the study so that other reasons for the itch could be assessed.

The results are currently being done by de-identified data to be analyzed by the PI and the Sub-I. Descriptive statistics will be utilized and final results section will be presented during Health Sciences Research day.

POSTER 15

EFFECT OF KETROLAC ON BENIGN HEADACHE

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Headaches are a very common presenting problem to Emergency Departments (ED). Multiple agents are used in the management of headaches in the Emergency Department. These agents include anti-dopaminergic agents, such as metoclopramide, promethazine, prochlorperazine, non-steroidal anti-inflammatory drug (NSAID), narcotics, triptans, and others drugs. Prochlorperazine is one of the most effective and most commonly utilized agents for migraine headaches. Though commonly employed in practice, the role and efficacy of using agents from different classes in combination has not been well investigated. Our study is designed to examine the effect of adding ketorolac to a standard intravenous dose of prochlorperazine in patients presenting with headache.

We conducted a prospective, double-blind, randomized controlled trial of adult, non-pregnant patients (age > 18 years old) presenting to the Emergency Department with the primary complaint of headache. Exclusion criteria included any clinical evidence of trauma or infectious etiology for the headache.

Eligible patients were randomized to receive either 30mg of intravenous ketorolac or placebo in combination with a 15 minute infusion of 10 mg of intravenous prochlorperazine. Pain level and nausea were subsequently assessed at 0, 30, and 60 minutes using a visual analog scale to assess whether the addition of ketorolac results in a greater improvement of the patient's pain score.

To date, 19 patients have been enrolled in the trial, with a planned enrollment of 150 patients and an interim analysis after 37 patients are enrolled.

POSTER 16

RETROSPECTIVE REVIEW OF INFECTIVE ENDOCARDITIS FROM 2007-2012 AT THE UNIVERSITY OF MISSOURI

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Background: We describe our clinical experience and outcomes of infective endocarditis (IE) over the past six years.

Methods: 120 patient charts with the diagnosis of endocarditis were reviewed from January 1, 2007 through December 31, 2012 for presence of definite or possible IE as determined by the modified Duke criteria [1] for epidemiology, microbiology, and outcomes.

Results: 98 patients with definite and 22 patients with possible IE by the modified Duke criteria were analyzed. The majority of cases presented within 30 days of symptoms (86.8%). Staphylococcus and Streptococcus accounted for 70.6% of cases. A history of IE, congenital heart disease, and/or the presence of prosthetic valve existed in 42.1%. A history of intravenous drug abuse was present in 25 (21.9%) patients. Among intravenous drug users (IVDU), MRSA was the most common pathogen and the tricuspid valve was most commonly involved. All three cases of *S. pneumoniae* IE were in patients with alcoholism. Common complications included: stroke (9.6%), embolization other than stroke (56.1%), and heart failure (22.8%). A transesophageal echocardiogram was performed alone in 25.4% and in combination with a transthoracic echocardiogram in 50.9% of the cases. 35 patients (30.7%) underwent valve replacement.

Conclusions: Our data reflects a large series of IE, which is mostly an acute illness at our institution and mostly community –acquired. As expected *S. aureus* and the tricuspid valve were most commonly associated with IVDU. Alcoholism was found to be a risk factor for *S. pneumoniae* endocarditis [CID 1998; 26: 165-71]. Surgery was not routinely performed during the primary admission. Nutritionally variant streptococci endocarditis was more common in IVDU.

POSTER 17

DOES OPTIMIZED GENERAL ANESTHESIA CARE REDUCE POSTOPERATIVE DELIRIUM IN OLDER PATIENTS UNDERGOING HIP FRACTURE REPAIR?

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Background: Postoperative delirium occurs in more than 50% of patients following hip fracture surgery. The Interdisciplinary Hip Fracture Improvement Team at the University of Missouri hospital implemented a hip fracture protocol to optimize perioperative care in 2001. As a result, the incidence of postoperative delirium has decreased to 35%. Still, little has been done to optimize intraoperative anesthesia care to further minimize postoperative delirium in this population.

Objective: To determine if an optimized general anesthesia regimen during surgery can decrease the incidence and severity of postoperative delirium.

Methods: After obtaining informed consent, elderly patients were randomized to either optimal or usual anesthesia care during hip fracture surgery. All patients received the same anesthetic agents. In the usual care group, anesthetic management was titrated using clinical judgment. In the optimal care group, the following interventions were used: 1. anesthesia was titrated using the bispectral index (BIS®), a device that evaluates depth of anesthesia using electroencephalography; 2. cerebral oxygenation was measured and, if cerebral desaturations occurred, interventions to improve cerebral oxygenation (increased oxygen administration and/or blood pressure) were implemented; 3. blood pressure was maintained within 20% of baseline. The monitors (BIS and cerebral oxygenation) were placed on all patients but only used to direct care in the optimal care group. Following surgery, patients were evaluated daily and screened for delirium using the Confusion Assessment Method.

Results: Pending – data collection is currently ongoing.

Conclusion: Although final results are pending, initial results suggest intra-operative anesthesia optimization may ultimately improve postoperative outcomes.

POSTER 18

AN UNDERAPPRECIATED LEUKOCYTE IN NECROTIZING ENTEROCOLITIS

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Background: Recent reports demonstrate neonatal basophils inhibiting early-life dendritic cells and preventing T helper cells from assisting in the fight against infection. Hence, we theorized basophil counts on hematologic profiles of preterm infants might discriminate between classic necrotizing enterocolitis (NEC) and transfusion-associated necrotizing enterocolitis (TANEC). Differentiating between the two disease processes will assist in understanding pathophysiology and help develop preventive and therapeutic strategies.

Objective: To investigate whether blood basophil levels may serve as a predictor of the onset of NEC.

Materials and Methods: Cases of NEC at MU Children's Hospital from 2008 - 2013 were matched with preterm infants without this disease. We examined complete blood counts and determined percentages per 100 white blood cells and absolute basophil counts prior to and during NEC. Data for controls was collected on a similar day of life. Other markers of inflammation are being evaluated.

Results: Demographics did not differ between case and control groups. Percentages and absolute basophil counts in the control group were greater ($p<0.05$) than those in the TANEC group on hematologic profile prior to NEC onset. Basophil counts recorded after the onset of the disease did not differ significantly. Basophil counts before and during NEC did not differ for classic NEC compared to controls.

Discussion and Conclusions: Currently, caregivers do not monitor blood basophil counts among at-risk neonates. This retrospective study shows lower blood basophil counts are a predictor for TANEC. Studies of basophils during the entire course of TANEC will define their role in pathogenesis and TANEC-related severity.

POSTER 19

COMPASS: A LONGITUDINAL COURSE ADDRESSING MEDICINE, PATIENT, SELF AND SOCIETY

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Medical education substantially impacts students' professional formation, effectiveness in inclusive practice, and mental health and wellness. The AAMC's statement on learning environment emphasizes high quality, safe, and effective care for patients founded in respect, resilience, integrity, and collaboration amongst others. We present a novel curricular program called COMPASS that seeks to build upon an educational structure with these aspects of the medical student development and mental health and wellness in mind.

Introduced in 2013, the Contemplating Medicine, Patients, Self and Society (COMPASS) course is a unique small group program composed of medical students from all 4 years. The goal of the course is to develop and foster skills of a physician with a focus on self-awareness, personal well-being, professional development, and culturally effective care. The sessions allow students the opportunity to reflect, mentor and discuss topics that are meaningful to each individual through storytelling, reflective writing and group discussion. Two faculty members guide students in topics such as personal transitions, values, and cultural awareness.

Due to the novelty of the COMPASS course, feedback is currently being collected to assess student and faculty input. Data regarding individual sessions as well as overall satisfaction and competences are being assessed. Feedback occurs in four ways; student evaluation of the course, faculty evaluation of the course, student evaluation of faculty and faculty evaluation of student competencies. Finally, a literature review was completed in order to address how each competency of the course should be effectively evaluated.

POSTER 20

INCIDENCE OF ANKLE FUSION AFTER PILON FRACTURE

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Introduction: Pilon fractures are severe injuries to the ankle with relatively high incidence of complications that can lead to ankle arthrodesis. The purpose of this study was to determine the effects of key variables on the likelihood of arthrodesis in patients with pilon fractures.

Hypothesis: Key patient variables will have significant effects on likelihood of arthrodesis in pilon fracture patients.

Methods: Patients with pilon fractures at the University of Missouri managed by three fellowship-trained orthopaedic trauma surgeons from 2005-2014 were studied. Medical records and radiographs were reviewed for patient demographics, co-morbidities, pre-injury arthritis, injury characteristics, associated injuries, mechanism of injury and functional activity. Current functional level was gathered by calling participants. Proportions for each patient variable were determined and Fishers Exact or chi-square tests were used to assess for significant ($p<0.05$) differences for each variable. When proportions were significantly different, odds ratio was calculated.

Results: 306 patients met inclusion criteria. Mean patient age at time of surgery was 43.8 +/- 15.4. No statistically significant differences in likelihood of arthrodesis were found with respect to patient age <65, tobacco use, fracture type or open fracture status. Diabetics were significantly ($p=0.001$) and 5 times more likely to have arthrodesis. The need for additional surgeries was significantly ($p<0.0001$) and 11 times more likely to be associated with arthrodesis.

Conclusion: Diabetic patients and those requiring additional surgeries beyond the initial pilon fracture surgeries are at significantly increased risk for arthrodesis. Surgeons may use this information to communicate these risks to their pilon fracture patients.

POSTER 21

CYTOKINE PROFILE ANALYSIS OF JUVENILE IDIOPATHIC ARTHRTIS PATIENTS

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Background: Approximately 17% of children between the ages of 2-19 are classified as obese. White adipose tissue was thought to only be involved in energy storage but is now regarded as an endocrine organ capable of secreting multiple adipokines that induce inflammation. Similarly, arthridites such as Juvenile Idiopathic Arthritis (JIA) are associated with inflammatory states mediated by cytokines. JIA is an autoimmune disease defined as the onset of chronic joint inflammation in children less than 16 years of age. This inflammation is marked by antigen presenting cells surrounded by activated CD4+ T-cells in the joint space. These helper T-cells ultimately lead to production of cytokines such as IFN-γ and IL-17, TNF-α, IL-1, and IL-6.

Objective: To evaluate the cytokine profile of children with Juvenile Idiopathic Arthritis and identify potential associations with sex, race, BMI profile, and joint involvement.

Methods: An inception cohort was utilized. All sequential consenting patients who presented with Juvenile Idiopathic Arthritis at the Women's and Children's Pediatric Rheumatology Clinic were included in this study. Demographic information, height, weight, and diagnoses were retrospectively reviewed via Electronic Medical Record. Cytokine values were provided by Dr. Peterson's lab from the department of Nutrition & Exercise Physiology. BMI was calculated according to CDC guidelines.

Results: No significant differences of any cytokine level were found between obese and non-obese patients, males and females, Caucasians and non-Caucasians, and mono-, oligo-, and polyarthritis.

Conclusion: Further patient recruitment is needed before drawing conclusions.

POSTER 22

DOES AN ELECTRONIC MEDICAL RECORD IMPROVE PROVISION OF DIABETES QUALITY-OF-CARE INDICATORS IN A STUDENT-RUN FREE CLINIC?

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Contradictory research exists on the effectiveness of electronic medical records (EMR). Student Run Free Clinics (SRFC) serve as primary care facilities for patients with limited resources. SRFC have proven effective in providing care for diabetes through the monitoring of diabetes quality-of-care indicators. EMR implementation at SRFC may increase the monitoring of diabetes quality-of-care indicators.

The purpose of this study was to determine the usefulness of EMR in improving diabetes quality-of-care at the University of Missouri SRFC, MedZou. To measure this a retrospective cohort study was conducted of 38 patients seen prior to and after EMR implementation. At each visit the following diabetes quality-of-care indicators were collected: gender, age, diagnosis, blood pressure, weight, height, BMI, HgA1c, LDL, cholesterol, urine albumin, evidence of dilated ophthalmology exam, peripheral neuropathy foot exam and medications.

No significant differences were found in diabetes quality-of-care indicators between pre and post-EMR (HgA1c t= .432, p=.670; Cholesterol t= .498, p=.628; LDL t=.524, p=.611). The lack of consistent provider care and patient follow-up at SRFC limits data sample size and results in inconsistent data charting. Implementation of a user-friendly quality of care program tracker tool may prove more effective in improving diabetes care at SRFC.

POSTER 23

COMPARISON OF ANTERIOR CRUCIATE LIGAMENT RUPTURE RATES IN MEN'S AND WOMEN'S HIGH SCHOOL SOCCER

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Background: Female athletes have been shown to have an increased risk of Anterior Cruciate Ligament (ACL) tears compared to males. Although this greater susceptibility has been shown, our goal was to quantify an incidence rate in high school soccer athletes.

Methods: A web-based survey was created and sent to every high school soccer coach in Missouri using the Missouri State High School Activities Association (MSHSAA) database. The survey investigated the number of athlete exposures over the course of the season and number of ACL injuries for each team in the 2011-2012 and 2012-2013 seasons. The primary outcome measure was ACL injuries. Secondary endpoints included specific characteristics of each ACL injury including contact or non-contact, position, practice or game, school grade, and playing surface.

Results: 36 ACL tears (28 female; 8 male) were reported during 330,062 estimated athlete exposures (163,511 male; 166,551 female). ACL injury rates were calculated per 1000 estimated athlete exposures: Female – total, 0.168; match, 0.47; practice, 0.02. Male – total, 0.05; match, 0.18; practice, 0. Female athletes had a total ACL tear incidence rate per 1000 estimated athlete exposures of 3.4 times greater than male athletes. Female athletes were 27x more likely to tear their ACL in a match compared to practice.

Conclusions: Results of the study showed female high school soccer athletes showed an increased rate of ACL rupture when compared to males. For both female and male athletes, the majority of ACL tears occurred during a match, with 83.33% of ACL tears occurring in matches.

POSTER 24

RECONSTRUCTION OF A COMPLEX DENTOSKELETAL DEFORMITY IN A PATIENT WITH SEVERE MACROGLOSSIA IN THE CONTEXT OF MUSCULAR DYSTROPHY

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Introduction: Macroglossia has been shown to contribute to orthognathic deformities including open-bite and malocclusion. When macroglossia is addressed before complete bone maturation, normal growth patterns can often be restored with orthodontia. However, when bone maturation occurs under the stress of an enlarged tongue, jaw abnormalities are less responsive to orthodontic treatment and require more extensive surgical intervention.

Patient Overview: The patient presented to our clinic when she was 19 years old with concerns of symptomatic macroglossia. The patient had a past medical history of congenital muscular dystrophy. On physical exam and radiologic imaging, she was noted to have macroglossia, class III malocclusion, and an anterior open bite.

Objectives: The treatment objectives were to: (1) reduce macroglossia, (2) improve her occlusal plane and open bite deformity, (3) improve the patient's functional mastication, and (4) achieve an improved cosmetic result.

Treatment Progress and Results: Our plan was a 2-staged procedure with tongue reduction followed by second stage double-jaw orthognathic procedure. The patient underwent 3 partial glossectomies to maximally improve her speech and masticatory potential, and to facilitate orthognathic surgery. At 4 years after initial presentation, she underwent the orthognathic procedure consisting of a Le Forte 1 osteotomy with maxillary advancement and bilateral sagittal split osteotomy with mandibular setback. Ultimately, we achieved an acceptable and stable functional and cosmetic result.

Conclusions: Early intervention has the potential to limit the severity of dentoskeletal deformities and the necessary intervention. However, good surgical options and prognoses exist for patients presenting after full dentoskeletal maturation.

POSTER 25

DOES CIRCADIAN RHYTHM CONTRIBUTE TOWARDS SLEEP INERTIA: A META-ANALYSIS

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Background: Sleep inertia is a transient decrease in performance and alertness that occurs immediately after awakening. The effects of sleep inertia are variable and can last from 1 minute to approximately 4 hours upon awakening. These cognitive and performance decrements are severe and can have a profound impact on decision making and/or performing critical tasks. Sleep is regulated by the interaction of two processes: Process S or the homeostatic drive that maintains the "constancy" in the amount of sleep and Process C that maintains the timing of sleep. Since the nadir of the Process C occurs in the early morning hours, some previous studies have implicated circadian rhythm as a major contributing factor in sleep inertia. However, others have been unable to demonstrate that sleep inertia has any circadian rhythm. Thus, to further examine the role of circadian rhythm in sleep inertia we decided to perform a meta-analysis.

Methods: We've started reviewing the literature and are in the process of performing a meta-analysis to further understand the role of circadian rhythm in the development and maintenance of sleep inertia. We have conducted a "PubMed" search using free-text search term "sleep inertia" to identify studies.

Results: To date, our search has retrieved 152 publications. Our preliminary results indicate a role of circadian rhythm in sleep inertia. However, further analysis is required at this time. We expect to complete the review and meta-analysis in a few weeks and present our findings at the Health Sciences Poster Session.

POSTER 26

DOES PRE-OPERATIVE COGNITIVE STATUS PREDICT THE DEVELOPMENT OF POST-OPERATIVE DELIRIUM IN OLDER PATIENTS UNDERGOING HIP FRACTURE REPAIR?

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Background: Post-operative delirium (POD) occurs in up to 50% of patients undergoing hip fracture surgery. The Interdisciplinary Hip Fracture Improvement Team at the University optimizes perioperative care in these patients using a hip fracture protocol, decreasing incidence to as little as 35%. A screening tool that would predict which patients are at highest risk for POD would allow practitioners to implement additional measures to further minimize the duration and severity of POD.

Objective: This prospective study is examining preoperative comorbidities and cognitive status in patients presenting for hip fracture surgery to identify predictors of POD.

Methods: We enrolled patients, 65 years of age or older, who were scheduled for surgery to correct a hip fracture at University Hospital. After obtaining informed consent, we performed a battery of neuropsychological tests to quantitate the cognitive status of each patient prior to their surgery. Additionally, we collected data on demographics, comorbidities, and preoperative functional status. Following surgery, we visited the patients daily to screen for delirium using the Confusion Assessment Method, a validated screening tool for delirium. If a patient screened positive for delirium, we completed a more comprehensive assessment with the Delirium Rating Scale-Revised-98 to assign a severity score for their delirium.

Results: Pending – data collection is currently ongoing

Conclusion: Although final results are pending, initial results suggest the following: 1) patients with preoperative cognitive impairment are more likely to develop POD than those without, and 2) low preoperative cognitive function may be the most sensitive risk factor for POD.

POSTER 27

HORSES WORKING IN THERAPEUTIC RIDING PROGRAMS: CORTISOL AND BEHAVIOR STRESS INDICATORS

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Therapeutic horseback riding programs have been demonstrated to have many positive outcomes for people, including those with severe physical and mental disabilities, such as military veterans with Post-Traumatic Stress Disorder. With continued growth in the number of horses used for therapeutic riding, it is imperative to consider the stress levels of horses to ensure both health and welfare for the animals. The purpose of this pilot study is to measure the stress levels of horses working in therapeutic horseback riding programs. We hypothesized that the stress levels of horses in these programs should not rise due to an inexperienced rider with disabilities compared to a healthy experienced rider.

The same five horses were used in separate 6-week therapeutic riding classes for a group of military veterans with experienced riders as a control group. Serem cortisol and ACTH levels were the primary stress measurement. The secondary measurement included 2-minute videos of the horses to identify stress behaviors, scored using a nationally standardized equine stress behavior instrument. Both blood samples and video recordings were taken on a resting day, before the lesson, after tacking, and after the lesson on weeks 1, 3 and 6. We expected the stress measurements to show no difference between the experimental and control groups.

Findings demonstrated that horses experienced significantly higher levels of stress with healthy experienced riders. This may be due to expectations that experienced riders imposed on the horses. Growth of these programs, could be potentially beneficial for current horse overpopulation issues.

POSTER 28

DOG PRESENCE AND CHILDREN'S STRESS DURING FORENSIC INTERVIEWS FOR CHILD ABUSE

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Introduction: The U.S. Department of Health & Human Services reported more than 3.3 million children underwent Child Protective Service investigations for abuse in 2010 (DHHS, 2012). Considering the large numbers of children experiencing potential psychological distress and the legal prosecution processes involved, it is necessary to identify interventions to alleviate children's stress.

Method: A two-group, randomized, repeated measures design was used in children ages 3-18 undergoing forensic interviews for abuse to identify to what extent children who have a trained service dog present during the interview have less fear and physiological reactivity. Children in the treatment group (TG) undergo forensic interviews with a trained service dog. Children in the control group (CG) undergo the standard of practice. All participants completed a demographic questionnaire and the FACES Fear Scale. Heart rate variability was monitored at one minute intervals during the forensic interview using the POLAR RS800CX heart rate monitor. The FACES Scale was completed at baseline, before the interview, and post interview.

Results: To date, 114 children have participated (TG n=58, CG n=56). 24.5% (28/114) were males and 75.5% (86/114) were females, ages ranged from 3-18 years (mean 10.17 years). TG mean FACES score pre=1.61, post= 0.56; Heart Rate pre= 108, post =99. CG mean FACES score pre=1.8, post= 0.8; Heart Rate pre= 111, post =100. Heart rate variability data are currently being analyzed.

Conclusion: The presence of a service dog to provide unconditional love and distraction may provide a safeguard for the children during the disquieting forensic interview.

POSTER 29

ROLE OF PRN AND SCHEDULED MEDICATIONS IN SECLUSION AND RESTRAINT USE IN CHILDREN AND ADOLESCENTS IN PSYCHIATRY

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Psychiatric inpatients, including children and adolescents, can become violent towards self or others. Techniques for managing aggression include PRN medications, restraint, and seclusion use.

This study compared PRN medication use in population of children and adolescents in seclusion and restraint (SR) due to aggression and those in SR due to a mix of causes, including self-harm.

The study found that while the aggression group was likely to be placed in seclusion (70%), the mixed group was almost exclusively placed in restraints. The PRN use was similar between groups, with about half of the population receiving PRNs during SR, of which sedatives were the most common. Scheduled medications between intake and discharge were not changed significantly in either group.

Further research is needed with strict aggression and self-harm only groups, larger sample size, and more recent data.

POSTER 30

DECREASED AIRWAY COMPLICATIONS WITH GLYCOPYRROLATE PROPHYLAXIS FOR PEDIATRIC ENDOSCOPY: A PROSPECTIVE TRIAL

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Objective: Currently, there is no consensus about antisialogogic premedication prior to sedation in pediatric patients undergoing upper esophagogastroduodenoscopy (EGD). Hypothesis: Prophylactic administration of glycopyrrolate, an anticholinergic, before EGD will decrease oral secretions and airway complications.

Methods: A prospective trial enrolled 212 subjects to study adverse events during EGD. Pediatric intensivists provided sedation. Group-A (n=129) received propofol with glycopyrrolate, fentanyl and midazolam. Group-B (n=83) received propofol sedation alone. Procedural time and outcome, demographics, and adverse events were recorded and subdivided into 3 categories: major airway complications (apnea >20 seconds, BVM ventilation, endotracheal intubation, oral airway), minor airway complications (desaturation, oropharyngeal suctioning, head positioning, oxygen mask, nasal cannula), and non-airway complications (hypotension, nausea, emesis, arrhythmia).

Results: Significantly fewer total airway complications occurred in the glycopyrrolate group (Group-A, n=17) than in the group without glycopyrrolate (Group-B, n=33) ($p<0.01$). It is plausible that by decreasing oral secretions, glycopyrrolate decreases the need for oropharyngeal suctioning and is responsible for the significant decrease in minor airway events and shorter procedure time noted in Group-A. Conversely, Group-A had an increase in apneic events (Group-A, n=2; Group-B, n=0; $p=1.00$) and transient desaturations (Group-A, n=15; Group-B, n=3; $p<0.05$). Fentanyl and midazolam, but not glycopyrrolate, are suspected as the cause of the apnea and desaturation in Group-A.

Conclusions: Glycopyrrolate was associated with decreased adverse airway events during EGD; the increase in non-airway adverse events in Group-A was likely confounded by the co-administration of fentanyl and midazolam. This merits a randomized, controlled trial to isolate glycopyrrolate's effects during propofol sedation.

POSTER 31

RADIOSURGERY TO THE POST-OPERATIVE TUMOR BED FOR METASTATIC CARCINOMA VERSUS WHOLE BRAIN RADIATION

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This project was a selected recipient of the American Brain Tumor Association Medical Student Research Fellowship Award.

Introduction: Metastatic carcinoma to the brain occurs in 20-40% of cancer patients and is a significant cause of morbidity and mortality. Brain metastases traditionally have been treated with surgical resection and whole-brain radiation therapy (WBRT). The combination of recent evidence of adverse effects of WBRT and technological changes in the delivery of high-dose radiation has contributed to a paradigm shift towards treating brain metastases with surgical resection and stereotactic radiosurgery (SRS) to the post-operative tumor bed, in lieu of WBRT. We hypothesize that SRS to the tumor bed after surgical resection is equivalent to WBRT.

Objective: To determine if surgery with SRS to the tumor bed is equivalent to surgery with WBRT with respect to overall survival, progression-free survival, local control of brain tumor, distant recurrence of brain tumor in the central nervous system, and adverse radiation changes.

Methods: A retrospective cohort study was undertaken to compare patients treated with SRS to the tumor bed after surgery with patients treated with WBRT after surgery from January 1, 2010, to December 31, 2013. Patients were identified from the tumor and radiosurgery databases of senior author. Patients treated with surgery followed by WBRT were compared to those treated with surgery followed by SRS to the tumor bed. Data is being analyzed by T-test for continuous variables, Chi-square for categories, and Kaplan-Meier for survival and progression-free survival.

Results: 38 patients were treated with surgery followed by SRS to the tumor bed, and 46 patients were treated with surgery followed by WBRT. Statistical analysis is pending.

Conclusions: Conclusions are pending.

POSTER 32

SURFACTANT WARS: CLINICAL TRIAL COMPARING TWO SURFACTANTS TO TREAT RESPIRATORY DISTRESS SYNDROME (RDS) IN PRETERM INFANTS

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Introduction: Poractant, a porcine surfactant used to treat neonatal RDS, has an FDA black box warning for pulmonary hemorrhage. We conducted the first clinical trial comparing poractant (PS) and bovine calfactant (CS) given to preterm infants with RDS. PS and CS have equivalent surfactant protein B, but PS has added unsaturated lipids. We theorized lipid peroxidation caused pulmonary inflammation and bleeding. C-reactive protein (CRP) is a biomarker of inflammation. We anticipated a greater rise in CRP with the administration of PS compared to CS as unsaturated lipids are not present in CS.

Materials and Methods: Thirty preterm infants with RDS that required intubation and surfactant were randomized into two groups (PS=15, CS=15). We obtained blood CRP values at birth, at 24 and 48 hours. We took tracheal aspirates before administration of surfactant, at 24 and 48 hours or until extubation. We analyzed slides made from tracheal fluid for the number of neutrophils and lipid hydroperoxides. We are evaluating other markers of inflammation.

Results: Population demographics did not differ between PS and CS groups. A pathologic CRP ($\geq$1.0 mg/dL) at 24 hours of age occurred more often in PS compared to CS-treated infants ($p<.01$). ΔCRP between the 1st to 2nd measurement was also greater ($p<.05$) in PS- versus CS-treated infants. Evaluation of pulmonary neutrophils and lipid hydroperoxides are in progress.

Conclusions: PS therapy caused an increase in CRP, a gold standard test for inflammation. We conclude our findings support research on PS as a cause of pulmonary hemorrhage.

POSTER 33

CORRELATING MOTION ANALYSIS SYSTEMS AND CLINICAL TESTING TO ESTABLISH AN APPROPRIATE RETURN TO SPORT PROTOCOL FOLLOWING ACL RECONSTRUCTION IN ATHLETES

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INTRODUCTION: The optimal timing for return-to-play (RTP) following ACL reconstruction is controversial. The purpose of this investigation is to develop a comprehensive protocol for safe RTP by comparing functional movements in control athletes to patients recovering from ACL reconstruction.

METHODS: The study includes skeletally mature patients between the ages of 14-25. Control group consists of healthy male and female athletes who will undergo one time data collection. Test group include male and female patients who have recently undergone ACL reconstruction. They will be tested serially at 4, 6, 8, and 12 months post-operatively. During each session, pertinent demographic information will be obtained along with subjective outcome scores. Each subject will undergo functional testing to include Biodex isokinetic testing, hop tests, and functional movement screen (FMS). VICON and Microsoft Kinect will be used for assessment dynamic motion patterns during functional movements (i.e. Drop Vertical Jump). Control group will be compared to test groups, and results analyzed statistically.

RESULTS: Control group has completed questionnaires and functional testing. Female controls (n=3) measured 72 in., weighed 78 kg, and were 20.4 years old, on average. Male controls (n=2) measured 81.5 in., weighed 93 kg, and were 16.7 years old, on average. Mean FMS scores were 18.3 and 15.5 for females and males, respectively. Males performed significantly better in hop and isokinetic testing with no significant differences in limb symmetry.

DISCUSSION: Correlating clinical evaluation and functional testing may help guide RTP decision-making following ACL reconstruction. Control and patient data will be compared upon study completion.

POSTER 34

VERTICAL GROUND REACTION FORCES IN HEALTHY AND KNEE OSTEOARTHRITIS POPULATIONS

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INTRODUCTION: Osteoarthritis (OA) is a prevalent disease that involves the wearing down of articular cartilage, most commonly in the elderly population. Often accompanied by pain, muscle weakness and abnormal movement patterns. This study will determine between limb differences in vertical ground reaction forces (GRF) in a knee OA population compared to a healthy population.

METHODS: Nine healthy and five unilateral knee OA subjects were recruited and performed five trials of a self-selected speed walking task.

Data was collected using a Vicon MX-T40S 8-camera motion capture system synchronized with three force plates. Kinematic/kinetic data sampled at 100Hz and 2000Hz, respectively, was processed using Vicon Nexus 2.1 software. Vertical GRF was averaged across trials and subjects. Data was normalized to body weight and time to 100% stance, then analyzed qualitatively.

RESULTS: Lower average peak GRF and reduced loading rates were observed in the OA population compared to the healthy group. Additionally, slightly reduced loading rates were observed in the affected limb when compared to the unaffected limb, though peak GRFs were similar.

CONCLUSION: Results correspond with previous literature and may be associated with the presence of pain and muscle weakness. Severity of patients OA is unknown, leaving this association unclear. Walking speed wasn't taken into account, therefore it's unclear how this parameter has influenced GRF outcomes. Future studies should examine physical impairments plus functional outcomes in relation to biomechanical measures.

POSTER 35

AN INVESTIGATION OF REOPERATION RATES FOLLOWING SURGICAL FUSION FOR ADULT SPINAL DEFORMITY

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Introduction: Adult spinal deformity (ASD) is an ever-increasing concern as health systems face an aging U.S. population. The purpose of this study is to quantify the reoperation rate following ASD surgery and to identify patient and surgery-related variables that may predispose to reoperation.

Methods: Patients undergoing ASD correction over a six-year period were identified using billing data. Medical records were reviewed to identify patients with spondylolisthesis, kyphosis, or scoliosis and to extract the following data: diagnosis, age, BMI, smoking status, vitamin D and calcium levels, bone mineral density score (BMD), BMP use, number of levels fused, reoperations and indications for reoperation.

Results: 270 patients with a mean age of 53.0 years and follow-up of 3.26 years met inclusion criteria. 101 patients required reoperation for an overall rate of 37.4%. Common indications for reoperation were hardware failure (36.4%), pseudarthrosis (25.1%), and wound complications (14.6%). Patients older than 65 ($p=0.008$), patients with low BMD (p-0.005), and fusion longer than 1 level ($p=0.0001$) had increased risk of requiring revision surgery. No significant difference in reoperation rate was identified for smoking status, BMI, vitamin D and calcium levels, and between diagnoses of osteopenia and osteoporosis. Patients who received BMP were less likely to require reoperation ($p=0.0002$).

Conclusion: Older age, low BMD, and fusions >1 level were identified as risk factors for revision surgery. There was no difference in reoperation rates between DEXA-confirmed osteopenia and osteoporosis. This novel finding suggests the need for further investigations into the role of BMD screening prior to surgical intervention of ASD.

POSTER 36

PREDICTORS OF OCULAR INVOLVEMENT IN GIANT CELL ARTERITIS

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Introduction: Ophthalmic artery involvement in giant cell arteritis (GCA) is the second leading cause of acquired blindness in the United States, often resulting in sudden, irreversible vision loss in patients over 50. The typical presentation is acute anterior ischemic optic neuropathy (AAION). However, other ocular manifestations have been reported, including diplopia, ptosis, posterior ischemic optic neuropathy (PION), central retinal vein occlusion (CRVO), central retinal artery occlusion (CRAO), and anterior segment ischemia. This study sought to evaluate the prevalence of ocular manifestations of GCA in the University of Missouri Health Care System.

Methods: Following IRB approval, the charts of all patients with ICD code for "giant cell arteritis" and "temporal arteritis" from January 2010 – June 2015 were reviewed. Inclusion criteria included diagnosis of GCA by temporal artery biopsy. Of 136 patients suspected of giant cell arteritis, 25 patients had biopsy-proven GCA. The charts of these patients were reviewed for ophthalmic findings and other risk factors.

Results: Of the 25 patients, 72% with biopsy-proven GCA had some form of ocular involvement. The most common findings were: vision loss (40%), visual field loss by confrontation (24%), and AAION (20%). Other visual manifestations were diplopia (12%), eye pain (8%), ptosis (4%), and CRVO (4%).

Conclusion: Many cases of suspected GCA are not confirmed on biopsy. The classic finding of AAION was a prevalent ocular manifestation, but occurred in a minority of cases. This supports the importance of timely, full ophthalmologic evaluation for patients suspected of GCA.

POSTER 37

DILUTE PROPARACAINE: A POTENTIAL TREATMENT FOR ACUTE CORNEAL INJURY

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Purpose: Corneal abrasions are extremely painful to patients. In an emergency clinic diluted Proparacaine, a topical anesthetic, is used to relieve discomfort. Prescription-strength proparacaine (0.5%) hinders corneal re-epithelialization. The effects of dilute proparacaine (0.05%) on corneal epithelial regeneration and wound healing are unknown. We tested the hypothesis that dilute proparacaine does not inhibit corneal healing to the degree of its prescription-strength counterpart.

Methods: Human corneal fibroblast (HCF) cultures were used for *in vitro* assays (trypan blue viability, scratch, and MTT). New Zealand White rabbits were used for *in vivo* study. An 8-mm abrasion in the central cornea was created mechanically. Eyes were treated with balanced salt solution (BSS), 0.5% proparacaine, 0.5% proparacaine + ophthalmic topical antibiotic, 0.05% proparacaine, or 0.05% proparacaine + ophthalmic topical antibiotic of respective groups 4 times daily for 3 days. Fluorescein staining performed before injury and every 24h following injury. After 3 days, rabbits were euthanized and corneas were collected. Immunohistochemistry evaluated corneal morphology, inflammation, and re-epithelialization.

Results: *In-vitro* assays data indicated that 0.05% proparacaine permitted increased HCF migration after 24h and proliferation after 72h when compared to our 0.5%. Diluted proparacaine (0.05%) was less cytotoxic than regular strength (0.5%). Fluorescein staining and immunohistochemistry data revealed increased re-epithelialization in 0.05% treatment group. CD11b immunofluorescence demonstrated higher inflammation in 0.5% proparacaine-treated corneas. 0.05% proparacaine revealed increased re-epithelialization and less inflammation in rabbit eyes.

Conclusions: Dilute proparacaine is a viable option for corneal pain management.

Funding: University of Missouri Fund and resources of VA Merit (1I01BX00035701) and NIH (RO1EY17294).

POSTER 38

POST-ACUTE CARE (PAC): UNDERSTANDING PATIENT FLOW, CARE, AND COSTS

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Background: In today's ever changing healthcare environment, it is critical for physicians to understand the Post-Acute Care (PAC) system, services, and costs available for their patients.

Objective: To evaluate the knowledge of University of Missouri (UM) physicians in the Departments of Surgery, Internal Medicine, and Orthopedics, concerning PAC.

Design: A prospective survey

Methods: Through the UM Research Electronic Data Capture (REDCap) System, a de-identified survey to evaluate physician understanding of PAC was sent to faculty and residents in the University of Missouri School of Medicine Departments of Internal Medicine, Orthopedics, and Surgery.

Results: There were a total of 22 surveys received for a response rate of less than 10% (72% attending, 27% residents). The most frequent PAC settings used by respondents were: Home Health (90%), Skilled Nursing Facilities (46%), and Inpatient Rehabilitation Facility (7%). None of the respondents were familiar with which HH their patients used, while 22% were aware of which SNF was chosen. When asked if respondents would be interested in receiving scorecards on quality and programs (quality metrics, length of stay, etc.) for the most commonly used facilities (IRF, SNF, HH), 86% responded yes, and indicated results could impact future care decisions.

Conclusion: Initial results reveal that there is an opportunity to educate physicians in reference to the PAC settings, services offered, patient outcomes, and other quality metrics. Physicians indicated that these results could play an important role in post discharge planning.

POSTER 39

PATIENT EDUCATION AND PERCEPTIONS ON CARE TRANSITIONS

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Background: As new and Alternative Payment Models (APMs) are developing, there has been a greater emphasis on linking patient satisfaction in the acute and post acute hospital setting. Therefore, patient understanding of their care transition from an acute hospital to a post-acute care (PAC) facility is critical.

Objective: To evaluate patient perceptions and education on their care transition from an acute hospital to an Inpatient Rehabilitation Facility (IRF) or Skilled Nursing Facility (SNF).

Design: A prospective 11-question survey was delivered through interviews to document patient education and experiences.

Results: A total of 31 patients (16 male, 15 female, mean age 61) were interviewed at the IRF and a total of 30 were interviewed at the SNF (13 male, 17 female, mean age 78). Of the patients, 94% (IRF) and 77% (SNF) stated they received information about these settings prior to transfer. In both groups (61% IRF, 43% SNF), identified their physician as the primary source of education about their transfer destination. All patients received written information after admission to each facility, however only 50% (SNF) and 81% (IRF) of the patients reported receiving this information. Full results and analysis of the survey responses will be provided.

Conclusion: While patients receive information on care transitions from many sources it is important to be aware of their perceptions and understanding. In our study, the physician is still seen as the primary source of information about transitions to PAC. Therefore, it is essential that physicians set appropriate patient expectations and understanding of their transitions. Our results revealed that all providers have specific opportunities to improve patient understanding of these care transitions.

POSTER 40

SURVEY OF ADULT ANKLE FOOT ORTHOTIC USE IN CEREBRAL PALSY

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The benefits of routine orthotic use in Cerebral Palsy are unknown. Prescriptions are commonly given under the auspices of a "standard of care" and without a fundamental, scientific basis for doing so.

A survey was administered to a populated list from the University of Missouri Hospital's electronic medical records. Inclusion required consent, a diagnosis of cerebral palsy, a relationship with PM&R or Orthopedics, and an age of 18 years or older. Of the survey respondents, 86% had been prescribed AFOs at some point in their lives, while 38% were currently utilizing the braces. Cessation factors differed among varying levels of disease severity (graded as Gross Motor Function Classification System I-V, or GMFCS).

Overall satisfaction with orthotic prescription was high — 80% across all GMFCS levels. Patients note discontinuation of orthotic use largely as a result of surgical intervention (GMFCS I-II) or until such time as they are no longer ambulatory (GMFCS IV-V). Prescription rates appear independent of GMFCS classification.

This study lays the groundwork for additional research on the biomechanics, appropriate wear-time, and overall effectiveness of orthotics.

POSTER 41

HEMISPHERIC DIFFERENCES IN EEG SPECTRAL POWER IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA

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Background: Obstructive sleep apnea (OSA) affects 9-10% of the U.S. population and its prevalence is rapidly increasing. However, polysomnography (PSG), the gold standard for diagnosing OSA, remains time-intensive and costly. This study compared electroencephalogram (EEG) spectral analysis data between healthy normal controls and patients with OSA before and after treatment with continuous positive airway pressure (CPAP). We sought to identify potential biomarkers that may aid in identifying, predicting and monitoring OSA disease progression using EEG spectral power.

Methods: The EEG [first 2 epochs of N3 (Stage 3 Non-REM) sleep] data from 8 healthy controls and 8 patients with OSA before and after CPAP treatment was obtained from Sleep Disorders Clinic at the University Hospital and was subjected to spectral analysis (Spike2 software; Cambridge Electronic Design, Cambridge, UK) yielding total power in the following bands: Delta (1-4 Hz); Theta (4-9 Hz) and Alpha (9-12 Hz). The "relative power" (defined as the total power in each band divided by the total power; 1-50 Hz) was calculated and used for further analysis.

Results: Significant differences (One Way ANOVA+ LSD post-hoc test) were found in the EEG (delta and theta bands) during N3 sleep, only in the left hemisphere of OSA patients. The right hemisphere was unaffected. CPAP therapy was effective in normalizing the EEG.

Conclusions: To the authors' knowledge, this is the first reported observation of a significant hemispheric effects during N3 sleep in the EEG of OSA patients. CPAP therapy appears to be effective in normalizing EEG changes. This information may be critical in identifying potential biomarkers of OSA.

POSTER 42

EFFECT OF INSULIN RESISTANCE ON FAT/GLUCOSE UTILIZATION IN HUMANS

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The early hypothesis of Randle postulated an antagonism between substrate oxidation such that states of elevated fat oxidation (FatOx) would result in low glucose oxidation (GluOx).

The goal of the present study was to test the Randle hypothesis in the setting of health and insulin resistance. Adult subjects (n=19) were studied in the fasted and fed states, after consuming a standardized meal (36.6% fat, 17.3% protein, 46.2% carbohydrate).

Fasting and fed energy expenditure and substrate oxidation were measured by indirect calorimetry, body composition by DEXA, and insulin sensitivity assessed using HOMA-IR (insulin resistant, IR≥2.5; insulin sensitive, IS<2.5).

As expected, compared to IS subjects, IR subjects had lower GluOx in the fasted state (1.6±0.8 mean±SD, 0.7±0.4 mg/kgBW/min, respectively, P=0.0065). GluOx was also significantly lower in the fed state (2.0±0.8 vs. 1.0±0.7 mg/kgBW/min, P=0.0155). For the IR subjects only, higher FatOx was significantly associated with lower trunk fat mass (kg/kg body weight), and reduced total body fat, in both fasted (r=-0.846, P=0.008) and fed states (r=-0.787, P=0.02).

For the group as a whole, energy expenditure was inversely correlated with trunk fat mass (fasted, r=-0.820, P<0.0001; fed, r=-0.738, P<0.0001). These data suggest that greater trunk fat is due to limited total FatOx and lower total energy expenditure. Exercise training, diet or pharmacological interventions should lower trunk fat by increasing FatOx and energy expenditure through greater muscle mass.

These data do not support the Randle hypothesis for substrate oxidation in insulin resistance and highlights the complex interrelationships between insulin sensitivity and body fat distribution.

POSTER 43

PATIENTS WITH OBSTRUCTIVE SLEEP APNEA DISPLAY AN INCREASE IN EEG ALPHA POWER, AN INDICATOR OF COGNITIVE DECLINE

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Background: With obstructive sleep apnea (OSA) affecting more than 10% of the U.S. population, we sought to assess whether there is a visible link with between OSA and cognitive decline. Changes in EEG alpha frequency power have been frequently observed in patients exhibiting cognitive decline. This study compared electroencephalogram (EEG) spectral analysis data between healthy normal controls and patients with OSA.

Methods: We obtained EEG data (30 sec epoch of quite wakefulness) from Sleep Disorders Clinic at the University Hospital from 3 subjects with OSA and 3 healthy controls. The data was applied to spectral analysis (Spike2 software; Cambridge Electronic Design, Cambridge, UK) yielding total power in the Alpha band (8-12 Hz). Relative power (defined as the total power in each band divided by the total power; 1-40 Hz) was calculated and used in further analysis.

Results: Our preliminary analysis performed in 3 OSA and 3 healthy controls revealed an increase in alpha power in the central (C3 EEG leads) and frontal (F4 EEG leads) brain regions of OSA subjects as compared to normal controls.

Conclusions: Our preliminary results suggest that an increase in EEG alpha power in the central and frontal brain regions of cognitive decline in patients who present with OSA. The data shown in this study can help determine whether there is need for greater intervention and early detection of cognitive decline in patients with OSA.

POSTER 44

INVESTIGATION OF RATE CONTROL THERAPY FOR TREATMENT OF ATRIAL FIBRILLATION IN THE EMERGENCY DEPARTMENT

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Atrial fibrillation (AF) is the most common sustained arrhythmia in the US with over half a million patients each year visiting the Emergency Department (ED) with palpitations/chest pain. Treatment options include rate control and rhythm control. Various studies have shown that both treatment options have similar effectiveness and thus it is up to the provider to determine the best plan of care on a case-by-case basis.

This retrospective clinic chart review aims to determine if there is benefit to a combination of rate control medications. The hypothesis is that if both beta-blockers (BB) and calcium-channel blockers (CCB) are given in the ED patients are at increased risk to become hypotensive with worse overall outcomes. Medical charts with ICD-9 codes for AF were reviewed from the University of Missouri Emergency Department from 2013-2014 totaling 196 patients. Data collected included gender, age, drug/dosage used, initial BP and lowest BP (converted to MAP), home medications, and outcome status.

Currently there has been no significant correlation between BB/CCB dosed in the ED and hypotension. However, statistical evaluation of home medications paired with different rate control treatment is in progress.

POSTER 45

COMPARISON OF COST AND HOSPITAL OUTCOMES FOR PATIENTS UNDERGOING A CUSTOMIZED INDIVIDUALLY MADE TOTAL KNEE REPLACEMENT VS. OFF-THE-SHELF BRANDS

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The growing demand for total knee arthroplasty (TKA) in association with the need to limit health care costs requires the use of cost-effective TKA implants. The purpose of this study was to compare hospital outcomes and cost between patients undergoing TKA using a customized individually made implant (ConforMIS iTotal) or a conventional off-the-shelf brand.

The Conformis implant showed significantly lower average total cost compared to the conventional implant ($22,391 vs. $28,383; $p = 0.012$). The Conformis implant also showed lower average length of stay compared to the conventional implant (3.29 days vs. 3.39 days; $p = 0.484$).

No statistically significant difference was seen in transfusion rates and discharge disposition between the Conformis implant and the conventional group.

POSTER 46

A NEEDS ASSEMENT OF A STUDENT-RUN DERMATOLOGY CLINIC FOR UNINSURED INDIVIDUALS

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Introduction: This study was a needs assessment (e.g. diagnoses, treatments, comorbidities, laboratory work and biopsies ordered) of the Medzou Student-Run Dermatology Clinic. Evaluation of care transition factors (e.g. use of social services, duration for follow up appointment) were also evaluated in the population served by this clinic who were referred to the University of Missouri Health Systems (UMHS) Dermatology Clinic for further care.

Methods: A chart review and descriptive statistics were used to summarize the most prevalent complaints, diagnoses, treatments, and comorbidities encountered at the Medzou Dermatology Clinic. Descriptive statistics were also used to determine diagnoses most associated with laboratory work ordered, biopsies and the duration of time in receiving follow up appointments at UMHS. A Fisher's exact test was used to determine the relationship between use of social services and referral appointment scheduled at UMHS.

Results: The most common diagnoses were benign and malignant neoplasms; the most common treatment was Topical Corticosteroids of Potency IV&V; the most common comorbidities were alcohol use (low risk limits) and tobacco use. Of the 164 encounters at Medzou, 45% (74) required follow-up at Medzou and 11.6% (19) required follow-up at UMHS. A Fischer's exact test was used to determine the relationship between use of social services and referral appointments scheduled, $p=1$.

Discussion: This describes the current state of Medzou Dermatology Clinic allowing for better preparation and more effective allocation of resources to match patient needs. One gap identified was the need for a better system of tracking and documentation of patient dermatologic biopsies.

POSTER 47

A SURGICAL MOUSE MODEL OF IATROGENIC LARYNGEAL NERVE INJURY

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Objective: Dysphagia (swallowing impairment) is a common postoperative complication of surgical approaches targeting the neck and chest regions. For example, up to 80% of patients experience dysphagia after anterior cervical discectomy and fusion (ACDF), with symptoms persisting life-long in 20% of cases. Surgically-induced (iatrogenic) injury to the laryngeal nerves is presumed to be the leading cause. The purpose of this study was to establish a surgical mouse model of iatrogenic laryngeal nerve (LNI) injury to investigate the pathophysiology of dysphagia and explore therapeutic interventions.

Methods: C57BL/6 mice (n=35) underwent surgical transection of the laryngeal nerves: superior laryngeal nerve (SLN) and/or recurrent laryngeal nerve (RLN). Electrical stimulation (ES) was used to identify the SLN and RLN via evoked swallows. A sham surgery group (n=15) underwent the same surgical approach without nerve stimulation or transection. Videofluoroscopic and endoscopic assessments of swallowing and laryngeal function were conducted pre- and post-surgery to quantify several outcome measures.

Results: SLN stimulation evoked swallowing in all mice. Only 20% of mice swallowed during RLN stimulation; however, surgical RLN isolation consistently evoked swallowing. Ipsilateral laryngeal paralysis occurred after RLN but not SLN transection. Significant dysphagia was evident after bilateral but not unilateral SLN transection. Analysis of swallow function post-RLN transection is underway.

Conclusion: We successfully created a surgical mouse model of iatrogenic laryngeal nerve injury. We are currently investigating other common nerve injury types (traction, compression, and thermal). Results will identify which injury type (or types) is most associated with dysphagia, and therefore, most suitable for further investigations.

POSTER 48

DEVELOPMENT & VALIDATION OF A NOVEL REAL-TIME PCR PROCEDURE FOR QUALITATIVE DETECTION OF HSV-1 & HSV-2

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Herpes simplex viruses are categorized as herpes type 1 (HSV-1) and herpes type 2 (HSV-2). HSV-1 usually causes sores around the mouth and lips while HSV-2 usually causes genital herpes. However, both types can have oral, genital, ocular, or encephalitic manifestations. If untreated, herpes simplex encephalitis has high mortality and morbidity. Early antiviral treatment is most effective, but a timely diagnosis cannot be made by clinical criteria, or CSF viral cultures and serology is rarely initially positive. Thus a sensitive method of early detection is needed.

We developed a novel real-time PCR procedure for detection of HSV-1 and HSV-2 utilizing the HSV glycoprotein D gene. Amplification is performed with a minor groove binder (MGB) attached to the 5'-end of the DNA probe, stabilizing the DNA duplex, increasing the primer and probe melting temperature (T_m), and allowing the use of a shorter probe. An Eclipse ® Dark Quencher and a proprietary flurophore are used for detection of the HSV glycoprotein D gene (shared by HSV-1 and HSV-2) during the annealing PCR cycle. The MGB probes remain intact following amplification allowing melt curve analysis for differentiation of HSV-1 and HSV-2.

Validation against known samples revealed a negative predictive value of 100%, a positive predictive value of 98%, 99% specificity, 97% sensitivity for HSV-1 and 100% sensitivity for HSV-2

POSTER 49

REGULATION OF NEUROPROTECTIVE MYELOID CELL LEUKEMIA 1 (MCL-1) BY RAPAMYCIN AND NP-6A4, A NEW AT2R AGONIST, IN DOPAMINERGIC NEURONAL CELL LINE

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Background: Myeloid Cell Leukemia I (MCL-1) is essential for neuronal cell survival and its loss results in dopaminergic neuronal cell death under conditions of oxidative stress such as those seen in neurodegenerative diseases including Parkinsonism. Therefore, identifying drugs that can increase MCL-1 expression in neuronal cells is of high priority for enhancing neuronal resistance to oxidative stress and improving neuronal survival.

Hypothesis: Our recent work showed that Rapamycin (Rap) suppresses MCL-1, and NP-6A4, a novel agonist of Angiotensin II receptor AT2R, up-regulates the expression of MCL-1 in cardiovascular cells. We hypothesized that Rap would also suppress MCL-1 and neurite development in dopaminergic neuronal cells and NP-6A4 would reverse this effect.

Methods and Results: Human dopaminergic neuronal cell line SH-SY5Y, a highly translational model for Parkinson's disease was subjected to serum starvation and then treated with Rap (10nM), AT2R partial agonist CGP42112A (300nM), NP-6A4 (300nM), AT2R antagonist PD123319 (1μM) or their combinations. Neurite outgrowth was visualized by fluorophore-conjugated wheat germ agglutinin (WGA) staining and expression of MCL-1 was assessed by immunofluorescence using anti-MCL-1 antibody. Cells were imaged using a confocal microscope and fluorescence was quantified using Leica LAS AF software. Rap treatment significantly suppressed MCL-1 expression in SH-SY5Y cells (~40% suppression, $p<0.001$). Rap+NP-6A4 treatment reversed this effect ($p<0.0002$); but Rap+CGP42112A treatment did not. Rap also showed a trend to reduce neurite length and Rap+NP-6A4 treatment reversed this effect.

Conclusion: NP-6A4 is a unique AT2R agonist that promotes the expression of neuroprotective MCL-1, reverses rapamycin-mediated suppression of MCL-1, and improves neurite outgrowth.

POSTER 50

CORTICOTROPIN RELEASING FACTOR ELEVATES CYTOSOLIC CALCIUM IN NUCLEUS TRACTUS SOLITARUS NEURONS

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As has been well established, peripheral chemoreceptor afferent information is sent to the nucleus tractus solitarii (nTS), integrated, and relayed to other brain regions to alter cardiorespiratory function. It is known that the nTS projects to the hypothalamic paraventricular nucleus (PVN) during incidents of intermittent hypoxia, but the exact nature of this pathway is poorly understood. Previous work has demonstrated the presence of corticotropin releasing factor (CRF) receptors in the nTS, but the exact role of these receptors in the activation of the nTS neurons has until now remained unexamined.

Using FURA-2 calcium imaging, we demonstrated that CRF induced an increase in cytosolic Ca^{2+} concentration in a select percentage of nTS neurons, while other neurons remained unresponsive. This increase was statistically significant but did not appear to be dose-dependent. Although more work remains to be done to detail the nature of the pathway, our results indicate that CRF plays a significant role in the activation of the nTS pathway.

POSTER 51

ASSESSING THE MISSOURI OSTEOCHONDRAL ALLOGRAFT PRESERVATION SYSTEM FOR PRESERVATION OF GLENOID OSTEOCHONDRAL ALLOGRAFT TISSUE

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Introduction: Osteochondral allografts (OCA) are commonly used to treat articular cartilage defects of the femoral condyle. To expand the use of OCAs for the treatment of large articular cartilage defects in the shoulder, the ability of the Missouri Osteochondral Allograft Preservation System (MOPS) to maintain the viability of the glenoid with labrum attached during long-term storage was evaluated.

Methods: With ACUC approval, glenoids were harvested from 33 dogs euthanatized for reasons unrelated to this study. Glenoid and labrum tissues were stored using the current standard of care (SOC) or the MOPS protocol at 4°C or room temperature (RT) for 28 or 56 days. Media were changed and collected every 7 days for biomarker analyses. On days 0, 28, and 56 tissues were analyzed for viable chondrocyte density (VCD).

Results: There were no significant differences in VCD between Day 0 controls and the MOPS RT group on days 28 and 56. VCD in the SOC groups on days 28 and 56 was significantly lower than in day 0 controls and the MOPS RT group at days 28 and 56. Biomarker analyses indicated significant metabolic differences between groups in favor of MOPS RT.

Conclusion: The Missouri Osteochondral Allograft Preservation System successfully preserves glenoid tissues at day 0 level for at least 56 days, indicating that MOPS could be used to store allografts for clinical treatment of articular defects in the shoulder.

POSTER 52

INFLAMMATORY MEDIATED CORTICAL STIFFNESS IN ENDOTHELIAL CELLS

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Introduction: Endothelial dysfunction is implicated in hundreds of diseases either as the primary cause or the innocent victim. Endothelial interaction with several byproducts of inflammation have been described, and partially characterized. Many of the effects they have on endothelial stiffness and cytoskeletal structure have recently become an active area of investigate using an Atomic Force Microscopic (AFM). The AFM was used to determine changes in stiffness induced by various inflammatory byproducts.

Materials and Methods: Endothelial cells were cultured to a various levels of confluence and incubated with either diluent, Chloro-fatty acid, or Chloroaldehyde. Cells were probed with the AFM to determine their stiffness.

Results: Treatment of endothelial cells with chlorinated lipids showed distinct time dependent patterns of stiffness depending on the exact chlorolipid used.

Discussion: The stiffness of endothelial cells is due to glycocalyx, cortical cytoskeleton, and bulk stiffness. Sufficient controls were used to determine cortical stiffness. While certain patterns were seen – some treatments are yet to achieve statistical significance. Noise reduction AFM assays remain to be done for higher control. The results are being further investigated with biochemical assays to further elucidate the nature of the changes seen. Future findings promise to provide important insight for pharmacologic treatment of vascular diseases.

Conclusion: Chemical specific patterns of time-dependent endothelial cortical stiffness were observed, providing strong implications for future pharmacological intervention in cardiovascular disease. Results currently lack statistical significance –due to the non-parametric results and high levels of noise. Noise reduction strategies are being tested for future work.

POSTER 53

ROCK INHIBITOR, HA1077, FOR TREATING CORNEAL FIBROSIS

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Purpose: Rho associated Kinase (ROCK) pathways regulate cell proliferation, survival, adhesion, permeability, migration, and polarity *in vivo*. We postulate that ROCK inhibitor, HA1077, topical application to eye will treat corneal fibrosis and neovascularization *in vivo* in a rabbit model by preventing excessive wound healing.

Methods: New Zealand white rabbits were used and divided into two groups: Group-1 received Balanced Salt Solution (BSS) and Group-2 received HA1077. The untreated contralateral eyes served as a negative control. Corneal fibrosis and neovascularization (CNV) was produced by a single topical alkali (1.0 N NaOH) application for one min. Eyes received 50 µL BSS or HA1077 (3nM) BID for 3 days. Slit and stereo-biomicroscopy recorded ocular inflammation, edema or opacity. Intraocular pressure (IOP) was recorded with Tonopen. On day 14, rabbit corneas were harvested to characterize levels of fibrosis, CNV, apoptosis and inflammatory cells using H&E and immunofluorescence.

Results: Biomicroscopy detected significant decrease (~2.8 fold; $p < 0.01$) in fibrosis and CNV in eyes treated with HA1077 compared to controls. Further, HA1077-treated corneas showed significant decrease in fibrosis markers (smooth muscle actin, fibronectin and F-actin; 55-60 %; $p < 0.001$), inflammatory (CD11b), and apoptotic cells compared to control during immunofluorescence analyses. Likewise, a remarkable decrease in CNV was also noted in treated eyes (quantification pending). Clinical eye exam and histology did not find signs of acute toxicity from HA1077 topical application.

Conclusions: Rock inhibitor HA1077 is a viable option for treating corneal fibrosis and angiogenesis caused by chemical injuries. Larger animal analysis is warranted.

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POSTER 54

EXTRAVILLOUS TROPHOBLAST CELLS DERIVED FROM IPS CELLS OF PREECLAMPTIC PATIENTS AND THE POTENTIAL INVASION DEFECT IN PREECLAMPSIA

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Preeclampsia (PE) is responsible for up to 15% of pre-term births and 20% of maternal deaths in the US. The disease is characterized by onset of hypertension, proteinuria, poorly perfused placenta, and premature delivery. Even though the pathophysiology of PE remains unknown, there are many hypotheses that have been proposed to explain its mechanism. One of the etiologies is the insufficient remodeling of the uterine spiral arteries due to the defects in the invasion of extravillous trophoblast (EVT). Currently, the studies of PE have shown many limitations, including the absence of animal models. PE appears to be only a disease in humans. A third limitation is the inability to use primary cells because these cells cannot provide accurate information about physiologic defects in early development.

The lack of studying models available to investigate the progress of the disease has changed the methods to address the dilemma. Here, we create induced pluripotent stem cells (iPSC) from umbilical cord (UC) taken from newborns whose mothers with PE. Once iPSC lines are established, they will be converted into trophoblasts by BMP4 (**B**, 10ng/ml) in absence of FGF2. After 1 week of treatment, colonies contain extensive syncytial areas and produce copious amounts of placental hormones. This process is accelerated if inhibitors of ACTIVIN signaling A83-01 (**A**, 1 μM) and FGF2 signaling PD173074 (**P**, 0.1 μM) are present (**BAP** conditions). This approach allows partial recapitulation of trophoblast development as it might have occurred in early pregnancies to provide a potential studying model for PE.

POSTER 55

HYPERMETHYLATION COMMONALITIES IN HUMAN AND CANINE ACUTE LYMPHOBLASTIC LEUKEMIA

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Acute lymphoblastic leukemia (ALL) is a neoplasm of precursor lymphoblast. In the United States, approximately 2,500 new cases of ALL are diagnosed each year. Genomic rearrangements, hyperploidy, and hypoploidy have all been implicated in the pathogenesis of ALL. Alteration of DNA methylation in key regulatory regions of the genome can also play a role in the pathogenesis of ALL. In particular genes involved in cell morphogenesis, cell-cell signaling, cell fate commitment, and a large number of tumor suppressor gene promoters have been shown to be hypermethylated in ALL. Dogs provide a potential avenue to further study the role differential methylation has in a variety of malignancies, like ALL, as dogs live in a similar environment to humans.

In this project a DNA methylation profile of canine acute lymphoblastic leukemia was compared to previously generated DNA methylation profiles for human ALL. This comparison of canine to human ALL allowed for the identification of differentially methylated promoters common to humans and dogs, thus lending support to the concept that differential methylation plays a role in ALL. These regulatory regions that are differentially methylated in ALL might serve as a potential therapeutic targets in the future for both humans and dogs.

We determined that 33,871 peaks aligned between humans and canine ALL and of these 33,871 peaks 2,090 were hypermethylated. Hypermethylation in both canine and human ALL leads to the silencing of genes in transcription regulation, cell differentiation, and calcium signaling pathways.

POSTER 56

RECOMBINANT PRODUCTION OF A PLA2 INHIBITOR: IMPLICATIONS FOR PRODUCTION OF VENOM INHIBITORS

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Globally, bites from venomous snakes cause a wide variety of health issues from minor emergencies to complete paralysis and even death. However, most of these deaths are fully preventable with the timely use of anti-venoms.

Thus, increasing the availability of these anti-venom treatments is essential to decreasing the mortality rates of those bitten by venomous snakes. Alternatives to anti-venoms include venom inhibitors produced by the venomous snakes themselves. Many pit vipers, including the South American *Lachesis muta*, express the toxic enzyme, Phospholipase A2 (PLA_2) in its venom complex. The snake prevents harmful effects of its own venom by expressing an inhibitor, beta-phospholipase inhibitor (βPLI), to counteract the activity of PLA_2 within the snake.

Here we show, the ability to clone both genes into pET expression vectors for recombinant expression in *E. coli*. The ability of βPLI to inhibit PLA_2, *in vitro*, will be assayed.

POSTER 57

THE DIFFERENTIAL EFFECTS OF PLASMINOGEN ACTIVATOR INHIBITOR-1 (PAI-1) ON VASCULAR ENDOTHELIAL GROWTH FACTOR PRODUCTION IN CULTURED MURINE ADIPOCYTES

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Adipose tissue is not simply an energy storage organ, but also an endocrine organ that secretes multiple hormones and cytokines, some of which contribute to the development of insulin insensitivity and diabetes mellitus. Research from other labs has shown a strong correlation between serum levels of plasminogen activator inhibitor-1 (PAI-1) and the development of metabolic syndrome in mice.

The aim of our research is to study the effect that PAI-1 has on both white (WAT) and brown (BAT) adipose tissue. Specifically, our lab has published work that has shown that PAI-1 treatment decreases vascular endothelial growth factor (VEGF) signaling in human umbilical vein endothelial cells (HUVEC). We hypothesize that treatment of adipocytes with exogenous PAI-1 will decrease the angiogenic VEGF signaling in cultured murine adipocytes.

Our work in HUVEC cells found that PAI-1 reduced VEGF receptor-2 phosphorylation, and our early work in adipocytes has shown that PAI-1 differentially affects the secretion of VEGF from both white and brown adipocytes. These studies were done in wild type adipocytes, which produce their own PAI-1. Future studies will include the treatment of PAI-1 deficient adipocytes with exogenous PAI-1, as well as the treatment of PAI-1 transgenic adipocytes that overexpress PAI-1 with PAI-039, an orally-bioavailable pharmaceutical inhibitor of PAI-1 activity.

The preliminary data suggests that increased levels of PAI-1 affect VEGF secretion in adipocytes, possibly contributing to the development of insulin insensitivity and diabetes mellitus.

POSTER 58

EXERCISE INDUCES APPROPRIATE CARDIOVASCULAR ADAPTIONS IN NSML ASSOCIATED HYPERTROPHIC CARDIOMYOPATHY

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Hypertrophic Cardiomyopathy (HCM) is estimated to affect 1 in 500 individuals and is on of the leading causes of sudden death in young athletes. The effects of chronic exercise have been of great interest, and studies have yielded conflicting results. Multiple mutations result in HCM, one of which is the SHP2 signaling protein, believed to be involved in cardiomyocyte stress adaptation. In humans, the loss of function mutation Q510E is associated with HCM in patients with Noonan Syndrome with Multiple Lentigines (NSML), which has been modeled in transgenic mice.

It was proposed that exercising transgenic mice would result in diminished cardiac function relative to their sedentary peers. Mice were exposed to chronic exercise or remained sedentary for four weeks. Echocardiograms were performed to determine fractional shortening, ventricular wall thickness and stroke volume, then cardiac tissue was harvested and weights recorded. Compared with the sedentary mice, both exercise groups had increased heart weights and decreased fractional shortening. Exercise HCM had thicker myocardium and decreased fractional shortening but stroke volume was preserved compared to sedentary HCM mice.

These findings suggest that cardiac function was preserved in the HCM exercise mice. Studies involving varying the intensity and duration of exercise have been proposed.

POSTER 59

ENDOTHELIAL ENaC INHIBITION ATTENUATES WESTERN DIET-INDUCED ENDOTHELIAL DYSFUNCTION IN FEMALE MICE

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Introduction: Globally, cardiovascular disease (CVD) is the number one killer of women. Consumption of a western diet (WD) high in fat and sugars further increases CVD incidence by contributing to endothelial dysfunction through endothelial cell mineralocorticoid receptor (ECMR) signaling. This increases endothelial sodium channel (ENaC) activation and impairs nitric oxide production. Evidence suggests current therapies for such dysfunction (e.g. ACE inhibitors) do not appreciably lower circulating aldosterone levels, suggesting a residual role for ECMR activation in CVD pathogenesis. We hypothesized that arterial ENaC inhibition with amiloride would attenuate endothelial dysfunction associated with increased ECMR signaling in WD-fed female mice.

Methods: We used isolated mesenteric resistance arteries from ECMR-knock out (KO) and wild type (WT) female mice fed a WD from 4-20 weeks old. To test our hypothesis, effects of arterial exposure to 1μM amiloride on flow-induced dilation (FID) were determined, as well as effects of ECMR-KO on WD-induced arterial stiffness.

Results: Arteries from ECMR-KO mice showed greater FID than those of WT in the absence of amiloride ($P<0.05$). Amiloride increased FID only in arteries of WT ($P<0.05$). FID comparisons in arteries of ECMR-KO vs WT with amiloride and in arteries of ECMR-KO with and without amiloride were not different.

Conclusion: These data suggest ECMR signaling plays a role in endothelial dysfunction associated with WD-feeding in females, and that this vascular dysfunction and remodeling may be partially ameliorated via ENaC inhibition with amiloride. This may represent a novel strategy to prevent development of CVD secondary to consumption of WD in females.

POSTER 60

MODULATION OF JCV REPLICATION BY NF1/CTF TRANSCRIPTION FACTORS

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John Cunningham polyomavirus (JCV) is the etiological agent of progressive multifocal leukoencephalopathy (PML), manifested by lytic infection of oligodendrocytes with demyelination that causes motor deficits, altered consciousness, gait ataxia and visual symptoms. While most adults appear to be infected by JCV, its replication is suppressed by a healthy immune system, so the virus becomes a health issue only in individuals with compromised immune systems. Alternatively, administration with certain monoclonal antibody therapies developed for multiple sclerosis (such as Natalizumab) and other autoimmune disorders can activate JCV infection; currently there are no means to efficiently and selectively block JCV replication.

We have previously reported that interactions between NFI/CTF cellular transcription factor isotypes, and Pol-primase and the viral initiator protein, T-Ag, modulate replication of BK virus (Liang et al, 2012, J. of Virology 86:3264), and this virus shares many properties with JCV. Our data suggests that NFI/CTF might serve as a therapeutic target by which to block JCV replication. Here we assess NFI/CTF modulation of JCV replication with a sensitive luciferase reporter assay system in which plasmids containing the virus origin and adjacent regulatory sequences and T-Ag are transfected into cells together with vectors expressing NF1/CTF isotypes.

The results show the expected dependence of JCV replication upon NFI/CTF, which sets the stage for high throughput screening of combinatorial chemical libraries for potential inhibitors.

POSTER 61

WATER-SOLUBLE GELATINASE INHIBITOR *O*-PHOSPHATE PRODRUG AND ITS METABOLITE *P*-HYDROXY SB-3CT AMELIORATE MOTOR FUNCTIONS AGAINST BRAIN DAMAGE AFTER SEVERE TRAUMATIC INJURY IN MICE

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While the primary causes of traumatic brain injury (TBI) are broad, studies point to matrix metalloproteinase-9 (MMP-9) as a key factor in the pathogenesis of TBI secondary injury. Secondary injury includes generation of pro-inflammatory cytokines, resulting in neuroinflammation, blood-brain barrier (BBB) breakdown, and apoptosis. SB-3CT (**1**) is a selective MMP-9 inhibitor which effectively reduces brain damage after TBI in mice. SB-3CT is poorly water-soluble and is metabolized to *p*-hydroxy SB-3CT (**2**), a more potent inhibitor than SB-3CT. We examined the effects of the *O*-phosphate prodrug (**3**) of *p*-hydroxy SB-3CT on motor functions and histological changes in C57Bl/6J mice with TBI. Prodrug **3**, an inactive MMP inhibitor, enhanced water solubility and is hydrolyzed to metabolite **2** in blood. Pharmacokinetics and brain distribution studies in mice showed that metabolite **2** crossed the BBB and achieved therapeutic concentrations in the brain. Mice were divided into three groups: sham, vehicle, and prodrug **3**/metabolite **2**. Prodrug **3** was administered intravenously after TBI, followed by subcutaneous injections of *p*-hydroxy SB-3CT. Simple Neuroassessment of Asymmetric Impairment (SNAP) and beam-walking tests were performed to assess neurological impairment. SNAP results for sham were the lowest, followed in increasing order by 7-day treatment, 3-day treatment and vehicle. Foot-faults for sham and 3-day treatment stayed relatively constant over time; however, foot-faults in 7-day treatment mice decreased, indicating greater motor control. Our results suggest prodrug **3**/metabolite **2** treatment over seven days decreases neuronal damage. Thus, inhibition of MMP-9 by a water-soluble thiirane inhibitor may be a promising therapy for treatment of TBI.

POSTER 62

IMPROVED SURVIVAL OF NUTRIENT-STARVED HUMAN AND MOUSE CARDIOVASCULAR CELLS BY A NOVEL AT2 RECEPTOR AGONIST NP-6A4

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Background: Nutrient stress is a major contributor to cardiovascular (CV) cell death during heart failure. This study determined the efficacy of NP-6A4, a novel peptide agonist of Angiotensin II (Ang II) receptor (AT2R), in improving CV cell survival under nutrient stress.

Hypothesis: NP-6A4 would be more effective in promoting CV cell survival under nutrient stress compared to β-blockers and AT1R blockers (ARB) that are standard of care for cardiovascular disease.

Methods and Results: Mouse cardiomyocyte HL-1 cells and primary cultures of human coronary artery VSMCs (hCAVSMCs) were subjected to serum starvation and treated with β-blockers (Nebivolol, Carvedilol, Metoprolol, and Atenolol (3μM each), Ang II (300nM), ARB (Losartan :1μM)) , AT2R agonists (CGP42112A [CGP] and NP-6A4 (300nM each) and AT2R antagonist PD123319 (1μM). Xcelligence RTCA that measures the Cell Index (CI: a combined effect of cell number, size and adhesion), showed that CI was suppressed by β-blockers (Atenelol≤15%; Metoprolol≤15%; Nebivolol≤17%; Carvedilol≤8%), increased by Ang II (≥9.6%), CGP (≥14%) and NP-6A4 (≥25%), but not by ARB ($n \geq 4$ and $p \leq 0.05$ for all treatments) in HL-1 cells. MTS Cell Proliferation assay showed that only NP-6A4 significantly increased viability of serum-starved hCAVSMC and HL-1 cells (≥20% each). Importantly, CV-protective MCL-1 expression was suppressed by β-Blockers (Neb≤26%, Car≤24%, Met≤24%, Aten≤16%) and increased by AT2R agonists (CGP≥17%, NP-6A4≥28%, $n=3$; $p<0.05$ for all) in HL-1 cells and similar results were obtained in hCAVSMCs.

Conclusion: NP-6A4 was most efficient in improving human and mouse CV-cell survival and increasing CV-protective MCL-1 expression under nutrient stress.

POSTER 63

A MOUSE MODEL OF ASPIRATION FOR TRANSLATIONAL DYSPHAGIA RESEARCH

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Objectives: Aspiration pneumonia is the third leading cause of death in elderly individuals. Aspiration of food or liquid may lead to aspiration pneumonia and is often related to dysphagia (swallowing impairment). Current models used to study aspiration pneumonia provide barriers to elucidating the molecular mechanisms of action and identification of therapeutic targets to prevent fatal outcomes. The goal of our research is to establish a mouse model of aspiration to permit systematic investigation of contributing factors of the aspirate to the development of aspiration pneumonia.

Methods: Videofluoroscopy was used to evaluate swallowing in mouse models of healthy aging and amyotrophic lateral sclerosis (ALS). A tracheoscopy approach was developed to experimentally induce aspiration by injecting controlled volumes of liquids solutions with differing biochemical properties (e.g., fat, sugar, protein) into the trachea of anesthetized mice. A second experimental approach entailed surgical transection of the superior laryngeal nerve (SLN) to induce aspiration during self-feeding.

Result(s): Both disease models displayed characteristics of dysphagia; however, they did not aspirate when self-feeding, even after SLN transection. Therefore, tracheoscopy was deemed the most suitable method to experimentally induce aspiration in mice. Radiographic and histologic methods are underway to evaluate pulmonary inflammatory changes associated with each contributing factor of aspiration pneumonia in these disease models.

Conclusion(s): We have created a mouse model of aspiration for translational dysphagia research. Our ongoing research will attempt to identify thin liquids that can be safely aspirated without developing aspiration pneumonia to minimize the risk of dehydration associated with thickened liquid diets.

POSTER 64

MOLECULAR MECHANISMS CONTROLLING BLOOD VESSEL REGRESSION

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Introduction: Vessel regression affects tissue homeostasis during development and wound healing. Our lab has developed a defined 3D model of capillary tube regression. We allow human endothelial cells to form tubes over a 24-48h period, at which time we add regression-inducing growth factors that show marked effects within 6-12 hours.

Hypothesis: Phosphorylation events during regression will be distinct, and possibly opposite, from those that occur during normal vascular tube formation. We anticipate identification of key signaling molecules responsible for controlled regression of endothelial tubes. When regression is induced, we will examine if differences in p38 MAPK signaling or pro-caspase activation (indicative of apoptosis) occur. We also anticipate a reduction in vessel formation and stabilization signals from Raf and Erk kinases.

Methods: Human Umbilical Vein Endothelial Cells were allowed to form tubes in 3D collagen matrices, and then TNFα (10 ng/ml), TGFβ2 (10 ng/ml), and thrombin (1 μg/ml) were added singly or in combination to induce tube regression. At different timepoints following treatment (between 1 and 2 days), gel samples were stained, imaged and quantitated for tube area using Metamorph. Gel samples were also collected to identify key phosphoproteins via Western blot analysis.

Results: We have demonstrated that TNFα combined with thrombin, and TGFβ2 combined with thrombin have the most robust effects on blood vessel regression. These results are defining the novel role of particular combinations of growth factors and signals that control vessel regression under normal or pathologic conditions.

POSTER 65

ASSESING HYPOXIC-ISCHEMIC DAMAGE OF THE NEONATAL THALAMUS USING NOVEL HISTOGRAM IMAGING ANALYSIS IN A MOUSE MODEL

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Introduction: Neonatal hypoxic-ischemic injury (HII) damages the thalamus, with the ventrolateral nuclei being a selectively vulnerable target. It is unknown whether hypothermic management following hypoxia-ischemia selectively affects thalamic outcome. We aimed to identify thalamic nuclei damage in HII mice to assess the role of hypothermic management using histogram analysis of diffusion tensor imaging (DTI) data.

Methods: HII was induced at postnatal day 10 by a right carotid artery ligation followed by 45 minutes of hypoxia. The mice were randomized to control (N=20), hypothermia (31˚C) (N=32) or normothermia (36˚C) (N=25) groups following HII. DTI data were acquired at postnatal (p) day 11, 18, and 30. Fractional anisotropy (FA) and mean diffusivity (MD) maps were generated. Regions of interest were drawn manually to cover the entire thalami. FA and MD values were calculated per voxel and histograms were generated in MATLAB.

Results: Qualitative evaluation of FA and MD histograms revealed wider MD histograms with a double peak of the right thalamus for mice with normothermia compared to controls at p11. At p18 and p30, MD histograms of the right thalamus for mice with normothermia were wider compared to controls and hypothermia mice. No differences were found in FA histograms of the right thalamus or in MD and FA histograms of the left among groups at any time point.

Conclusions: A wider MD histogram with a double peak represents two groups of (injured and preserved) thalamic nuclei in mice after HII and reflects most likely the selective vulnerability of the ventrolateral nuclei.

MU sponsor: Kristina Aldridge, PhD, Pathology & Anatomical Sciences

POSTER 66

ABLATION OF NLRP3 PROTECTS MICE FROM WESTERN DIET-INDUCED ARTERIAL STIFFENING BUT NOT ADIPOSE TISSUE INFLAMMATION AND GLYCEMIC DYSREGULATION

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Adipose tissue (AT) inflammation in obesity is largely attributed to the activation and infiltration of immune cells into AT. Immune cells are equipped with the NLRP3 inflammasome, which can sense metabolic "danger signals" originating with obesity and promote classic M1 activation of macrophages. As such, it is conceivable that obesity-induced activation of NLRP3 inflammasome exacerbates AT macrophage activation/infiltration and AT inflammation.

Given the known role of AT inflammation in instigating metabolic and vascular complications, herein we tested the hypothesis that loss of NLRP3 would protect mice from Western diet-induced AT inflammation and the accompanying glycemic dysregulation and arterial stiffening. Five-week old C57BL6 wild-type (WT, n=16) and $NLRP3^{-/-}$ (n=16) mice were randomized to either a control diet (10% kcal from fat) or Western diet (45% kcal from fat and 1% cholesterol) for 24 weeks.

In WT mice, Western diet-induced obesity led to an increased AT expression of inflammatory genes (e.g., NLRP3, MCP1, TNFα, CASP1, PYCARD mRNAs) and markers of immune cell infiltration (e.g., CD11c, CD68 mRNAs, and Mac-2 protein), glucose intolerance, and increased aortic stiffness as assessed by pulse wave velocity. The induction of adipose tissue inflammation and glucose intolerance with Western diet was also apparent in $NLRP3^{-/-}$ mice. However, obesity-induced arterial stiffening was attenuated in $NLRP3^{-/-}$ mice.

Collectively, ablation of NLRP3 appears to protect mice from Western diet-induced arterial stiffening but not AT inflammation and glycemic dysregulation in our model of obesity.

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POSTER 67

SOY PROTEIN ISOLATE IN THE PREVENTION OF HEPATIC STEATOSIS IN OBESE OLETF RATS

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Background: Soy protein may have beneficial effects on hepatic lipid metabolism and prevention of hepatic steatosis. Here we sought to test our hypothesis that a diet high in soy protein isolate would significantly improve hepatic mitochondrial function and attenuate hepatic steatosis development in hyperphagic Otsuka Long-Evans Tokushima Fatty (OLETF) rats. **Methods:** Five week old male OLETF rats were randomized to isocaloric diets containing 21% kcal as protein from milk protein isolate (MPI), soy protein isolate (SPI), or 50:50 MPI/SPI (M/S) (N=9-10/group) for 16 weeks. **Results:** SPI significantly ($p<0.05$) attenuated fat mass and percent body fat by 10-15% compared with M/S, but did not differ from MPI. Cumulative food intake was not different between SPI and other groups, but was significantly less in MPI rats compared with M/S ($p<0.05$), which corresponded with lowered serum insulin ($p<0.05$ vs SPI and M/S); serum glucose did not differ among groups. SPI reduced serum cholesterol ($p<0.05$) and tended to lower serum free fatty acids compared with the other groups ($p=0.18$). Histological examination of liver revealed significant attenuation in hepatic steatosis in the SPI group compared with MPI and M/S animals and biochemical assessment of liver triglyceride content showed a similar trend. Intriguingly, reduced hepatic steatosis with SPI was associated with dramatic reductions in markers of hepatic de novo lipogenesis (acetyl-coA carboxylase and fatty acid synthase protein content) but not with improvements in hepatic mitochondrial content or function. In fact, MPI livers displayed higher hepatic mitochondrial respiration, β-HAD activity and citrate synthase activity ($p<0.05$) compared with SPI and M/S groups. **Conclusions:** Soy protein isolate may be more beneficial than milk protein in the attenuation of hepatic steatosis development in hyperphagic obese OLETF rats. Furthermore, milk protein and soy protein appear to impact different pathways in hepatic lipid metabolism, with milk protein upregulating hepatic mitochondrial content/function and soy protein downregulating hepatic de novo lipogenesis. The clinical relevance of these findings needs to be explored.

Funding: MU School of Medicine Summer Research Fellowship (CMS), DuPont Nutrition & Health, and VHA-CDA2 IK2BX001299 (RSR).

POSTER 68

EXPLORING THE EFFECTS OF SEROTONIN DEFICIENCY ON SWALLOWING AND OTHER LARYNGEAL REFLEXES

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Objectives: Previous studies have revealed discrepancies regarding the effects of serotonin (5-HT) on swallow function. The aim of this project is to investigate the effects of 5-HT deficiency on swallowing utilizing a colony of 5-HT deficient knockout (KO) mice in comparison to healthy wild-type (WT) littermates. We hypothesize that serotonin deficiently causes dysphagia that becomes progressively worse over time. We further hypothesize that 5-HT replacement will improve swallow function.

Methods: WT (n=14) and KO (n=9) mice underwent a videofluoroscopic swallow study (VFSS) at 6 and 8 months of age using a custom miniature fluoroscope. At 8 months of age, mice underwent a 5-HT replacement regimen for three consecutive days via intraperitoneal (ip) injections. WT mice received ip injections of sterile saline. VFSS was repeated within one hour after the final injection. At 12 months of age, these same mice will undergo a 2 week 5-HT replacement regimen to determine the effect of a longer treatment duration on swallow function.

Results: Compared to controls, KO mice had significantly slower lick rates, pharyngeal transit times, and swallow rates at 6 months of age. Analysis is underway for the 8 month time point to determine if swallow function progressively worsens with longer durations of serotonin deficiency, and if swallow function improves after 5-HT replacement. Testing/treatment will resume when mice reach 12 months of age (October).

Conclusions: This study provides novel evidence that 5-HT deficiency causes dysphagia. Data from the 5-HT-treated mice will provide insight into 5-HT supplementation as a potential treatment for dysphagia.

POSTER 69

INGENUITY PATHWAY ANALYSIS OF THE EFFECT OF SUTHERLANDIA FRUTESCENS ON GENE EXPRESSION

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Sutherlandia frutescens is a medicinal plant native to South Africa that is widely used to relieve symptoms of HIV infection and metabolic syndrome (diabetes). (Van Wyck and Albrecht, 2008) However, a recent clinical trial suggests that Sutherlandia consumption may interfere with isoniazid preventive treatment for tuberculosis. (Wilson et al, 2015). It is imperative to understand such interactions, so that the appropriate precautions may be taken. In a collaborative study, the MU Center for Botanical Interaction Studies recently conducted analyses of Sutherlandia's influence on the transcriptomes of mouse epithelial, microglial, and macrophage cell cultures under conditions simulating inflammation and pathogen attack. The resulting RNAseq data has been processed and uploaded into QIAGEN's Ingenuity Pathway Analysis™ software, which can shed insights into the activity of *S. frutescens* on diabetes and tuberculosis infection.

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POSTER 70

TWIST2 IN THE AGING KIDNEY

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Morphological and functional changes occur in the aging kidney, including the loss of kidney mass and an increase in fibrosis, an abnormal accumulation of the extracellular matrix (ECM). Functional changes include a decrease in glomerular filtration rate (GFR), proteinuria, and reduced ability to concentrate urine (1, 2, 3).

Age is a major risk factor for chronic kidney disease (CKD) and fibrosis is a hallmark of CKD. Thus, aging and CKD have many common elements (4). Aging male Fischer 344 rats are an excellent animal model as they develop severe renal disease and fibrosis similar to CKD (5).

However, a soy diet started at 16-months, the age dysfunction is first detected, has been demonstrated to attenuate age-related damage and fibrosis to the kidneys (6). Sequencing of kidney RNA purified from aged soy-fed rats, compared to control, found decreased expression of Twist2, a basic Helix-Loop-Helix (bHLH) transcription factor. Conversely, rats fed a normal diet had increased Twist2 expression with age, as compared to young. Immunohistochemistry (IHC) staining shows that Twist2 is increased in tubules, most notably the distal tubules.

A stable cell line overexpressing Twist2 was generated in NRK-52E cells. Again, RNA sequencing revealed the expression of several genes significantly changed, including up-regulation of Serpine1. Serpine1 encodes for a serine protease inhibitor, plasminogen activator inhibitor-1 (PAI-1). Interestingly, PAI-1 expression increased with age and parallels increasing Twist2 expression. Increased PAI-1 expression is associated with increased fibrosis. Twist2 recognizes the E-box element, nCAnnTGn, (9) of which the Serpine1 promoter has several. Thus, Twist2 is a novel regulator of Serpine1/PAI-1 and fibrosis in the kidney.

POSTER 71

DEGENERATIVE MYELOPATHY: A POTENTIAL DISEASE MODEL FOR AMYOTROPHIC LATERAL SCLEROSIS

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Amyotrophic Lateral Sclerosis (ALS), a disease for which there is currently no effective treatment, is characterized by progressive loss of motor function. The disease progresses from initial muscle weakness to complete paralysis and eventually death when the muscles required for respiration cease to function. Mutations in the superoxide dismutase gene (*SOD1*) are responsible for a rare hereditary form of ALS. Some dogs, as a result of an *SOD1* mutation, develop Degenerative Myelopathy (DM), a disease with many features of ALS. DM is a useful model for studying the pathogenesis of ALS because owners choose to euthanize their dogs at different stages of the disease. Thus we can obtain and examine tissues from multiple stages of disease progression and develop a better understanding of how the disease develops. Analyses are being performed on the spinal cord and nerves from Pembroke Welsh Corgis (PWCs) that have been euthanized as a result of DM and age-matched PWCs euthanized for other reasons. The goal of this study is to test the hypothesis that there is disease-related axon loss in the C-7 motor root, C-7 sensory root, and ulnar nerve. Through correlation of axonal pathology in lower motor and sensory nerves during the disease progression we will gain a better understanding of the processes occurring in DM, and corresponding forms of ALS. Such an understanding could allow us to hypothesize disease mechanisms and modify approaches being used to develop treatments for ALS.

POSTER 72

CHARACTERIZATION OF UPPER MOTOR NEURON AND MUSCLE PATHOLOGY PROGRESSION IN A CANINE MODEL OF AMYOTROPHIC LATERAL SCLEROSIS

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Introduction: ALS is characterized by progressive loss of motor function, ultimately resulting in death. Understanding mechanisms of disease progression has been hampered by lack of tissue samples from early stage ALS. Because of its many similarities to ALS Canine Degenerative Myelopathy (DM) has the potential to serve as an animal model in ALS research. Owners of affected dogs have their pets euthanized at varying stages of disease, providing us with tissue samples to characterize pathological changes at all stages of disease progression in muscles and the nerves that control their function.

Methods: We examined forelimb muscle fibers and a motor tract in the cervical spinal cord for pathology. Samples were obtained from affected dogs at both early and late disease stages and unaffected age-matched controls. Muscle samples were analyzed for range and mean of muscle fiber cross-sectional areas. Upper motor neuron pathology was assessed by measuring axon density in a spinal cord motor tract.

Results: DM was characterized by increased muscle size variability in early stage disease that disappears in late stage disease. These data indicate that in early stage disease, there are fibers that are both larger and smaller than normal. The decrease in these abnormally large and small fibers in late stage disease suggests that these fibers are selectively lost as the disease progresses. The muscle pathology was accompanied by a decrease in upper motor neuron axon density in the cervical cord. The loss of upper motor neuron input may contribute to disease-related pathology in DM.

POSTER 73

DETERMINING THE ROLE OF INTEGRIN SIGNALING IN THE DEVELOPMENT OF POST-TRAUMATIC OSTEOARTHRITIS

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Introduction: Traumatic joint injury often results in damage to the articular cartilage resulting in loss of viable chondrocytes in the affected tissue and subsequent development of osteoarthritis. Integrins, cell surface receptors that bind to the surrounding matrix and translate mechanical loads into intra-cellular signals, may play roles in the initiation of chondrocyte apoptosis after cartilage injury. This study was designed to determine if blocking integrin signaling decreases the loss of cell viability and production of inflammatory and degradative biomarkers after traumatic injury to cartilage.

Methods: With ACUC approval, articular cartilage tissue was harvested from dogs euthanatized for reasons unrelated to this study. Cartilage explants were pretreated with RGDS (experimental tetrapeptide), RGES (tetrapeptide control), rcIL-1β (inflammatory control), or plain media (Negative control) 24 hours prior to application of a single impact injury. Tissues were cultured for 3 or 12 days post-impact, and media were changed and collected every 3 days for biomarker analyses. On days 3 and 12, chondrocyte viability was determined using a fluorescent cell viability assay.

Results: Treatment of impacted cartilage explants with the experimental tetrapeptide RGDS was not associated with a significant increase in chondrocyte viability nor significant decreases in inflammatory or degradative biomarkers at either assessment time point.

Discussion: This study suggests that this method of integrin blockade is not a viable stand-alone option for ameliorating loss of chondrocyte viability or reducing inflammatory and degradative responses after impact injury to articular cartilage. Further study is needed to determine the complicated dynamics involved in post-traumatic osteoarthritis.

POSTER 74

COMPARISON OF SYNOVIAL AND INFRAPATELLAR FAT PAD TISSUE RESPONSES TO CYTOKINE STIMULATION USING AN IN VITRO CO-CULTURE MODEL

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Introduction: Osteoarthritis (OA) is a debilitating disease associated with loss of functional articular cartilage. Pro-inflammatory cytokines, such as IL-1β, have been shown to contribute to the clinical progression of OA. Delineating the potential roles of tissues involved in OA pathogenesis can guide the development of therapeutic strategies.

Methods: All procedures were performed with ACUC approval. Cartilage, synovial, and infrapatellar fat pad tissues were collected from dogs euthanatized for reasons unrelated to this study. Cartilage explants were co-cultured with either synovial (CS) or fat pad (CF) tissue explants. Tissues were co-cultured in DMEM media supplemented with rcIL-1β at 50 (CS50, CF50), 2 (CS2, CF2), 0.1 (CS01, CF01), and 0 ng/ml (NS, NF) for 21 days. The media were changed every three days and collected to assess PGE2, general MMP activity, MMP-1, MMP-2, MMP-3, IL-6, IL-8, KC, and MCP-1 concentration. On day 21, cartilage explants were collected to assess cell viability.

Results: The CS50, CF50, CS2, and CF2 groups produced significantly higher levels of MMP-3, IL-6, IL-8, KC, MCP-1, and PGE2 compared to the NEG group. Cartilage viability was significantly lower in the CF50 group and approached significance in the CS50 group compared to the NEG group.

Discussion: The synovium and infrapatellar fat pad have similar dose-dependent responses to stimulation with IL-1β in vitro. Therefore, it is possible that the fat pad may make similar contributions during OA development and progression, indicating a need to consider this tissue when treating OA clinically.

POSTER 75

DOES INTENSE EXERCISE ALTER THE ENZYMATIC FUNCTION OF THE PROTEIN TYROSINE PHOSPHATASE SHP2 IN THE HEART?

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In a large subset of patients, heart failure is due to insufficient cardiac adaptation to hemodynamic stressors. Therefore, improving cardiac stress adaptation would benefit many heart failure patients.

Several signaling pathways important for stress adaptation have been identified; however, it remains unclear whether signaling through such pathways is coordinated by upstream master regulators. A candidate for regulation of cardiac stress adaptation is the protein tyrosine phosphatase SHP2, since it simultaneously controls various stress related pathways such as Akt, MAPK, and JAK/STAT. This is supported by preliminary data indicating that SHP2 phosphatase activity increases under stress.

We expected that intense exercise will similarly increase the enzymatic activity of SHP2. The aim of this study was to assess how SHP2's enzymatic activity changes during adaptation to intense swimming exercise in mice.

Mice were randomly divided into cohorts of differing exercise length (1, 5, 8 and 28 day exercise and sedentary controls). Exercise consisted of introducing the mice to water and having them swim twice daily for select intervals of time, no shorter than 4 hours apart to ensure maximum recovery between trials.

In vitro phosphatase activity assays were carried out after immunopurification of SHP2 from mouse hearts. Extracted SHP2 was incubated with a phosphorylated src protein and the released inorganic phosphate was quantified using a malachite green reaction. During the 8-week project, first pilot data were obtained, and our analyses are currently ongoing to complete the data sets elucidating SHP2's function under acute intense swim training.

POSTER 76

GRILL WIRE BRUSH INJURY IN THE UNITED STATES

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Otolaryngology

Objective: The purpose of this study was to calculate the nationwide incidence of injury from grill wire brushes and characterize location of injury and outcomes.

Study design: The authors searched the Consumer Product Safety Commission's National Electronic Injury Surveillance System for grill wire brush injury emergency department visits from 2002 to 2014. Location of injury, demographics, outcomes were analyzed. A literature search and review of the Consumer Product Safety Commission's consumer reported injury database was also completed.

Results: A total of 43 cases were found within the NEISS database, which extrapolated to an estimated 1698 (95% confidence interval 1468-1927) emergency department visits nationwide. In the NEISS database, the mean age was 30 years (median=26, range 10 months-72 years of age). The gender distribution of the patients was similar (21 males vs 22 females). Of the cases that reported race, the majority were white (23/27, 85%). The location of injury most commonly provided was the oropharynx in NEISS (23/43, 53.4%) and literature review (11/36, 30.5%) where as the oral cavity was listed in the consumer reports (8/23, 34.7%) In NEISS database, the majority of patients were treated and released from the emergency department (31/43, 69.7%).

Conclusion: Wire brushes are a common method to clean grills and consumers need to be aware of their potential danger. Otolaryngologists play an important in the diagnosis and treatment of these injuries.

POSTER 77

HEALTH BENEFITS OF DOG WALKING FOR OLDER ADULTS

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Introduction: Pet ownership has been recognized as being instrumental in positively influencing one's health (e.g., petting a dog reduces blood pressure and cholesterol while increasing oxytocin and decreasing cortisol; Friedmann et al., 1983; Odendaal & Meintjes, 2003).

Method: This study utilized data from the 2012 wave of the Health and Retirement Study to explore the extent to which the physical activity and physical health of older adults is influenced by dog walking. Sample selection criteria included responding to the HRS in 2012 and being randomly selected for the Human-Animal Interaction Module (N=696). We tested the hypothesis that older adults who walk their dog would have better physical health and health behaviors than people who do not engage in dog walking. Five weighted regression models were conducted with dog walking as a key predictor of BMI status, number of ADL limitations, number of chronic conditions, frequency of moderate exercise, and frequency of vigorous exercise. All models controlled for age, gender, marital status, years of education, race, Hispanic ethnicity, and household income.

Results: We found that dog walking was associated with a half point lower body mass index ($\beta = -.06$, $p<.01$), fewer ADL limitations ($\beta = -.08$, $p<.01$), fewer chronic health conditions ($\beta= -0.10$, $p<.01$), and fewer doctor visits ($\beta= -0.08$, $p<.01$). It was also associated with more frequent moderate exercise ($\beta= 0.11$, $p<.01$) and vigorous exercise ($\beta= 0.13$, $p<.01$).

Discussion: These findings suggest that health interventions for older adults could be strengthened by including recommendations that encourage dog walking.

POSTER 78

THE EFFECTIVENESS OF CARES® DEMENTIA TRAINING MODULES ON DELIVERY OF PERSON CENTERED CARE INSIDE A MEMORY CARE UNIT: UTILIZING THE CARES® OBSERVATIONAL TOOL

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The quality of care provided to residents with Alzheimer's disease (AD) and related dementias remains a serious challenge in long-term care environments. Evidence has suggested that through the enhancement of staff training (to include direct and non-direct care providers), quality of care and quality of life can improve, however, transfer of knowledge in to practice remains a challenge. Through the inclusion of Person Centered Care (PCC) approaches, residents with AD and related dementias must first be viewed as a person, irrespective of their diagnosis.

This longitudinal, single-group, repeated-measures study tested the effectiveness of ten online dementia training modules and their impact on delivery of PCC inside a memory care unit (MCU), amongst staff across three time points (n = 24). The setting included a 60-bed private pay memory care unit located outside of Saint Louis, Missouri. Specific aims for this study included: 1) Evaluate for perceived changes in dementia care after completing the CARES dementia training modules, using the CARES Observation Tool (COT) over a five month period (January 2015-May 2015), 2) Evaluate for changes in dementia care knowledge after completing the CARES dementia training modules, using the CARES Dementia Knowledge Test (DKT).

This study offers a viable, systematic approach to the enhancement of dementia knowledge and provision of PCC to residents with AD or related dementias residing in MCUs, with endorsement from the Alzheimer's Association.

POSTER 79

ASSOCIATIONS BETWEEN CYTOKINES, ENDOCRINE STRESS RESPONSE, AND GASTROINTESTINAL SYMPTOMS IN AUTISM SPECTRUM DISORDER

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Many children and adolescents with autism spectrum disorder (ASD) have significant gastrointestinal (GI) problems, but the etiology is currently unknown. Individuals with ASD and individuals with GI disorders without ASD tend to have altered immune system functioning as well as an altered reactivity to stress. Interestingly, there is overlap between immune system markers associated with the stress response and those altered in ASD, particularly TNF- α and IL-6. With this, we examined whether GI distress is associated with increases in stress-associated endocrine markers and immune responses in ASD. Exploratory analyses were also conducted between immune system markers and problem behavior and adaptive functioning. A significant positive relationship was found between lower GI symptoms and post-stress cortisol concentration. However, this did not result in a relationship between lower GI symptoms and TNF- α or IL-6 Exploratory analyses revealed significant correlations between cortisol change score, intelligence, and inappropriate speech. In addition, significant correlations were found between TNF- α and IL-6 and irritability, socialization, and intelligence. Last, the relationship between the response to stress and GI functioning was significantly modified for children who with lost skills that were previously acquired. These findings support that individuals with ASD and lower GI symptoms may have an increased response to stress, but this effect is not associated with concomitant changes in immunological functioning for stress-associated cytokines. However, the relationship between cortisol, IL-6, and intelligence, as well as the relationship between endocrine stress reactivity and lower GI symptoms in children with loss of skills warrant further investigation.

POSTER 80

KINEMATIC COMPARISION OF MARKER-BASED AND MARKERLESS MOTION CAPTURE SYSTEMS

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Introduction: Markerless motion capture systems may provide an easier method for motion analysis. The purpose of this study was to compare hip, knee, and ankle joint kinematics between marker-based and markerless systems.

Methods: With institutional approval, eight healthy adults performed 5 trials of a side cutting maneuver. Markerless motion was collected using an 18-camera system (Organic Motion Biostage) and processed via third party software (Dynamic Athletics DARI, Vault software). Marker-based motion was collected using an 8-camera system (Vicon, Oxford, UK). Vicon's Plug-In Gait skeletal model with functional joint calibration was used to determine joint angles. Trials were collected simultaneously, with subjects performing a single elbow flexion motion before each task to sync the two systems. RESULTS: Between-system agreement was strongest in the sagittal plane and weakest in the frontal and transverse planes. Absolute between-system discrepancies were largest at the hip in the sagittal plane. However, after normalizing to joint range of motion, RMS errors were largest at the hip in the non-sagittal planes.

Discussion: The potential for using markerless motion capture methods may be limited by the joint of interest as well as the plane of motion. While it is known how joint centers and axes were defined in the marker-based system, these definitions were unclear in the markerless system. This information is important for defining joint motion for biomechanical and clinical applications. Analysis of sagittal plane joint motion may have the best potential for application.

POSTER 81

SAGITTAL KNEE ANGLES IN HEALTHY AND KNEE OSTEOARTHRITIS POPULATIONS

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Introduction: Knee Osteoarthritis (OA) is often accompanied by pain, muscle weakness, and dysfunction. The purpose of this study is to determine between limb difference in knee flexion angle in an OA population compared to healthy individuals.

Methods: Nine healthy individuals and 5 subjects with unilateral knee OA were recruited for this study. All subjects performed five trials of a walking task at a self-selected speed.

Data was collected using a Vicon MX-T40S 8-camera motion capture system (Vicon, Oxford, UK) synchronized with three force plates (AMTI Optima). Retroreflective markers were placed according to the lower body Plug-In Gait marker set. Kinematic data were sampled at 100Hz and processed using Vicon Nexus 2.1 software. Knee flexion angles were averaged across trials and across subjects. Data were time normalized to 100% stance. Data will be analyzed qualitatively.

Results: Subjects with knee OA had less knee extension at initial contact and during midstance, and had a lower peak knee flexion angle during weight acceptance compared to controls. Furthermore, peak knee extension during midstance was lower in the affected knee compared to the unaffected knee in the OA population.

Discussion: Subjects with knee OA demonstrated asymmetrical joint angles and a reduced range of motion throughout stance compared to healthy individuals. Such abnormal movement patterns may be associated with the presence of pain and muscle weakness commonly associated with OA. Future studies should examine physical impairments, as well as spatiotemporal parameters to further understand the relationship between OA and kinematic outcomes.

POSTER 82

REDUCTION OF FALLS AND FALL-RELATED INJURIES IN HIGHLY ENGAGED, LOW PERFORMING HOSPITALS

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Background: The Hospital Engagement Network (HEN) is a collaborative effort between the American Hospital Association and Hospital Research and Education Trust (HRET) to reduce preventable harms in healthcare by 40%. Project sponsorship and oversight is provided by Centers for Medicare and Medicaid Services. The Missouri Hospital Association has an active HEN with 94 participating hospitals. HEN goals are to reduce preventable harms in key areas: adverse drug events, catheter associated urinary tract infections, central line associated blood stream infections, falls, pressure ulcers, readmissions, surgical site infections, ventilator-associated pneumonia, and venous thromboembolism. This project focused on reduction of falls and fall-related injuries in Missouri hospitals.

Significance: According to HRET, each fall increases costs by approximately $11,250. Effective fall prevention can provide a safer patient environment and reduce hospital costs from injuries.

Methods: Falls data collected since January 2012 was used to complete a Harm Across the Board storyboard for the majority of HEN hospitals. An individualized gap analysis determined current practice and areas for potential improvements for each hospital. Coaching in best practices was provided via in-person site visits or conference calls. A fall prevention seminar was held allowing high-performing hospitals to share successful fall reduction strategies.

Results: Results of preliminary analysis of data from 23 hospitals are reported. Since January 2014, 248 falls have been prevented resulting in an estimated cost savings of $2.79 million.

Conclusions: Assessment, coaching, and data collection continued through December 2014. If interventions are successful and sustainable, the fall prevention program could expand to other settings.

POSTER 83

USING I2B2 FOR QUALITY IMPROVEMENT

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i2b2 is a well-known tool in academic spaces fostering access to clinical information for research purposes. At the University of Missouri, i2b2 provides access to clinical data in several formats: aggregate, de-identified, and fully identified. These sets of data can provide valuable access to clinical information for the purposes of clinical trial feasibility assessment and cohort identification, retrospective or prospective data analyses, and quality improvement.

To date, the primary use cases for i2b2 have been for clinical trials use; its use for quality improvement projects has been low. In this poster, we will describe the model and process for i2b2 access at the different access levels, and present a flowchart for how i2b2 fits into research activities. We will evaluate a "train the trainer" model for spread and adoption of i2b2 across the clinical landscape at MU, as well as present survey results regarding use of i2b2 for quality improvement.

POSTER 84

EFFECTS OF INCREASED DIETARY PROTEIN ON DAILY APPETITE CONTROL, SATIETY, & FOOD INTAKE IN HEALTHY, OVERWEIGHT WOMEN

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Purpose: To investigate the effects of consuming normal-protein (NP) vs. higher-protein (HP) meals on daily appetite control, satiety, and food intake in healthy, overweight women during energy balance (EB) and energy restriction (ER).

Methods: Thirty-four women (age: 35±2y; BMI: 28.1±0.3kg/m^2) completed the following randomized, full-feeding, cross-over design studies. For study 1, 17 participants randomly consumed an EB diet (2000kcal/d) containing NP (76g protein/d) or HP (125g protein/d) for 7 days/treatment. For study 2, 17 participants randomly consumed an ER diet (1250 kcal/d) containing NP (48g protein/d) or HP (125g protein/d) for 7 days/treatment. On day 6 (of each pattern and within each study), participants completed a tightly-controlled 11-h testing day consisting of questionnaires assessing perceived hunger, fullness, and food cravings. On day 7, protein intake was held constant but carbohydrate and fat-rich foods were provided ad libitum to assess daily intake.

Results: Daily hunger, fullness, and food intake were not different between treatments during EB. HP led to greater daily food cravings vs NP ($p<0.05$). Concerning ER, HP led to lower daily hunger (18598±1868) vs NP (24849±2557mm*660min, $p<0.003$) and greater fullness (36313±2260) vs NP (30862±2896mm*660min, $p<0.003$). Daily food cravings tended to be lower following HP vs NP ($p=0.007$). Lastly, HP led to greater daily food intake (+425±98 kcal) vs NP ($p<0.001$).

Conclusions: The protein-driven appetite and satiety effects were only observed during energy restriction suggesting that energy state is a critical factor. Additionally, although appetite and satiety alterations occurred, protein consumption did not reduce free-living daily food intake in overweight, healthy women exposed to ad libitum, highly palatable foods.

POSTER 85

QUANTITATION OF DIETARY FAT INCORPORATION INTO INTRAMUSCULAR LIPID SPECIES IN HUMANS

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Elevated lipid content in skeletal muscle contributes to insulin resistance. No reports have compared the quantitative contributions of dietary saturated (SatFA) and monounsaturated fat (MUFA) to intramuscular lipid pool.

The goal of the present study was to develop a method to quantify the rate of dietary fat incorporation into skeletal muscle lipids in humans. Nondiabetic adults (n=4, 2M, 2F, BMI 24.8 ± 4.6 kg/m^2) were fed a high-fat breakfast and lunch of identical composition (40% fat, 42% CHO, 17% protein), and underwent two vastus lateralis muscle biopsies (fasting and fed). A stable isotope (d_{31}-palmitate or d_{33}-oleate) was added to the meals to label triglyceride-rich lipoproteins (TRL). Infusion-based quadruple time-of-flight (Q-TOF) mass spectrometry was used to analyze the triglyceride (TG) labeling pattern in TRL and in muscle biopsy samples. TRL-TG enrichment was used as the precursor pool to calculate muscle lipid fractional synthesis rate (FSR).

Intramuscular TG (IMTG) contents ranged from 0.98-1.26 mg/g wet weight in the fasting state, and 0.77-1.33 mg/g after fed. The FSR of IMTG from dietary fat ranged from 0.31%/h-1.13%/h, which was, surprisingly, higher than reported synthesis rates of IMTG from the plasma FFA pool (0.28%/h). The isotope enrichment and labeling pattern were measured in other muscle lipid species, and desaturation and elongation products of d_{31}-palmitate were detected.

In summary, these data demonstrate the extent to which dietary fat can directly and significantly contribute to intramuscular lipid synthesis. This methodology could be applied to determine how dietary fat composition influences muscle lipid handling and impacts insulin sensitivity.

POSTER 86

BIOMECHANICAL ANALYSIS OF THE ANTEROLATERAL LIGAMENT (ALL) USING IN VIVO MUSCULOSKELETAL MODEL

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Introduction: There has been renewed interest in surgical reconstruction of the anterolateral capsular structures as an adjunct to ACL reconstruction in order to prevent rotatory knee instability. However, the anatomic insertion points of the ALL are controversial and biomechanical properties of surgical reconstruction vary widely based on a surgeon's choice of ligament location.

Methods: With institutional approval, computational knee models were created from MRI derived geometries (bone, cartilage, menisci) and motion captures data for two female subjects. The computational model included contact between articulating cartilage surfaces and knee ligaments with origins and insertions identified from MRI and literature. ALL was modeled using two femoral origin locations. The first modeled the origin of ALL anterior to the LCL origin and the second modeled the origin of the ALL posterior and proximal to the LCL origin.

Results: In the first model (ALL origin anterior to the LCL origin), both force and ligament length increased with flexion angle. In the second model (ALL origin posterior and proximal to the LCL origin), both force and ligament were most taut at extension and decreased with increasing flexion angle.

POSTER 87

EXPLORING WHAT MOTIVATES INDIVIDUALS TO SEEK NON-EMERGENT MEDICAL TREATMENT FROM THE EMERGENCY DEPARTMENT

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Emergency Department (ED) utilization for non-emergent illnesses tends to obstruct throughput and increase ED wait times, which contributes to higher costs of care. Understanding what motivates individuals to seek non-emergent care in the ED will assist in developing future interventions aimed at improving health literacy, reducing inappropriate ED use, and ultimately lowering healthcare costs.

The purpose of this qualitative study is to understand thought processes and reasoning involved in making the decision to visit the ED for non-emergent health problems, and patients' perceptions of the EDs role in the delivery of health care. This was a qualitative research study using semi-structured interviews to gather participant data. IRB approval was obtained prior to data collection.

A purposive sample of ED patients was selected based on their ESI score assigned by the triage nurse. A total of 13 participants were interviewed (nine females and four males). Ages ranged from 19-86 years. Four main themes emerged from the interview data to explain the participants' decision to visit the ED for non-emergent care: Convenience, Excellent treatment in the ED, Lack of understanding ED's purpose; and Lack of awareness of other resources.

The study findings point to a need to educate the public about how to navigate the healthcare system and use more appropriate resources for non-emergent care. Nurse practitioners (NP) in the ED can move non-emergent patients through more quickly, allowing physicians to treat the most emergent problems. Placing NP's in schools and churches helps to root health promotion and education in the community.

POSTER 88

LOUDNESS EFFECTS ON TONGUE MOTOR CONTROL IN TALKERS WITH AMYOTROPHIC LATERAL SCLEROSIS

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Background and Motivation: Amyotrophic lateral sclerosis (ALS) is a relentless neurodegenerative disease that causes a rapid decline in speech intelligibility and loudness. In order to improve intelligibility, patients are often instructed to increase loudness while speaking. To-date, no empirical studies have examined these speech loudness changes at a physiologic level in ALS. The aim of the proposed study is to evaluate loudness effects on tongue motor control in order to provide a stronger scientific basis for a speech intervention strategy used with disordered talkers.

Methods: Our strategy is to recruit eight subjects with ALS and eight age- and gender-matched healthy controls. Participants will be asked to repeat the sentence 'I owe you a yo-yo' 10 times at their typical loudness and 10 times at twice their typical loudness. An electromagnetic articulograph will be used to track tongue movements using two receiver coils affixed to the tongue tip and back. Tongue motor control for each loudness condition will be assessed using the spatiotemporal index (Smith et al., 1995).

Expected Outcomes: Loud speech is shown to have a stabilizing effect on articulatory movements in disordered and healthy talkers; therefore, we predict that people with ALS will display lower tongue movement variability (more stable movements) with loud speech (Kleinow et al., 2001).

Discussion and Clinical Significance: This research will help determine the facilitative or deleterious effects of speech loudness manipulations on tongue motor control in talkers with ALS. This information will be valuable to clinicians when recommending loudness-based strategies to increase intelligibility.

POSTER 89

LEISURE TIME PHYSICAL INACTIVITY (LTPIA), OBESITY AND TYPE 2 DIABETES (T2DM) RATES IN THE SOUTHERN UNITED STATES (US)

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Background: Nearly 29,000,000 US adults have DM plus 86,000,000 have prediabetes. Physical inactivity is a modifiable risk factor for obesity, prediabetes and T2DM. People in the Southern US are more likely to be inactive than those in other US regions.

Purpose: This study explores changes in and relationships among age-adjusted prevalence rates of LTPIA, obesity, and T2DM in the Southern US from1994-2012.

Methods: National LTPIA, obesity, and T2DM data from the Behavioral Risk Factor Surveillance System (BRFSS) were analyzed using SPSS. Datasets included age-adjusted percentages for each state on even numbered years.

Results: In 1994, mean national rates of LTPIA, obesity, and T2DM were 4.5% (CI 3.58, 5.67), 14.1% and 29.5% (CI 27.26, 31.85), respectively. In contrast, mean rates of LTPIA, obesity, and T2DM in the Southern US were 5% (CI 4.05, 6.16), 15.1% and 36.2% (CI 33.9, 38.6), respectively. Mean obesity rates increased from 15.1% to 30.1%; mean T2DM prevalence rose from 5% to 10.3% (CI 9.5, 11.6); mean LTPIA rates dropped from 36.2% (CI 33.9, 38.6) to 26.2% (CI 24.8, 27.6) in the Southern US over the 18 years. Nationwide patterns were similar, but less severe. Additional analyses are underway to examine statistical relationships.

Conclusions: LTPIA, obesity and T2DM rates in the Southern US are higher than national rates. Although self-reported LTPIA rates have dropped 10% in the Southern US, obesity and DM rates have continued to rise.

POSTER 90

A SURVEY OF WOMEN WITH BREAST CANCER-RELATED LYMPHEDEMA (BCRL): TO IDENTIFY THE NEED FOR SUPPORT

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BACKGROUND: The complexity of breast cancer-related lymphedema (BCRL) treatment and its psychological impact on patients can negatively affect adherence to self-management. Sub-optimal BCRL self-management rates suggest that health care providers (HCP) may not be offering support options that are customized to patient-perceived needs. There are limited studies that discuss the concept of support from a patient's perspective.

METHODS: An IRB-approved survey was mailed to women with BCRL (N=15) with aims to: (a) understand the meaning of BCRL-related support; (b) identify what type of support has been received; and (c) identify what kind of support is wanted.

RESULTS: Survey responses indicated the best way to provide support to help maintain BCRL self-management: ongoing follow-up with health care providers (31%); engagement with others who have BCRL (31%); "unsure" or left the answer blank (25%); financial support (6%); and self-dependent (7%). Survey participants were also asked what type of support they received to help them maintain BCRL self-management: 74% responded: "Clinic referral" and/or "Prescriptions." Based on survey responses, it is unclear whether patients have been exposed to support other than medical treatment. Similarly to patients who need help to develop questions to ask their physicians when diagnosed with life-threatening illness, patients also need help to understand and select the types of support that will best fit their needs.

CONCLUSIONS: A proposed practice change would implement an interactive intervention that includes physiological, psychological, and social parameters to facilitate patients and HCPs in meaningful dialogue about individualized support options for BCRL self-management.

POSTER 91

WHAT IS THE EFFECT OF PEER SUPPORT INTERVENTIONS ON GLYCEMIC CONTROL? - A SYSTEMATIC REVIEW AND META-ANALYSIS

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Purpose: Estimate effect of peer support interventions on hemoglobin A1C in adult patients with diabetes.

Method: Systematic review and meta-analysis of randomized controlled trials of peer support interventions compared to control group that measured hemoglobin A1C as primary or secondary outcome. 357 citations retrieved from OVID MEDLINE, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, CINAHL, PsycINFO, Scopus, OCLC First Search and Social Service Abstracts along with author and reference searches.180 abstracts reviewed. Of 35 full articles reviewed, 18 articles excluded, leaving 17 articles (14RCT, 3cluster RCT) eligible for meta-analysis. Standardized mean difference effect sizes were calculated using random effects models. Heterogeneity assessed with Q and I^2 statistics. Multiple trial level data extracted including patient and peer supporter characteristics, intervention details and study quality.

Results: Forest plot with random effects model showed pooled standardized mean difference of 0.090 (95% CI -0.008 to 0.187, p 0.071, I^2 54.571%) on hemoglobin A1C in the peer support intervention group compared to controls (n=3557). Subgroup analysis showed significant effect of peer support interventions on hemoglobin A1C in studies with predominantly minority population (0.213, 95% CI 0.075 to 0.351, p 0.002), furthermore specifically in predominantly Hispanic population (0.229, 95% CI 0.11 to 0.347, p=0.000).

Conclusion: The results show non-significant minor positive effect of peer support interventions on glycemic control in adult patients with diabetes. Peer support showed positive effect on hemoglobin A1C in minority participants, especially with Hispanic ethnicity. This will inform future research on peer support interventions to improve diabetes care.

POSTER 92

COMPARITIVE EVALUATION OF THE MICROSOFT KINECT WITH THE VICON MOTION CAPTURE SYSTEM TO OBTAIN 3D HIP AND KNEE ANGLES

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Various applications for rehabilitation and assistive technologies require quantitative assessment of the specific performed task, such as the measurement of joint motion. More recently, the Microsoft Kinect™ (Microsoft, Redmond, Washington) sensor has gained momentum as a tool for quantitative assessment in clinics due to its ability to extract a 3-D virtual skeleton, its affordability, and portability.

This study compares joint angles derived from the new Kinect v2 to Vicon joint angles calculated during simultaneous capture. Three females and four male subjects (26.6 ± 4.0 years, 1.72 ± 0.09 m, 71.8 ± 12.3 kg) participated in this study. Data was simultaneously recorded using the Vicon MX motion capture system, and Microsoft Kinect™ v2. Retro-reflective markers were placed according to the full body PiG protocol along with four-marker clusters which were attached to the anterior-lateral aspect of the thigh and shank as required by PiG-FJC.

The subjects performed 3 trials of a drop vertical jump. Right Hip abduction/adduction was used to synchronize data obtained from the two systems. Good between-system agreement was measured in the sagittal plane (CMC = 0.88-0.99). Non-sagittal planes revealed poor waveform for Kinect™ when compared to Vicon.

Before it can be used in the clinical setting several improvements should be made to the predictive model in terms of fixed segment length, anatomically accurate rotation axes, accuracy and smoothness of joint center location. Although some improvements are necessary the Kinect™ v2 displayed promising initial results for use as an affordable tool in the clinical setting.

POSTER 93

SIMULATING THE EFFECT OF SULCUS ANGLE ON PATELLOFEMORAL CONTACT PRESSURES DURING GAIT

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Patellofemoral joint stability is influenced by the geometry of the trochlear groove. An abnormally shallow sulcus has been reported to be an important factor in patellar instability both in adults and in children. A sulcus angle of $138^0 \pm 6^0$ represents normal anatomy and $> 145^0$ is indicative of trochlear dysplasia. In-vivo musculoskeletal models may be useful tools to help predict changes in patellofemoral contact pressures during gait as a function of anatomic variation such as sulcus angle and Tibial Tubercle-Trochlea Groove Distance {TT-TG}.

One female subject was modeled using rigid body dynamics and deformable contacts were defined between tibia cartilage, femur cartilage and menisci. Ligaments were represented as one-dimensional tension only nonlinear springs. An inverse kinematics simulation was performed to capture the muscle contraction information for a subsequent forward dynamics simulation. The final simulation was muscle driven where muscle forces recreated the gait motion history. Trochlear dysplasia was induced by modifying the sulcus angle from an original 135^0 to 150^0. The tibial tuberosity location was also modified from an original TT-TG distance of 12 mm to 20 mm. The gait simulations were repeated, with new muscle forces calculated, and the patellofemoral contact pressure predicted for each modeling scenario.

At mid-stance the maximum patellofemoral contact pressure was 2.96 MPa for the normal sulcus angle of 135^0 and 3.96 MPa for sulcus angle of 150^0. When the patellar tendon insertions were moved laterally 8mm (TT-TG = 20 mm) for sulcus angle of 150^0 the maximum patellofemoral contact pressure was 3.9 MPa.

POSTER 94

DISSEMINATION AND IMPLEMENTATION OF THE MISSOURI MATERNAL, INFANT, AND EARLY CHILDHOOD HOME VISITING PROGRAMS: THE COMPLEXITY OF THE COORDINATION OF SERVICES

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Background: The Maternal, Infant, and Early Childhood Home Visiting (MIECHV) program was created by the Patient Protection and Affordable Care Act and is administered through Health Resources and Services Administration (HRSA). MIECHV provides comprehensive services to at-risk families through evidence-based home visiting programs. MIECHV is a complex adaptive system (CAS), in that programs and activities are part of a larger network with histories and evolving dynamics. CAS present challenges for efficient and effective implementation and coordination, sustainability, and evaluation of services.

Methods: We conducted a systematic review of publicly available information related first to the MIECHV programs (at federal, state, and local levels). Additionally, we reviewed affiliated early childhood programs with a birth to age five scope. We used snowballing of primary documents to identify additional affiliates and corresponding relationships.

Findings: We visually displayed an outline of the Missouri MIECHV systems infrastructure, which we found to meet CAS criteria. Despite an extensive review of documents, this network of organizations is still likely incomplete. This complexity challenges the potential for effective and efficient implementation of the MIECHV programs, while increasing the potential for redundancy, overlap, and fragmentation.

Implications: Implementing federal policy through state and local organizations is incredibly complex. Stakeholders' understanding of the systems-dynamics and infrastructure is critical for progress toward intended programmatic outcomes, through alignment, evaluation of coordination of services, and organized communication paths. Umbrella organizations creating visualization tools of federal, state, and local stakeholders and their relationships is a practical approach for addressing these needs and identifying service gaps.

POSTER 95

SLOWER RATE OF FAT ABSORPTION AT DINNER VERSUS LUNCH IS ASSOCIATED WITH LOWER CONCENTRATIONS OF TRIACYLGLYCEROLS (TG) THE FOLLOWING MORNING

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High postprandial TG are a risk factor for cardiovascular disease (CVD) and little is known about the impact of successive meals on the circadian TG pattern. Here, we measured the rate of fat absorption during two sequential meals to determine how lipid processing after dinner contributes to fasting TG concentrations the next morning.

Non-diabetic adults (n=6, BMI 20-49, fasting TG 50-198 mg/dL) were fed a low-fat breakfast, followed by a lunch and dinner of identical composition (35% fat, 46% carbohydrates and 18% protein). Stable isotopes were added to lunch (d_{31}-tripalmitin) and dinner ($^{13}C_4$-tripalmitin) to measure the kinetics of dietary fat absorption in TRL-TG by GC/MS. Blood samples were taken intermittently throughout the day and through the next morning. For insulin and glucose, the AUCs were not significantly different between the two meals. However, the rate of fat absorption was 1.9-fold higher after lunch than dinner (0.27±0.03 vs 0.14±0.04 mmol/L/h, respectively; P=0.04). Interestingly, faster dinner absorption rates were strongly correlated with higher 5h incremental contributions of dinner fat to TRL-TG (r^2=0.996; P=0.0001).

These data suggest that faster absorption contributes to poor tolerance to dietary fat. Further, faster absorption correlated with subsequently higher fasting TG (r^2=0.975; P=0.0002). In summary, isotopic labelling of successive meals allows for the identification of diurnal control of TG metabolism. These data provide a mechanism to explain why therapies that lower evening meal TG absorption rates, such as increased fiber content or reduced fat content of meals, may reduce CVD risk.

POSTER 96

WOMEN'S CONCERNS OF MAMMOGRAPHY FOR BREAST CANCER SCREENING

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Purpose: this article aims to investigate women's experience with the mammography and identify the barriers to follow the prescribed routines of mammography.

Method: Thirty women from Missouri, including both breast cancer survivors and women who never had breast cancer, participated in either focus groups or individual interviews with open-ended questions. Interviews were thematically analyzed using DEDOOSE software. The health belief model was adopted as an initial conceptual framework for data analysis.

Results: Three major themes have emerged: 1) women were afraid of mammography; 2) women were confused about mammography; 3) escapism and overawareness. The first theme covers the issues: discomfort with the mammography's procedure, concern of radiation causing cancer. The second theme includes: lack of accurate and sufficient health information service and education, inefficient clinical referral and scheduling management. The third theme refers to women's adverse reactions to the breast cancer screening: fear of diagnosis causes some to avoid mammography, and the over screeners exhibited less consciousness of the proper routine of mammography.

Conclusion: compare the results with health belief model, to improve the adherence to recommended routines of mammography, the technique and procedure of mammography causing women's discomfort, and the ways to efficiently deliver health information and health education need to be improved, which intervenes on the concepts of 'perceived barriers to take the action' and the 'cues to action' in the model. The adverse reactions refers the 'individual characteristics' act as additional modifying factors between individual perceptions and likelihood of action.

POSTER 97

PERCEPTIONS REGARDING ADOLESCENT PREGNANCY AMONG A GROUP OF THAI ADOLESCENTS IN SWEDEN

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Purpose and research questions: Thailand and Sweden have very different sexual health systems and community mores regarding sexual behavior. Therefore, we aimed to explain perceptions of adolescent pregnancy among a group of Thai adolescents in Sweden.

Methods: We developed and pilot-tested a semi structured interview guide to explore participants' perceptions of adolescent pregnancy and its risk factors, impact, and prevention strategies. We used a purposive sampling strategy, with male and female Thai adolescents (age 15-19) recruited from Swedish language classes. Eligibility criteria included: speak Thai-speaking; single; residing in Sweden ≥ six months but <5 years. Content analysis approach was used.

Results: We conducted four focus groups of Thai youths. Participants perceived adolescent pregnancy as having many negative consequences, including social perceptions within Thai immigrant communities of pregnant adolescents as "a bad person" and identified risk and protective factors for adolescent pregnancy among Thai immigrant youth, including family problems, parental communication, lack of contraception access/knowledge, self-control, and peer influences. Participants identified family readiness, economic factors, maturity, and cultural influences, in particular related to Buddhist beliefs. Finally, participants described youth clinics and comprehensive sexual education in schools as key factors in preventing adolescent pregnancy, contrasting Swedish services favorably with those available in Thailand.

Conclusions: Although Thai adolescents residing in Sweden live in a sexually open society with comprehensive sexual education and youth services, they perceived adolescent sexual activity and pregnancy as stigmatized. Attention to peer, family and cultural variables may be particularly important in sexual health interventions with this population.

POSTER 98

TOWARD DEVELOPING A MOBILE APPLICATION TO IMPROVE DIABETIC PATIENTS' SELF-CARE BEHAVIORS: A FUNCTIONALITY ANALYSIS

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Background: Changing patients' self-care behavior decreases the risk of long-term disability and complications for diabetes. Mobile apps have the potential to improve the patients' self-care behaviors. However, current literature lacks discussion about if the apps are designed to change self-care behaviors of the diabetic patients.

Aim: The aim of this study was to examine the functionality on self-care behavior of current diabetes apps.

Method: We searched the App Store (iOS, Apple Inc.) using key terms of diabetes, blood sugar, and glucose. Apps were excluded if they (1) were not designed for diabetic patients, (2) were not written in English, (3) only provided access to reference material. The functionality of the apps were analyzed and classified according to the validated seven principles of American Association of Diabetes Educators (AADE7) Self-Care Behaviors.

Results: Out of 600, 136 apps were identified as eligible. A majority of the apps were designed to support principles of Healthy Eating (HE, 87), Monitoring (M, 86), Taking Medication (TM, 62), and Being Active (BA, 42), with fewer apps on Problem Solving (PS, 23), Healthy Coping (HC, 16) and Reducing Risks (RR, 8).

Conclusion: Discussion with an experienced endocrinologist revealed that HE, PS and HC are considered top three critical principles for improving self-care behaviors. However, the PS and HC principles were assumed harder to address than the other five principles, which may attribute to the skewed app development trend. Future diabetes apps should incorporate functionalities of HE, PS and HC, to better support changing diabetic patients' self-care behaviors.

POSTER 99

GLOBAL AND SUBNETWORK RESTING STATE TOPOLOGY IN AUTISM, PHENYLKETONURIA, AND TRAUMATIC BRAIN INJURY

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Previous studies have suggested that functional connectivity, as measured by functional magnetic resonance imaging (fMRI), is altered in individuals with neurological syndromes.

In the present study, we used graph theoretical analysis to examine how the topology of functional networks differs based on diagnosis. Resting state fMRI data was collected from 61 individuals with autism spectrum disorder (ASD), 12 individuals with phenylketonuria (PKU), 18 individuals with traumatic brain injury (TBI), and 61 typically developing individuals (TD). Partial correlation matrices for 90 cortical and subcortical regions were generated and thresholded to control for network density. Topological properties were then compared between diagnostic groups and the TD group.

Statistical analysis revealed that the ASD group demonstrated disruptions in network efficiency at both the local and global levels. The PKU and TBI groups showed network-wide over-connectivity. In subsequent analyses, 13 functional subnetworks were identified and compared between groups for topological organization. In particular, as compared to the TD group, the ASD group demonstrated a reduced number of connections at each node within a subnetwork containing temporal cortical regions. The PKU group showed reduced network efficiency and connection strength in a large subnetwork containing frontoparietal connections, as compared to the TD group. Lastly, the TBI group displayed network differences in 9 of the 13 subnetworks.

The results of the present study indicate alterations in global network and subnetwork topology that are distinct to specific diagnoses. Future studies are needed to characterize these differences within the contexts of development and symptom severity.

POSTER 100

ADVERSE HEALTH OUTCOMES OF ENDOCRINE DISRUPTING CHEMICALS PRESENT IN HYDRAULIC FRACTURING FLUIDS

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Hydraulic fracturing is a drilling technique that injects pressurized water, chemicals, and suspended solids thousands of feet under the surface to release natural gases and oils. Over 1000 different chemicals have been reported to be used in this process and include known neurotoxins, carcinogens, and endocrine disruptors. Previously our lab has shown an association between hydraulic fracturing spills and an increase in endocrine disrupting chemical (EDC) activity in surface and ground water. Our lab has found antagonist activity in 23 of 24 chemicals tested for estrogen, androgen, progesterone, glucocorticoid, and/or thyroid receptors. An imbalance in hormones can cause a multitude of health problems, including decrease infertility and metabolic disease that can be programmed early in life.

We hypothesize that exposure to a mixture of chemicals used in hydraulic fracturing will disrupt reproduction and metabolism. A lab made mixture of 23 hydraulic fracturing chemicals at equimolar concentrations was administered via drinking water to pregnant mice. As a first step in the analysis of fertility, mice were exposed from gestation day 1 to 11 to assess number of implantations and embryo development. To evaluate metabolic disease, pregnant and lactating mice were exposed from gestation day 1 to postnatal day 21 and body weight, energy expenditure, fat and lean mass was measured in offspring. Completion of these studies will increase our knowledge about potential adverse health effects associated with chemicals used in hydraulic fracturing.

POSTER 101

A NOVEL DELTA METHOD FOR CLINICAL GRADING OF CORNEAL NEOVASCULARIZATION IN A MOUSE MODEL

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Rationale: Corneal neovascularization (CNV) is a prevalent cause of blindness and affects 1.2 million people worldwide. No standard method exists that represent CNV grading in animal model as seen clinically in human. We sought to develop a novel matrix as a standard method for clinical scoring of CNV as observed in patients.

Methods: Seventy C57BL/6 mice were used. A single topical 0.5-NaOH application for 30 seconds induced CNV consistently. Slit- and stereo-biomicroscopy analyzed CNV and ocular health. Histology was used to characterize morphology and neovascularization. The NIH Image J, Photoshop CS6 and Excel 2007 ToolPak were used to develop matrix for CNV grading. Data was collected in masked manner by three independent observers.

Results: Topical alkali initiated CNV at day-20 that peaked at day-37. The DELTA matrix was developed by dividing cornea in 4 quadrants and measuring vasculature density (D), vessels enlargement (E), length of vessels (L), thickness of vessels (T) and area of vasculature (A) at day-15, -21, -25, -28, and -37. Grading scale (0-4) was assigned for CNV based on DELTA score.

Grade 0: no CNV with DELTA score 0
Grade 1: low CNV with DELTA score 1-5 (20-30 % cornea affected)
Grade 2: moderate CNV with DELTA score 5-10 (30-50 % cornea affected)
Grade 3: severe CNV with DELTA score 11-15 (50-70 % cornea affected)
Grade 4: very severe CNV with DELTA score 16-20 (70-90 % cornea affected)

Conclusions: DELTA grading method determine levels of CNV in eye represents realistic CNV condition as seen in human patients.

POSTER 102

INTRAVENOUS DELIVERY OF A NOVEL AAV-9 MICRO-DYSTROPHIN VECTOR PREVENTED MUSCLE DETERIORATION IN YOUNG ADULT DUCHENNE MUSCULAR DYSTROPHY DOGS

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Duchenne muscular dystrophy (DMD) affects all muscles in the body. An effective gene therapy for DMD will require efficient whole body muscle transduction. We recently showed that a single intravenous injection of adeno-associated virus (AAV) can lead to safe bodywide muscle gene transfer in adolescent DMD dogs (Yue *et al.* 2015 Hum Mol Genet). Here we evaluated systemic gene therapy in three 3.5-m-old DMD dogs using a novel AAV-9 five-repeat canine codon-optimized micro-dystrophin vector. The microgene carries the N-terminal domain, hinges 1 and 4, spectrin-like repeats 1, 16, 17, 23 and 24, and the cysteine-rich domain. Transcriptional regulation is controlled by the muscle-specific CK8 promoter and a synthetic polyadenylation signal. All experimental subjects received transient immune suppression. One dog was administrated with $5x10^{13}$ viral genome (vg) particles/kg of the vector. Two dogs received $1x10^{14}$ vg particles/kg of the vector. All dogs tolerated injection well. Blood biochemistry (weekly in the first four weeks and biweekly thereafter) was unremarkable. Growth curve was nominally disturbed. Biopsy at 1 and 3 months after injection revealed widespread micro-dystrophin expression in 50-80% myofibers. The dystrophin-associated glycoprotein complex was restored. Muscle damages usually seen in young adult untreated dogs (inflammation, fibrosis, calcification) were rarely observed. CD4+, CD8+, and regulatory T cells were barely detected. Night activity monitoring showed a trend of improvement. Limb muscle force (both forelimb and hind limb) was significantly enhanced compared to that of pre-injection. Our data suggest that systemic AAV micro-dystrophin therapy may translate to large mammals afflicted by DMD.

POSTER 103

A PROCESS MINING APPROACH TO UNDERSTANDING CLINICAL FLOW AT MEDZOU

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Background: Health care organizations use business process management (BPM) to identify inefficiencies and make their workflow capable of adapting to a changing environment. Process mining is a method of visualizing and understanding workflows in real environments. We employed this methodology at MedZou Community Health Clinic to better understand and improve our patient flow.

Objective: The aim of this project is to establish baseline data that can subsequently be used to optimize clinic flow and increase the quality of care.

Methods: We implemented timecards for the volunteer staff to fill out as the patient completed services. These timecards were filled out with the patient ID, name of the service and its start and end time. The data was then collected and analyzed through the Disco process mining software to give us a graphical representation of clinical flow and statistical data on duration and utilization. We then used this data to develop a Value Stream Map for the main clinical activities. Data collection period was from May 2015 to July 2015.

Results: Through this process, we collected 31 patient timecards allowing us to understand the most frequent clinic flows and average times of services. We were also able determine the time it takes from arrival to physician as 138 minutes, of which 51% was value added steps and the rest was attributed to wait times.

Conclusion: Our initial findings indicate long wait times and underutilized stations. Our next steps are to collect more data before making operational changes, by asking observers to follow patients and fill out the timecards.

POSTER 104

TRPV4 ALTERS INTRACELLULAR CALCIUM TRANSIENTS IN CARDIOMYOCYTES OF AGED MICE

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Cardiac excitation-contraction coupling (ECC) occurs via calcium-induced calcium release. In response to the action potential, L-type calcium channel-mediated calcium influx triggers ryanodine receptor (RyR)-mediated calcium release from the sarcoplasmic reticulum (SR). Advanced age associates with dysfunctional cardiomyocyte calcium homeostasis and ECC, which leads to contractile dysfunction and arrhythmia. The ion channels responsible for such changes remain unclear. Analysis of mRNA expression in cardiomyocytes of Young (3-4 month) and Aged (24-26 month) C57BL/6 mice revealed that cardiomyocytes of Aged exhibited a ~50 fold increase in expression of the Transient Receptor Potential Vanilloid 4 (TRPV4) osmotically-sensitive ion channel. We therefore tested the hypothesis that TRPV4 alters intracellular calcium transients in cardiomyocytes following hypo-osmotic stress. Cardiomyocytes enzymatically isolated from the left-ventricle of Young and Aged mice were loaded with the calcium indicator dye fluo-4/AM, subjected to hypo-osmotic stress (250 mOsm, 40 minutes), and electrically stimulated at 0.5 Hz to induce intracellular calcium transients. In cardiomyocytes of Aged mice, pharmacological activation of TRPV4 using the channel agonist RN1747 (100 nM) resulted in an increase in calcium transient amplitude (F/F0: 4.6±0.5 RN1747 versus 3.6±0.4 control, $P<0.05$) and induced pro-arrhythmic cellular calcium overload (5/9 cells). The effects of RN1747 in Aged were prevented by the TRPV4 antagonist HC067047 (1 uM), and were absent in cardiomyocytes of Young mice. In conclusion, the TRPV4 ion channel is expressed in cardiomyocytes of Aged mice and alters calcium transients following osmotic challenge.

POSTER 105

RAPID CARDIAC MRI WITH ULTRASHORT TE AND COMPRESS SENSING

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Every year, about 610,000 people die of heart disease in the United States, which is 1 in every 4 deaths (http://www.cdc.gov/heartdisease/facts.htm). Our goal is to develop an ultrafast cardiac magnetic resonance imaging (MRI) technique for the early diagnosis and monitoring of therapy of the heart disease.

To achieve this goal, we adapted compressed sensing (CS) reconstruction technique to recover the image quality from only a sparsely undersampled subset of MRI data. In contrast to the conventional MRI that requires the sampling rate to fulfill Nyquist requirement, compressed sensing MRI (CS-MRI) saves a significant MRI scan time by undersampling acquisition in the spatial frequency space (k-space). Successful CS reconstruction requires the design of an incoherent and efficient k-space trajectory. An undersampling ultrashort echo time (UTE) sequence was implemented on a Bruker BioSpec 7 Tesla MRI system. UTE sequence uses a radial trajectory with a dense center and sparse peripheral edges, thus promoting incoherence (or sparsity). CF1 mice were imaged under 2% isoflurane anesthesia. The cardiac phases were represented in 40 movie frames per heartbeat. Undersampled MR images in the k-space were then reconstructed using the CS algorithm through identity transformation on Matlab platform. Undersampled UTE MRI data reconstructed through CS show the cardiac images as clear as the fully sampled conventional MRI data.

In the future, more quantitative measurements need to be done and incorporation of GPU Matlab computing with CS would improve the data reconstruction speed.

POSTER 106

SEX DIFFERENCES IN CARDIOPROTECTIVE AT2R EXPRESSION IN DIABETIC RATS AND ITS CORRELATION WITH MYOCARDIAL DAMAGE

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Diabetes mellitus (DM) is an independent risk factor for cardiovascular disease (CVD). Healthy, young women are protected from CVD, while diabetic women are more susceptible to CVD compared to age-matched diabetic men and non-diabetic women. Underlying mechanisms for this sex difference are not fully elucidated. The angiotensin II type 2 receptor (AT2R) is a member of the protective, vasodilative arm of the renin angiotensin system; its gene is X-linked, and increased Agtr2 expression is reported in female vasculature of rodent models.

We hypothesized that a sex difference might exist in DM-associated regulation of cardiac AT2R expression. We used hyperglycemic, male and female Zucker diabetic fatty (ZDF) rats and age- and sex-matched normoglycemic Zucker lean (ZL) rats. Cardiac Agtr2 expression was measured by qRT-PCR at 5-months, cardiac function by echocardiography was compared at 3- and 5-months, and histopathology of cardiac tissue was assessed at 5-months. ZL-F had a nearly 2-fold increase of Agtr2 compared to ZL-M ($p<0.01$). Relative to lean controls, ZDF-M had no significant change in Agtr2, while ZDF-F exhibited ~60% suppression of Agtr2 ($p<0.001$). Echocardiography data revealed evidence of compensated systolic function in all groups, however, diastolic dysfunction was observed in both ZDF-F and ZDF-M, relative to lean counterparts, due to increased isovolumic relaxation time and decreased early:late ventricular filling ratio (E/A). ZDF-F exhibited the highest cardiomyocyte hypertrophy (≥35% over ZL-F, ZL-M and ZDF-M).

Based on our results, we propose that myocardial remodeling, diastolic dysfunction and loss of cardioprotective AT2R may underlie greater susceptibility of diabetic females to CVD.

POSTER 107

TELEHEALTH RESOURCE CENTER - LISTSERV: ANALYSIS OF USAGE AND EFFICIENCY

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Purpose: The purpose of this study was to evaluate the usage of the telehealth resource center listserv (TRC-L). We also wanted to find out the users' opinions and perceptions of the usefulness of the TRC-L.

Background: Listservs have been used for group communication between organizations for many years. They are found to be especially useful for connecting experts from same or similar fields. Listservs are used as communication modality to assist with questions, administrative concerns, schedules, conference attendance etc. between various users.

Methods: We analyzed the usage data from the TRC-L database. We also conducted a survey of the TRC-L participants via REDCap. The survey aimed at finding out participants' perceptions of the listserv, usefulness, actual usage, and also asked for comments and suggestions.

Results: The response rate was 56 percent. Over 50 percent of the listserv users were employed at an academic institution, with the majority from urban areas (88%). The listserv was perceived as an effective tool for communication. The majority of the users felt that the number of messages posted was reasonable (69.7%). The main reason for subscribing to the listserv was to learn about relevant news and events.

Conclusion: Telehealth is a narrow health informatics field and a listserv connecting telelehalth experts from across the United States is a good tool for exchange of information and updates. While most of the users are from urban academic centers, there are still a significant number of rural organizations taking advantage from TRC-L.

POSTER 108

PERINATAL BPA EXPOSURE EXACERBATED POSTNATAL CATCH-UP GROWTH, BUT NEITHER PROGRAMMED ADULT OBESITY NOR INSULIN RESISTANCE IN MICE

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Perinatal exposure to bisphenol A (BPA) has been associated with obesity and insulin resistance in adulthood. Catch-up growth, which is defined here as fetal growth restriction followed by rapid weight gain in early life, has also been found to program adult obesity and insulin resistance.

We hypothesized that early life exposure to BPA combined with catch-up growth would have an additive negative effect on the adult metabolic profile. We administered three doses of BPA (6, 60, 600 μg via Silastic capsule) to pregnant C57BL/6 mice (n=10/group) from gestation day (GD) 7 until approximately postnatal day 7. Prior to the pregnancy, the females were hemi-ovariectomized to create intrauterine growth restriction (IUGR) by having a whole litter in one uterine horn.

We found that BPA treatment increased the variation of pup body weight at weaning, which suggests some mice underwent IUGR. The post-weaning growth rate between week 3 and 5 was negatively related to the weaning weight, that is, the lightest animals at weaning gained a higher percentage of their body weight. BPA 6 exacerbated this negative relationship in both male and female offspring, whereas BPA 600 only affected the males.

However, neither perinatal BPA exposure nor post-weaning growth pattern altered adult glucose tolerance or fat mass, and thus there was no additive effect. This may reflect the pattern of genetic diversity that accounts for differential sensitivity to obesity among humans who are exposed to omnipresent endocrine disrupting chemical BPA.

POSTER 109

DEVELOPMENT OF A NOVEL DECELLULARIZED MENISCAL SCAFFOLD FOR USE IN TISSUE ENGINEERING

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Introduction: Our objective was to develop a novel extracellular matrix (ECM)-derived scaffold to enhance primary healing following meniscal repair, and to assess the cytocompatibility of the scaffold in vitro.

Methods: All procedures were performed with IACUC approval. Grossly normal menisci were harvested from the stifles of adult dogs euthanatized for reasons unrelated to this study. Chemical and physical treatments were combined in order to establish a protocol for effective decellularization. To ensure complete removal of residual chemicals following decellularization, two separate wash protocols were evaluated. The washed scaffolds were flash frozen in liquid nitrogen and powdered using a grinder. The powdered matrix was then lyophilized and sterilized for cytotoxicity testing, and for assessment of tissue cytocompatibility using an in vitro model for meniscal repair.

Results: DNA content was significantly reduced, and histology showed effective cell and nuclear removal from treated menisci. The ECM scaffold was neither cytotoxic to cells in monolayer culture, nor to cells directly seeded on the scaffold. After 42 days of culture, histology showed normal tissue architecture and cellularity of menisci following treatment of full-thickness defects with the scaffold.

Discussion: Based on the results of this study, we report a safe and effective method for decellularization and micronization of meniscal tissue for fabrication of a novel scaffold for use in tissue engineering. Evaluation of the scaffold's potential to promote biological augmentation of meniscal tissue repair is currently under investigation.

POSTER 110

EXERCISE OR CALORIC RESTRICTION INCREASES BONE FORMATION RELATIVE TO RESORPTION AND IMPROVES INTRINSIC BONE STRENGTH IN OBESE, TYPE 2 DIABETIC OLETF RATS

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Obesity and type 2 diabetes (T2D) continue to be major health concerns. Insulin resistance and/or T2D increase the risk of fracture by ~1.5-fold, despite an increase in bone mineral density (BMD).

The objective of this study was to evaluate the effects of voluntary wheel running exercise (EX) or caloric restriction (CR) on bone outcomes in obese, T2D, Otsuka Long-Evans Tokushima Fatty (OLETF) rats. Four-week old, male OLETF rats were randomly assigned to one of three groups each fed a low-fat chow diet: sedentary (O-SED), EX (O-EX), or a 30% CR (O-CR) relative to the O-SED group.

At 40 weeks of age, whole body BMD was reduced in O-EX and O-CR vs. O-SED; however, O-EX and O-CR rats displayed a 20% increase in BMD when normalized to body weight. Osteocalcin (OC) was significantly lower in O-EX and O-CR vs. O-SED; no differences were observed in serum procollagen type1 N propeptide (P1NP). The serum bone resorption markers TRAP5b and CTx were significantly reduced in O-EX and O-CR vs. O-SED. The OC/CTx ratio was increased in O-EX, but not O-CR vs. O-SED, and the P1NP/CTx ratio was increased in O-EX and O-CR vs. O-SED. Femur cortical area/total area was reduced in O-CR vs. O-SED; no differences in O-SED vs. O-EX.

Shear modulus of elasticity and ultimate tensile strength were increased in O-EX and O-CR vs. O-SED; however, O-EX had a greater effect on ultimate tensile strength than O-CR. Overall, both EX and CR elicited beneficial effects on bone turnover and strength.

POSTER 111

LOSS OF FUNCTION IN αA-CRYSTALLIN MUTANT G98R IS RESCUED BY A COMPENSATORY MUTATION IN THE N-TERMINAL OF THE PROTEIN

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α-Crystallins (αA and αB) are the major lenticular proteins that serve both structural and functional roles in the eye lens. Lens transparency results from short ranged ordered interactions between α-crystallins and other lenticular proteins, as well as from their ability to function as molecular chaperones, preventing non-specific protein aggregation. Mutations in αA-crystallin are associated with both congenital and age related cataracts. Mutant αA-crystallin αAG98R is associated with early onset cataract and is characterized by its large oligomeric size, substrate dependent chaperone like activity and loss of stability. Another mutation associated with congenital cataract, αAR21Q, shows minimal deviation from the properties wild-type αA-crystallin, except for an enhanced chaperone like function. To assess whether the detrimental effect of αAG98R mutant could be rescued, a double mutant of αA-crystallin αAR21Q/G98R was generated. Light scattering studies show that the double mutant shows an increased molar mass compared to wild type αA-crystallin. Compared to wild-type αA-crystallin, the double mutant shows an increased intrinsic tryptophan fluorescence and Bis-ANS binding, suggesting an altered tryptophan microenvironment and an increased surface hydrophobicity. Far-UV CD studies reveal an increased α-helical content in the double mutant in comparison to wild type αA-crystallin. However, the double mutant shows a comparable chaperone like activity with wild type αA-crystallin against chemically induced non-specific aggregation of alcohol dehydrogenase and insulin. The study demonstrates that the loss of function in αA-crystallin can be overcome by a compensatory mutation that can rescue its function.

POSTER 112

A QUANTIFICATION OF THE CHANGES IN ARTICULAR CARTILAGE MATERIAL PROPERTIES DURING THE ONSET OF OSTEOARTHRITIS USING STRESS RELAXATION TESTING

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Background: The mechanical properties of articular cartilage change during the development of osteoarthritis. Understanding the relationship between changes in tissue biological and biomechanical properties can provide insight into disease progression.

Methods: With IRB approval, 8 mm diameter osteochondral plugs (n = 62) were created from tissue collected from total knee arthroplasty patients. The plugs were subjected to a stress relaxation test at -20% strain for 120 seconds while time-force data was collected. This data was optimized using MATLAB to determine the aggregate modulus and permeability of the samples. Cartilage surface integrity was assessed using India ink staining and tissue proteoglycan (GAG) and collagen (HP) content was assessed using biochemical assays. The GAG/HP ratio was used as a measure of tissue degradation.

Results: Tissue permeability had a weak, significant ($r^2 = 0.134$ and 0.083; $P < 0.05$) correlation to the GAG/HP ratio and amount of India ink staining of the tissue. The aggregate modulus of the tissue had a weak, significant ($r^2 = 0.074$; $P < 0.05$) correlation to the amount of India ink staining of the tissue. Subjectively, there was a clear trend between amount of tissue damage and the tissues aggregate modulus and permeability in each patient.

Significance: This research presents a rapid method to determine the material properties of articular cartilage and presents significant relationships between the biomechanical and biological properties of the tissue. This information assists in characterizing the progression of tissue damage and disease and may aid in diagnosing osteoarthritis.

POSTER 113

A SOY-PROTEIN-BASED DIET DOES NOT ALTER SERUM MARKERS OF BONE FORMATION AND RESORPTION IN OVARIECTOMIZED, LOW-FIT RATS

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Osteoporosis and the associated increased risk of fracture are serious health concerns for postmenopausal women. In addition to a significant decline in estrogen post-menopause, decreased physical activity may further predispose women to osteoporosis. The soy isoflavones genistein and daidzein are phytoestrogens, and, therefore, might reduce the negative effects of estrogen loss on bone.

We used ovariectomized, low-capacity runners (LCR) rats, which are selectively bred for intrinsically low aerobic fitness as a rodent model of menopause. We examined the effects of 23 weeks of a soy-protein-based diet (600 ppm genistein+daidzein; SOY) versus a corn-gluten-meal-based protein diet (<15 ppm genistein+daidzein; CORN) on bone formation (osteocalcin, OC; propeptide type I procollagen, P1NP) and resorption (tartrate-resistant acid phosphatase, TRAP5b; C-terminal telopeptide of type I collagen, CTx) serum markers in LCR rats following ovariectomy (OVX) or sham (SHAM) surgery at 28 weeks of age.

Final body weight was significantly increased by OVX vs. SHAM ($p=0.002$), but not by diet. P1NP, OC, TRAP5b, and CTx were measured in plasma using ELISAs. A two-factor (OVX, diet) ANOVA was used to test for significant main and interactive effects. There was a trend for OC and CTx to be higher and TRAP5b lower in OVX vs. SHAM (main effects: $p=0.098$, $p=0.083$, and $p=0.099$, respectively). In OVX, P1NP/CTx was significantly less than SHAM ($p=0.003$).

There were no effects of diet on serum bone markers. In conclusion, serum markers of bone formation and resorption are affected by OVX, but not by a soy-protein-based diet, in LCR rats.

POSTER 114

STING SIGNALING REGULATES PROTECTIVE IMMUNITY

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Memory CD8 T cells are critical players in our body's long-term protection against intracellular infections. Antigenic signals delivered by the T cell receptor (TCR) and inflammatory signals, such as type I interferon (IFN), are both required for the generation of memory T cells. Type I IFN is highly regulated by STING signaling in response to nucleic acids produced upon bacterial and viral infections. Yet, the role of STING signals in the generation of protective immunity is poorly understood.

We have employed listeria cancer vaccine platforms that induce enhanced STING signaling and STING deficient mouse models to address this question. We have found that the absence of STING signaling does not affect the generation of memory T cells. However, enhanced STING signaling has different impacts on the immune response depending on the strength of the antigenic signal. Thus, enhanced STING signaling severely impaired the generation of memory T cells in response to strong cognate antigens. However and contrary to expectation, supra STING signaling improved T cell protective immunity against weak antigens at the level of self or tumor antigens.

This strikingly indicates that the mechanisms that drive the generation of memory T cells change depending on the strength of the antigen and has important implications for the design of vaccines against pathogens (strong antigens) and tumors (weak antigens). Our current studies aim to identify the biochemical and cellular mechanisms behind this phenomenon and provide an excellent framework to explain why adjuvants that potentiate STING signaling are excellent elicitors of antitumor responses.

POSTER 115

ROLE OF CHOLINERGIC BASAL FOREBRAIN IN NICOTINE AND ALCOHOL CO-ABUSE

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Background: High prevalence of nicotine and alcohol co-use is attributed to enhancing each other's pleasurable effects while attenuating aversive side effects. However, the mechanism is unknown. The cholinergic basal forebrain (BF) plays an important role in mediating behavioral effects of alcohol. Moreover, the BF neurons exhibit high expressions of nicotine receptors. Hence, we hypothesized that nicotine via BF will enhance alcohol induced pleasure while suppressing aversive side effects of alcohol resulting in increased alcohol consumption.

Methods: Three experiments were performed. Since rats do not readily self-administer alcohol, in the third experiment, we used C57BL/6J mice which readily self-administer alcohol. Nicotine and alcohol doses were chosen based on average doses used by humans.

Experiment 1 was designed to determine the effect of nicotine administration in the BF on aversive (sleepiness) effects of alcohol. Sleep was recorded from surgically implanted sleep recording electrodes.

Experiment 2 determined whether nicotine administration in the BF enhances alcohol-induced pleasure. c-Fos immunohistochemistry was used to examine the activation of the nucleus accumbens (NAC; pleasure center).

Experiment 3 examined the effect of nicotine administration in the BF on alcohol self-administration. To mimic human conditions, the mice were allowed to consume alcohol during "Happy hours".

Results: Nicotine administration in the BF significantly 1) reduced the sleep-promoting effect of alcohol, 2) enhanced alcohol-induced activation of NAC and 3) increased alcohol consumption.

Conclusion: Based on our results, we suggest that nicotine via BF reduces the aversive effects while enhancing the rewarding effect of alcohol and hence, increases alcohol consumption.

POSTER 116

eNOS IS EXPRESSED BY PRIMARY MURINE HEPATOCYTES AND REGULATES FATTY ACID OXIDATION *IN VITRO*

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Introduction: Endothelial cell production of nitric oxide through endothelial nitric oxide synthase (eNOS) canonically exerts potent vasodilatory and anti-inflammatory effects. It is unclear whether eNOS is expressed in hepatocytes. Previously we have demonstrated that both NOS inhibition and eNOS knockout exacerbate nonalcoholic fatty liver disease in conjunction with reduced hepatic mitochondrial respiration. Here we tested the hypothesis that eNOS is expressed by hepatocytes and is necessary for normal fatty acid oxidation.

Methods: Hepatocytes were isolated using the two-step collagenase perfusion and digestion and maintained for 5 days post-isolation. A subset of cells were treated with scrambled or eNOS siRNA. On day 5, cells were processed for mRNA or protein expression. For fat oxidation, cells were placed in starvation media with or without 500 μM free fatty acids (FFA; 250 μM palmitate + 250 μM oleate) on culture day 4 for 21 hours. Following incubation, cells were placed in 1-^{14}C palmitate containing media for 3-hours and $^{14}CO_2$ production was measured to indicate complete fat oxidation.

Results: Isolated primary hepatocytes expressed eNOS mRNA and protein and eNOS siRNA reduced hepatocyte eNOS mRNA expression by ~75%. Complete 1-^{14}C palmitate oxidation was reduced by 30% ($p<0.05$) in primary hepatocytes from eNOS$^{-/-}$ mice versus WT. Prior exposure to FFA reduced 1-^{14}C palmitate oxidation by 19% and 15% in WT and eNOS$^{-/-}$ hepatocytes relative to genotype control, respectively.

Conclusions: Hepatocellular eNOS is necessary for normal fatty acid oxidation *in vitro*. These data suggest that loss of hepatocellular eNOS function *in vivo* may represent a novel disease mechanism in the etiology of NAFLD.

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POSTER 117

QUANTITATIVE PROTEOMIC ANALYSIS OF DIETARY EFFECTS OF SUTHERLANDIA AND ELDERBERRY ON TRANSIENT CEREBRAL ISCHEMIA IN MICE

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Stroke is the fourth leading cause of death and the primary cause of long-lasting disability in the U.S. We reported that consumption of Sutherlandia (Sutherlandia frutescens) and Elderberry (Sambucus spp.) reduces the risk of stroke by mitigating oxidative stress and inflammatory responses. To identify the proteins affected by these botanicals and elucidate the modes of their action in ischemic stroke, the present study utilized quantitative proteomic approach by isobaric labeling with deuterium isobaric amine reactive tag (DiART) and bioinformatics tools. Two months prior to giving C57Bl/6J male mice a 30-minute bilateral common carotid occlusion with a 3-day reperfusion, the mice were fed AIN93G diets without botanicals or with 2% American elderberry or 1% Sutherlandia. Global proteomes of the brain were examined by liquid chromatography/tandem mass spectrometry (LC-MS/MS). The protocol detected 1390, 1530 and 1941 proteins in cortex, striatum and hippocampus, respectively. In the elderberry group, 20 proteins in cortex, 6 proteins in striatum, and 10 proteins in hippocampus were differentially expressed with fold-change>1.3 compared to the control. Additionally, 4, 6 and 14 proteins in cortex, striatum and hippocampus respectively were differentially expressed in the Sutherlandia group. Using Ingenuity Pathway Analysis, some of the differentially expressed proteins were identified to play crucial roles in canonical pathways such as nNOS signaling, glutamate receptor signaling and CREB signaling. These findings begin to illuminate molecular mechanisms of elderberry and Sutherlandia supplements upon anti-oxidant protection against ischemic injury and provide insight into potential development of botanical use as anti-oxidants in the prevention of stroke.

POSTER 118

METABOLIC RESPONSES OF ANNULUS FIBROSIS AND NUCLEUS PULPOSUS TO PRO-INFLAMMATORY STIMULI

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Introduction: Intervertebral disc (IVD) disorders with associated pain and disability are prevalent. The injury mechanism is currently unknown and in order to further understand, relevant biomarkers such as matrix metalloproteinases, prostaglandin E_2, interleukins and nitric oxide have been evaluated. However, to the authors' knowledge, no studies have been reported that examined the basal and cytokine stimulated. The objective of this study was to compare the basal and cytokine (IL-1β and TNF-α) stimulated *in vitro* metabolism of normal AF and NP. It was theorized that cytokine stimulation would result in a significant dose dependent increase in the production of inflammatory and degradative biomarkers and that the AF and NP would have unique metabolic profiles.

Methods: With IACUC approval tissue explants from lumbar spine harvested from skeletally mature dogs euthanized for reasons unrelated to this study. Explants were divided into either NEG (control group) 2) H-IL (10 ng/ml IL-1β) 3) L-IL (0.1 ng/ml IL-1β) 4) H-TNF (10 ng/ml TNF-α) and 5) L-TNF (0.1 ng/ml TNF-α) for both AF and NP. Explants were analyzed for proteoglycan, collagen, MMP activity, MMP 1, 2, 3, IL-6, IL-8, MCP-1, KC, NP and PGE_2.

Results: We saw significant increases in MMP-1, MMP-3 for the H-ILβ group in the AF. We also saw significant increases in IL-6, IL-8, MCP-1, and KC for H-ILβ AF group. In addition, IL-8 and MCP-1 was significantly higher for the H-TNF- α in the NP.

Clinical significance: AF and NP have distinctly different responses to pro-inflammatory stimuli.

POSTER 119

EX VIVO GENE THERAPY FOR RETINAL DEGENERATION IN A CANINE MODEL OF CLN2 NEURONAL CEROID LIPOFUSCINOSIS

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CLN2 neuronal ceroid lipofuscinosis is a recessively inherited lysosomal storage disease characterized by progressive motor and cognitive decline, seizures, vision loss progressing to blindness, brain and retinal atrophy and childhood death. CLN2 disease results from mutations in the *TPP1* gene that encodes the soluble lysosomal enzyme tripeptidyl peptidase-1 (TPP1). In Dachshunds homozygous for a *TPP1* null mutation, repeated intrathecal infusion of recombinant human TPP1 into the CSF delayed the onset and slowed the progression of neurological signs and brain atrophy but did not prevent retinal degeneration and loss of retinal function. We conducted studies to determine whether continuous delivery of TPP1 protein to the retina could delay the onset and slow progression of retinal degeneration. Autologously derived mesenchymal stem cells (MSCs) from CLN2-affected Dachshunds were transduced with an adeno-associated virus (AAV2) packaged DNA construct that directs stable overexpression and secretion of TPP1. The transduced cells were implanted into the vitreous of the eye at an early stage of disease. Autologous MSCs programmed to express green fluorescent protein (GFP) were implanted in the contralateral eye. Retinal structure and function were then monitored over time. TPP1-MSC treated eyes exhibited preservation of retinal-mediated responses to light stimuli and delayed progression of disease-related retinal lesions relative to the GFP-MSC treated eyes. These results show that MSCs producing a therapeutic substance and implanted into the vitreous can be effective in treating retinal degenerative diseases.

POSTER 120

CORRELATION OF BIOMARKER PRODUCTION TO BIOMECHANICAL, BIOCHEMICAL, AND HISTOLOGICAL PROPERTIES OF OSTEOARTHRITIC OSTEOCHONDRAL TISSUE OBTAINED FROM PATIENTS UNDERGOING TOTAL KNEE REPLACEMENT

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Introduction: The objective of this study was to correlate the production of biomarkers by osteochondral tissue obtained from the knees of patients undergoing total knee arthroplasty to the biomechanical, histological, and biochemical properties of that tissue.

Methods: With IRB approval, osteochondral explants were created from fresh human OA femoral condyle and tibial plateau tissue, and cultured for 3-4 days at 37°C in DMEM. Media were assessed for production of MMPs; general MMP activity; inflammatory mediators; inflammatory cytokines (CYTO); extracellular matrix markers; and apoptosis markers. Explants were tested for tissue puncture force (TPF), aggregate modulus (AG), permeability (PERM), viable chondrocyte density (VCD), histological grade (HISTO), and extracellular matrix proteoglycan (GAG) and collagen (HP) content.

Results: PERM negatively correlated with GAG and TPF, and positively correlated with NO, AG, and VCD. AG and TPF negatively correlated with inflammatory mediators, MMP-2, CYTO, and HISTO, and positively correlated with each other, MMPs, GAG, CS846, and VCD. HISTO negatively correlated with VCD and GAG, and positively correlated with HP. GAG negatively correlated to MMP-9, MMP activity, CYTO, and apoptosis, and positively correlated with PGE2, MMP-1, and CS846. HP positively correlated to Cytochrome C and CS846.

Discussion: The data from this study indicate that known OA biomarkers show correlations to physical properties of cartilage in osteoarthritic knees. Cartilage properties were correlated to biomarkers of inflammation, degradation, apoptosis, and chondrocyte viability, which enhances our understanding of cartilage pathology and mechanisms that drive the development and progression of OA.

POSTER 121

BIMODAL MRI/FLUORESCENCE IMAGING CONTRAST AGENT TARGETING HUMAN PROSTATE CANCER

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Objectives: We aimed to develop novel site-specific diagnostic nanoparticles targeting the BB2 receptors overexpressed in prostate cancers.

Methods: Water soluble ultra-small superparamagnetic iron oxide (USPIO) nanoparticles with a core size of 5 nm were prepared. Cy7.5 was conjugated to K-8AOC-QWAVGHLM-NH_2 at a molar ratio of 1:1 followed by the conjugation with the COOH groups on USPIO. The USPIO-Cy7.5-BBN nanoparticles were characterized. *In vitro* binding affinity and specificity were evaluated by ^{125}I-Tyr^4-BBN competitive IC50 binding assay in PC-3 cells. *In vivo* T_2 MRI and near infrared fluorescence (NIRF) enhancement was evaluated on mice bearing prostate tumors on 7T MRI and IVIS-Spectrum. Mice were assigned to three groups: targeting group injected with 87μg USPIO-Cy7.5-BBN, blocking group injected with 50 μg unlabeled BBN [1-14] followed by 87μg USPIO-Cy7.5-BBN, and control group injected with USPIO-Dylit800.

Results: USPIO-Cy7.5-BBN has a core diameter of 5.1±0.5 nm, a hydrodynamic diameter of 34.2±14.4 nm, a r_2 relaxivity of 70.2±2.5 $s^{-1}mM^{-1}$, and a high binding affinity of IC50=2.5±0.7 nM. *In vivo* MRI contrast enhancement ratio of tumor to muscle was significantly increased in the uptake group at 4hr (31.1±3.4%) and 24hr (25.7±2.1%) post-injection compared to the blocking group (4hr: 15.3±2.0% and 24hr: 2.8±6.8%). *In vivo* and *ex vivo* NIRF imaging showed a significantly increased fluorescence on tumors in the uptake group compared to the blocking group.

Conclusions: Our data showed a high relaxivity and high *in vitro* and *in vivo* binding affinity and specificity of USPIO-Cy7.5-BBN nanoparticle to the BB2r overexpressed on PC-3 cells.

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