# HEALTH SCIENCES CENTER
# 32ND ANNUAL RESEARCH DAY
# AT MARSHALL UNIVERSITY
# MARCH 6, 2020

## Oral and Poster Presentations

Marshall University Medical Center • Huntington, West Virginia



MARSHALL UNIVERSITY • JOAN C. EDWARDS SCHOOL OF MEDICINE •

**Evaluation code**
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Completed faculty disclosure forms are on file in the CME Office.

Marshall University Joan C. Edwards School of Medicine is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

The conference will consist of a series of oral and poster presentations highlighting basic and clinical research performed by School of Medicine students, residents and fellows. Please use pages 12 and 13, to locate presenters, their abstracts, presentation times and location of presentation. The complete agenda begins on page 14. The complete syllabus is available online at https://jcesom.marshall.edu/research/office-of-research-graduate-education/research-day

## INTENDED AUDIENCE

The Health Science Center 32nd Annual Research Day at Marshall University is designed for physicians, residents, basic scientists, medical students, graduate students, and other interested health professionals.

## GOALS

1) To involve faculty, medical and graduate students in the process required to formally present their research in either oral or poster presentations.
2) To inform and involve the community in ongoing research at Marshall University Joan C. Edwards School of Medicine.
3) To encourage the attitude among faculty, residents, and students for Continuing Medical Education in the area of clinical research.

## GLOBAL LEARNING OBJECTIVES

By the end of these lectures the participant will be able to:

1) Compare different approaches to medical investigation.
2) Compare and contrast the importance of basic research and cellular mechanisms as it relates to human disease.
3) Discuss and review research related to current and future improvements in the clinical management of patients.
4) Interpret and analyze data for medical investigation to potentially determine the effectiveness towards improving patient care.
5) Stress the importance of translational research benefits to the basic scientist in support of the practicing physician.

**CREDIT STATEMENT**
Marshall University Joan C. Edwards School of Medicine designates this live educational activity for a maximum of 5.0 AMA PRA Category 1 Credits™. Physicians should only claim credit commensurate with the extent of their participation in the activity. (Session Registration and Evaluation are required).

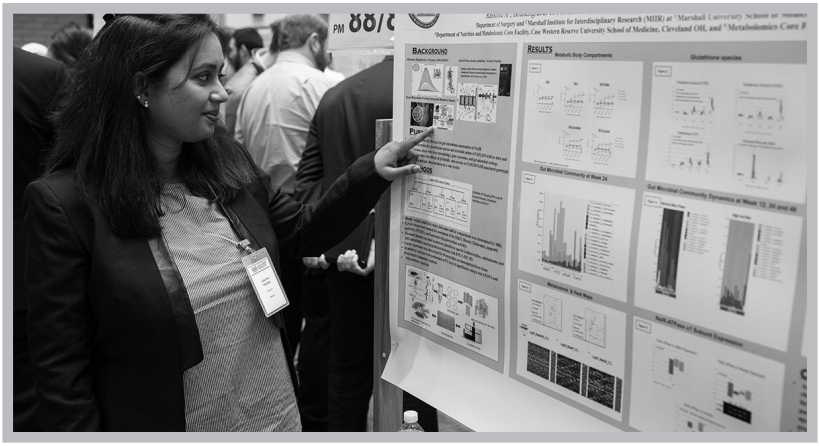
**EVALUATION FORM Completion**
Please follow specific instructions for completing the bar coded evaluation form. Keep your "X's" in the bubbles and your written comments in the designated boxes. Your input is needed for planning future events.

**ASSISTED SERVICES**
If special arrangements are required for an individual with a disability to attend these events, please contact Continuing Medical Education at (304) 691-1770 no later than 1 week before the event date or See a CME Representative at the Registration Area on the day of the event.

**NO RELEVANT CONFLICTS INDICATED BY DISCLOSURE**

**Uma Sundaram, MD**, Conference Chair, Vice-Dean, Research and Graduate Education
**David N. Bailey, MBA,** Assistant Dean, CME
**Richard D. Egleton,** PhD, Associate Professor, Biomedical Sciences
**Elsa I. Mangiarua, PhD,** Professor, Biomedical Sciences
**Paris N. Johnson,** Program Support Coordinator, CME Registration
**Amy Jones,** Program Support Coordinator, CME Registration
**Sheanna Spence,** MSJ, Director of External Affairs
**Joseph A. Haun,** IT Client Services Manager

# RESEARCH DAY




## PAST INVITED LECTURERS

**2019 Bishr Omary, MD, PhD**
Executive Vice Dean for Research and Chief Scientific Officer, Chair Department of Molecular and Integrative Biology at the Univeristy of Michigan and the next president of the AGA.
*1. The Intermediate Filament Cytoskeleton in Health and Disease*

**2018 Zijian Xie, PhD**
Director Marshall Institute for Interdisciplinary Research (MIIR)
*1. The Discovery of Na/K-ATPase as a Potential Drug Target for Multiple Human Diseases*

**2017 Julian E. Bailes, Jr., MD**
Neurosurgery Specialist
NorthShore Medical Group, Evanston, IL
*1. Concussions*

**2016 Naji Abumrad, MD**
Chair Emeritus, Department of Surgery
John L. Sawyers Professor of Surgery
Vanderbilt University School of Medicine
Nashville, TN
*1. The Life of an Academic Surgeon Persevere, Don't be afraid, Explore*

**2015 Richard J. Johnson, MD**
Tomas Berl Professor and Chief
Division of Renal Diseases and Hypertension
University of Colorado Anshutz Campus
Aurora, CO
*1. The Role of Sugar (fructose) in the Great Epidemics of Diabetes and Obesity*

**2014 - Jose S. Pulido, MD, MS, MBA, MPH**
Professor of Ophthalmology and Molecular Medicine
Associate in Neuro-oncology
Mayo Clinic Cancer Center
Rochester, MN
*1. The Topology of Blinding Eye Disease*
*2. Breaking bad and Breaking good*

**2013 - John J. Cannell, MD**
Executive Director
Vitamin D Council
San Luis Obispo, CA
*1. The Use of Vitamin D in Clinical Practice*

**2012 - William Thies, Ph.D.**
Vice President, Medical Scientific Affairs
Alzheimer's Association
Chicago, IL
*1. Alzheimers Today and the Future*

**2011 – Susan S. Smyth, MD, Ph.D.**
Professor of Medicine
Director, MD/Ph.D. Program
University of Kentucky
*1. Cardiovascular Complications of Obesity*

## PAST INVITED LECTURERS

**2010 – Gregory Germino, MD**
Deputy Director of the National Institute of Diabetes and Digestive & Kidney Disease (NIDDK) at the National Institutes of Health (NIH)
Bethesda, Maryland
*1. Dia-besity: converging problems, emerging science*

**2008 – Gregory Alan Hale, MD**
Associate Professor of Pediatrics
University of Tennessee
*1. Transplantation and Cellular Therapies: Current Research and Future Opportunities*
*2. An introduction to Hematopoietic Cell Transplantation*

**2007 –Daniel D. Bikle, M.D., Ph.D.**
Professor of Medicine and Dermatology
In residence University of California
*1. The skin game: Calcium and vitamin D regulated cellular differentiation*
*2. Vitamin D: how much do we need and why*

**2006 - Mark E. Shirtliff, Ph.D.**
Assistant Professor, Department of Biomedical Sciences
Dental School, University of Maryland-Baltimore
Baltimore, Maryland
*1. Staphylococcus aureus biofilms: in vitro and in vivo studies*

**2006 - J. William Costerton, Ph.D.**
Director & Professor, Center for Biofilms, School of Dentistry
University of Southern California
Los Angeles, California
*1. Biofilms in Device-related and other Chronic Bacterial Diseases*

**2005 – William F. Balistreri, MD**
Director, Gastroenterology
Cincinnati Children's Hospital Medical Center
*1. Inborn Errors of Bile Acid Biosynthesis*
*2. Viral Hepatitis 2005*

**2004 – Joseph S. McLaughlin, MD**
Professor Emeritus of Surgery
University of Maryland
*1. Traumatic Ruptured Aorta*
*2. Strange Tumor I Have Known*

**2003 – W. Jackson Pledger, Ph.D.**
Professor, Interdisciplinary Oncology
University of South Florida College of Medicine
Tampa, Florida
*1. Regulation of proliferation by cyclin dependent kinase*
*2. Functional genomics and cancer therapy*

**2002 – Alan H. Jobe, M.D., Ph.D.**
Professor of Pediatrics
Cincinnati Children's Hospital Medical Center
Cincinnati, Ohio
*1. Mechanisms of lung injury in the preterm*
*2. Translational research on lung maturation based on clinical observations*

## PAST INVITED LECTURERS

**2001 - Arnold Starr, M.D.**
Director, Alzheimers' Research Center
Institute Brain Research of California, Irvine
1. *Hearing but not understanding: auditory nerve dysfunction in the presence of preserved cochlear receptors*
2. *Patients' stories and their seminal importance for research*

**2000–Fredrick L. Brancati,M.D.,M.H.S.**
Associate Professor, Medicine and Epidemiology
John Hopkins Medical Institute
1. *Novel risk factors for type 2 diabetes mellitus and their implications for treatment*
2. *Prevention and clinical epidemeology in the new milleniu*um

**1999 – Robert B. Belshe, MD**
Director and Professor, Div. of Infectious Diseases and Immunology
St. Louis University
1. *Live attenuated influenza vaccine: using genetics to defeat the flu*
2. *Vaccines for the 21st century*

**1998 – Jerome S. Brody, MD**
Vice-Chairman of Medicine for Research, Professor of Medicine
Director, Pulmonary Center
Boston University School of Medicine
1. *Lung development: lesson from flies connections to cancer*
2. *Molecular approaches to the diagnosis of lung cancer*

**1997 – Rochelle Hirschhorn, MD**
Professor of Medicine, Department of Medicine
NYU School of Medicine
1. *Advances in defects in host defense*
2. *Reflection on the changing face of medicine*

**1996 – Stuart F. Schlossman, MD**
Baruj Benacerraf Professor of Medicine
Harvard Medical School
Chief, Division of Tumor Immunology
Dana-Barber Cancer Institute, Boston
1. *Human T-cell activation*
2. *What's in a name – cd nomenclature*

**1995 – Frank M. Torti, MPH, MD, FACP**
Director, Comprehensive Cancer Center
Professor Charles L. Spurr Professor of Medicine
Section Head for Hematology/Oncology, Wake Forest University
Chairman, Department of Cancer Biology
Bowman Gray School of Medicine
1. *New pathways for the regulation of iron*
2. *Popeye spinach and iron: the politics*

**1994 – Abner Louis Notkins, MDB**
Director, Intramural Research Program
Chief, Laboratory of Oral Medicine National Institute of Dental Research,
National Institutes of Health, Bethesda, MD
1. *Polyreactive antibody molecules and matter*
2. *The Bethesda experiment*

## PAST INVITED LECTURERS

**1993 – Erling Norrby, MD, Ph.D.**
Dean of Research and Professor of Virology
Karolinska Institute, Department of Virology Sweden
*1. Immunization against HIV-2/SIV in monkeys*
*2. The selection of Nobel Prize winners*

**1992 – Simon Karpatkin, MD**
Professor of Medicine
New York University School of Medicine
*1. Role of thromin, integrins and oncogenes*
*2. How scientific discoveries are made*

**1991 – Robert M. Chanock, MD**
Chief, Laboratory of Infectious Diseases
National Institute of Allergy & Infectious Diseases
National Institutes of Health, Bethesda, MD
*1. Epiedemiology, pathogenesis, therapy*
*2. New approaches to development of treatment plans*

**1990 – Dewitt S. Goodman, MD**
Director, Institute of Human Nutrition
Director, Arteriosclerosis Research Center
Tiden-Weger-Bieler Professor of Preventative Medicine
Professor of Medicine, Columbia University,
College of Physicians and Surgeons
Director, Division of Metabolism and Nutrition
Department of Medicine
Columbia-Presbyterian Medical Center, New York
*1. Retinoid and retinoid-binding proteins*

**1989 – Michael A. Zasloff, MD, Ph.D.**
Charles E.H. Upham, Profess of Pediatrics
University of Pennsylvania School of Medicine
Chief, Division of Human Genetics & Molecular Biology
The Children's Hospital of Philadelphia
*1. The flow of genetic information*
*2. Magainin peptides*

## 2019 RESEARCH DAY CONFERENCE PRESENTATION WINNERS

**Basic Science**

- **Poster Abstract: Lexie Blalock/Biomedical Sciences** on a systematic approach to identifying the immunogenic proteins of the unculturable intestinal commensal, segmented filamentous bacteria
- **Poster Abstract: Timothy Adkins/Biomedical Sciences** on Inhibition of Mitochondrial Protein Synthesis to Stimulate the Effect of 4-Hydroxy Tamoxifen in ER(+) Cell Lines
- **Oral Abstract: Taylor Boggess/Biomedical Sciences** on Investigating the role of astrocytes in the development of synaptic connectivity in neonatal abstinence syndrome
- **Oral Abstract: Molly Butts/Clinical and Translational Science** on the unique regulation of ethanol on sodium-dependent glutamine cotransport in intestinal epithelial cells

**Clinical Research**

- **Poster Abstract – Student: Emma Nellhaus/Division of Addiction Sciences, Family and Community Health** on inclusion of positive self-reporting by mothers of substance-exposed neonates increases the predictability of NAS severity over toxicology alone
- **Poster Abstract – Post-Doctoral: Henry Heisey/Psychiatry** on multimorbidity among adults with intellectual or developmental disability
- **Oral Abstract – Student: Cecilia Nease/Pediatrics** on obesity and attention deficit hyperactivity disorder (ADHD): When epidemics collide- a longitudinal study of body mass index (BMI) patterns in pediatric patients with ADHD treated with stimulant medication
- **Oral Abstract – Post-Doctoral: Meghan Pauley/Pediatrics** on physician compliance with obesity guidelines and related complications

**Case Study**

- **Poster Abstract – Student: Taylor Maddox/Family and Community Health** on neonatal withdrawal following in utero exposure to kratom
- **Poster Abstract – Post-Doctoral: Tamara Murphy/Psychiatry** on two ankylosing spondylitis patients treated with adalimumab associated with ParietoOccipital cerebral abscesses and neuropsychiatric sequelae

**Education**

- **Poster Abstract: Emily Sloane/Obstetrics and Gynecology** on using patient satisfaction questionnaire as an assessment and feedback tool for medical students in third-year clerkship

# RICHARD J. STEVENS, MD MEMORIAL LECTURE

## RESEARCH DAY | INVITED LECTURER

**MARCH 6, 2020 at 11:30 AM • HARLESS AUDITORIUM**

***TITLE: New approaches to targeting mitosis in breast cancer***

**Ruth A. Keri, PhD**
Professor and Vice Chair, Department of Pharmacology
Arline H. and Curtis F. Garvin MD and Constance C. Frackelton Professor in Cancer Research
Associate Director for Basic Research, Case Comprehensive Cancer Center
Case Western Reserve University School of Medicine

*No relevant conflicts indicated by Disclosure*

**Learning Objectives:**
Upon completion of the lecture, attendees should be able to:

- Explain the unique features of triple negative breast cancer compared to other breast cancer subtypes.
- Describe the utility and limitations of taxanes for the treatment of triple negative breast cancer.
- Explain the role of the cell cycle, in general, and mitosis, specifically, as a vulnerability in cancer.
- Describe the molecular mechanisms by which epigenetically-targeted impact mitosis and induce cell death in cancer

For more than 17 years, my research has focused on the genomic and signaling mechanisms that control mammary gland development and cancer. As reflected by my position as a member of the steering committee for the Gene Expression and Genotyping Core Facility at CWRU, I have significant expertise in the acquisition and use of gene expression profiling data to identify novel factors that may control the phenotypes of breast cancer cells. This has involved generating and using data from cell lines and genetically manipulated mouse models of breast cancer as well as evaluation of publicly available human breast cancer array data. I have designed and used mouse models of disease throughout my research career, including assessing the efficacy of therapeutic agents such as vitamin D analogs, rapamycin, and dasatinib in mammary cancer models. I also have significant experience assessing drug synergy, in vitro and in vivo. My laboratory extensively uses xenograft models of breast cancer. We also have expertise in the analysis of proliferation and apoptosis, migration and invasion, centrosome defects and genomic instability, and gene-specific chromatin immunoprecipitation as well as immunohistochemistry of mouse and human tissues.

I grew up in an Appalachian community in rural Pennsylvania and, with grants and scholarships, attended Edinboro University of Pennsylvania (not the University of Edinburgh in Scotland), earning a BA in chemistry. I became a Research Assistant in the Department of Pharmacology at CWRU and have been here ever since. I am also the Associate Director for Basic Research in the Case Comprehensive Cancer Center. My research trajectory began with identifying the basic mechanisms of gene regulation in reproductive biology, specifically the glycoprotein hormones in the pituitary. After a brief stint identifying the role of luteinizing hormone in contributing to granulosa cell tumors of the ovary, I moved into discerning mechanisms underlying breast development and cancer and have been in this field for nearly 20 years. I have many interests in science, but my core foci are transcriptional and intracellular signaling control of cell states. I am also strongly committed to training the next generation of scientists, particularly those from underserved backgrounds. My mantra is to never give up. If you work hard enough and smart enough, you will be successful!

**List of Presenters' Abstracts**
No relevant Conflicts of Interest as supported by Disclosure
See Agenda Pages 14-15

**Oral Presenters**

## List of Presenters' Abstracts

No relevant Conflicts of Interest as supported by Disclosure

See Agenda Pages 16-22

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## RESEARCH DAY AGENDA

**MARCH 6, 2020**

Specific learning objectives will be presented with each oral presentation
Participant Q & A are encouraged throughout all sessions.
No relevant speaker conflicts are indicated as confirmed by disclosure

| | | |
|---|---|---|
| 7:00AM | Registration | Participant AM & PM registration and evaluation are required. |
| 8:15AM | Welcome | |
| 8:20AM | Opening Remarks | Uma Sundaram, MD, Vice Dean and Research Day Chair |

### ORAL SESSION I • ABSTRACTS • PAGE 21

| Time | Name/Department/Format | Abstract Title |
|---|---|---|
| 8:30AM | Skylar Cooper/Biomedical Research/Basic Science | Electronic Cigarette Flavors Enhance Nicotine Reward by Altering Ventral Tegmental Area (VTA) Dopamine Neurons |
| 8:42AM | Molly Butts/Clinical and Translational Sciences/Basic Science | Moderate Ethanol Differentially Regulates Glucose and Amino Acid Absorption in the Mammalian Small Intestine |
| 8:54AM | Christopher Walker/Biomedical Research/Basic Science | INVESTIGATING THE RELATIONSHIP BETWEEN ASTROCYTE- NEURONAL DECOUPLING AND SYNAPTIC HOMEOSTASIS FOLLOWING REPEATED ADOLESCENT ETHANOL EXPOSURE |
| 9:06AM | Reagan Stafford/Surgery/Clinical Science | Reimbursement of Common Plastic and Reconstructive Surgical Procedures Compared to Other Surgical Specialties from Centers for Medicare and Medicaid |
| 9:18AM | Lauren Fitzpatrick;Casey Tufts /Pediatrics/Clinical Science | Improving Resident Attendance at Neonatal Resuscitations |

**9:30 AM BREAK - POSTER SESSION 1 - ATRIUM - ABSTRACTS PAGE 47**

### ORAL SESSION 2 • ABSTRACTS • PAGE 27

| | | |
|---|---|---|
| 10:30AM | Minqi Huang/MIIR/Basic Science | Regulation of Adipogenesis by α1 Na+/K+-ATPase via Its Conserved Caveolin Binding Motif |
| 10:42AM | Cassaundra Song/Biomedical Sciences/Basic Science | High-fat diet alters serum cytokines before the onset of obesity |
| 10:54AM | Justin Chuang/Biomedical Sciences/Basic Science | pNaKtide elongates RBC half-life in Sham and PNx mice without changes of iron homeostasis |
| 11:06AM | Amy Smith/OBGYN/Clinical Science | Obesity Does Not Impact Continuation rates of Long Acting Reversible Contraception |
| 11:18AM | Joshua Wyner/Biomedical Sciences/Clinical Science | Stroke Incidence and Outcome Disparity in Rural Regions of Southern West Virginia |

## RESEARCH DAY AGENDA

**11:30AM Keynote/Ruth A Keri, PhD**

Professor & Vice Chair Pharmacology
New approaches to targeting mitosis in breast cancer
Case Western Reserve School of Medicine, Cleveland, OH

**12:30PM - BOX LUNCH**

### ORAL SESSION 3 • ABSTRACTS • PAGE 35

| | | |
|---|---|---|
| 1:15PM | Fatih Koc/Biomedical Sciences/Basic Science | Mitochondrial Translation impairs Oxidative Phosphorylation and Apoptosis in ER/PR(+) Breast Cancer Cell lines |
| 1:27PM | Catherine Cavender/Biomedical Science/Clinical Science | Role of endometriotic peritoneal components in ovarian cell transformation |
| 1:39PM | Mina Shenouda/Hematology/ Oncology/Clinical Science | Primary Endocrine Therapy (PET) with no Surgery for Elder Women with Hormone Receptor-Positive, Non-Metastatic Invasive Breast Cancer, a Rural-Healthcare Experience. |
| 1:51PM | Michael Abdelmasseh/Surgery/Clinical Science | VALUE ASSESSMENT AND COST ANALYSES FOR COLON RESECTIONS ON PATIENTS AT A TERTIARY MEDICAL CENTER. |
| 2:03PM | Hong Yue/iomedical Sciences/Basic Science | Thymidine phosphorylase plays a mechanistic role in obesity and atherogenesis |

**2:30PM BREAK - POSTER SESSION 2 - ATRIUM - ABSTRACTS PAGE 89**

### ORAL SESSION 4 • ABSTRACTS • PAGE 41

| | | |
|---|---|---|
| 3:15PM | M. Jeremiah Matson/Biomedical Sciences/Clinical Science | Bacteremia Is Not Commonly Detected in Ebola Virus Disease |
| 3:27PM | William Foster/Pharmaceutical Sciences/Basic Science | Extracellular acidification promotes CD4 T cell survival in a GPR68-dependent manner |
| 3:39PM | Vishavpreet Singh/Orthopaedics/Clinical Science | The Utility Of Leukocyte Esterase Test In The Diagnosis of Culture Negative PJI |
| 3:51PM | Collin Lamba/Orthopaedics/Clinical Science | Synovial Fluid Absolute Neutrophil Count a Promising Marker for Diagnosing Periprosthetic Joint Infection |
| 4:03PM | Renat Roytenberg/Biomedical Sciences/Basic Science | Pseudomonas aerosol infection in DBA/2 mice causes an elevated lung inflammation via complement C5a independent pathway |

**4:30PM WINNERS PRESENTATION • HARLESS AUDITORIUM**

**5:00PM - ADJOURNMENT**

## RESEARCH DAY AGENDA

### 9:30AM • POSTER PRESENTATIONS SESSION 1 - MU ATRIUM

**No. Name/Department**
Abstract

1. **Taylor Boggess/Biomedical Science/Basic Science**
Long-Term Effects of Prenatal Drug Exposure on Brain Connectivity in a Rodent Model of Neonatal Abstinence Syndrome

2. **Vijaya Lakshmi Sundaram/Clinical and Translational Sciences/Basic Science**
Na-Glucose co-transport is stimulated in response to adipose-derived secretome (ADS) in intestinal epithelial cells during obesity

3. **Macaela Barnett/Clinical and Translational Sciences/Basic Science**
The Inhibition of the Na-K-ATPase beta-1 subunit in Response to Moderate Ethanol Exposure in Intestinal Epithelial Cells

4. **Darby McCloud/Biomedical Science/Basic Science**
Effects of a High-Fat Diet on the Growing Skeleton

5. **Sara Moreno/Chemistry/Basic Science**
Quantification of cannabis in infused consumer products and their residues on skin

6. **Cecilia Sierra/Biomedical Research/Basic Science**
Regulation and Function of L-Type Amino Acid Transporter in Breast Cancer in Obesity

7. **Juan Daniel Sanabria/Surgery/MIIR/Basic Science**
Src-phosphorylation at the α1-Na/K-ATPase Modulates Microbiota Communities and CD4/CD8 Lymphocyte Variation in the NASH Murine Model.

8. **Rachel McGuffey/Biomedical Sciences Toxicology Research Cluster/Basic Science**
Examination of Resveratrol Attenuation of Doxorubicin Cytotoxicity and Mitochondrial Dysfunction in Noncancerous Human Proximal Tubular Epithelial Cells

9. **Shreya Tapan Mukherji/Biomedical Research/Basic Science**
Renal Proximal Tubule-Specific Ablation of Atp1a1 Reveals a Novel Tonic Inhibitory Mechanism of Sodium Reabsorption

10. **Kristiana Sklioutouskaya-Lopez/Biomedical Sciences, Obesity and Related Diseases Research Cluster/Basic Science** Tart Cherry, Fish Oil, and Their Combined Effect on Indicators of Obesity and Type 2 Diabetes in TALLYHO Mice Fed High Fat Diets

11. **YUNHUI XU/Marshall Institute for Interdisciplinary Research/Basic Science**
Biased Effect of Cardiotonic Steroids on Na/K-ATPase-mediated Signal Transduction

12. **PRADEEP KUMAR RAJAN/SURGERY/MIIR/Basic Science**
α1-S-Glutathionylation's role at the Na/K-ATPase and protein's function in high fat diet induced oxidative stress

13. **Rebecca D. Pratt/Surgery and Biomedical Sciences/Basic Science**
Transplantation of Na/K-ATPase signaling antagonist, NaKtide, transfected adipose tissue attenuates experimental uremic cardiomyopathy

14. **Hari Vishal Lakhani/Surgery/Basic Science**
Detecting early onset of chemotherapy-related cardiac dysfunction in breast cancer patients in the West Virginian population using a novel panel of biomarkers

15. **Nathan Baisden/Family Medicine/Clinical Science**
Evaluation of Factors Affecting Nutritional Status in the Community Dwelling Oldest Old

16. **Sydney Yoho/Internal Medicine/Geriatrics/Clinical Science**
Health Literacy Among Primary Care Patients in an Academic Setting in the Appalachian Region

17. **Dana Sharma/Internal Medicine/Clinical Science**
Stereotactic Body Radiation Therapy (SBRT) for Metastatic Renal Cell Carcinoma: An Analysis of Clinical Outcomes from a Multi-Institutional SBRT Registry

18. **Drake Seccurro/Internal Medicine/Clinical Science**
Predictors of Frailty in Individuals Presenting to an Outpatient Geriatric Clinic

19. **Trenton Hayes/Internal Medicine/Clinical Science**
The Nutritional Status of Geriatric Patients Presenting to an Outpatient Clinic in Appalachia

20. **Andrew Cottrill/Adolescent Medicine/Clinical Science**
Trauma and Resiliency in Adolescents and Young Adults with Opioid Use and Eating Disorders

21. **Jordan Ratcliffe/SOM/Clinical Science**
Over-The-Counter Analgesic Medication Habits of Geriatric Patients

22. **Mitchell Shelton/Biomedical Sciences/Clinical Science**
Evaluation of Gram-positive bacterial DNA recovery from a swab collection and transport system for Point-of-Care diagnostic tests.

23. **Ifeoluwatomi Fuwape/Internal Medicine Geriatrics/Clinical Science**
A CASE BASED SYSTEMS-BASED PRACTICE CURRICULUM FOR RESIDENTS ON GERIATRICS

24. **Jett MacPherson/Family Medicine/Clinical Science**
Spirometry on Community Dwelling Oldest-Old: Determining a normal

25. **Rodrigo Aguilar/Internal Medicine/Clinical Science**
The Rising Trend of Hypertension in Pediatric and Adolescent Patients

26. **Mohammed Ferdjallah/Internal Medicine/Clinical Science**
Serum Calcium Homeostasis and Volume Dynamics in Alzheimer's Disease and Diabetes Mellitus-2

27. **Michelle Worthy/Pediatrics/Clinical Science**
Improving Pediatric Resident Education and Experience in Outpatient Continuity Clinic

28. **Abdul Rana/Internal Medicine/Clinical Science**
Influence of Body Mass Index on the duration of Ventilator use and its association with Acute Respiratory Distress Syndrome

29. **John Yun/Family Practice Residency Holzer/Clinical Science**
Reducing Unnecessary Emergency Department Visits in the Holzer Health Systems

30. **Raquel Giacomelli Cao/Pediatrics/Clinical Science**
A Mindfulness/Wellness Intervention to Decrease Burnout and Increase Empathy in Pediatric Residents

31. **Arslan Iqbal/Surgery/Clinical Science**
Assessment of value for patients who underwent appendectomies at an academic medical center

32. **William Fravel/Orthopaedics/Clinical Science**
Rural Patient Attitudes Towards Resident Participation in Orthopedic Surgery

33. **Michael Abdelmasseh/Surgery/Clinical Science**
FACTORS AFFECTING VALUE FOR OUTPATIENTS VS INPATIENTS WHO UNDERWENT CHOLECYSTECTOMIES AT A TERTIARY MEDICAL CENTER.

34. **Holly Cyphert/DCTS and Biological Sciences/Clinical Science**
Biomarker Identification for Polycystic Ovary Syndrome Diagnosis

35. **Seth Deskins/Orthopaedics/Education**
A Novel Technique to Detect Femoral Shaft Perforation During Direct Anterior Total Hip Arthroplasty.

36. **Simran Jandu/Pediatrics/Education**
Written Action Plans in West Virginia: Improving the Process and Communication between Schools, Parents, and Physicians

37. **Priya Prasher/Pediatrics/Education**
Transitioning from Intern to Senior

38. **Shylah Napier/Marshall Pediatrics/Education**
A Quality Improvement Project to Improve Resident Preparation for Rural Practice

39. **Dipali Nemade/Neurology/Case Study**
A Family of Sporadic Creutzfeldt-Jakob Disease (sCJD).

40. **Hassaan Jafri/Hematology/Oncology**
Case Study ISOLATED CUTANEOUS RELAPSE FROM FOLLICULAR LYMPHOMA- A RARE ENTITY

## 2:30PM • POSTER SESSION 2 - MU ATRIUM

41. **Katherine Wang/Department of Biology/Basic Science**
The Central Regulation of Lrp1b in the Development of Obesity

42. **Bethany Koontz/Biomedical Sciences/Basic Science**
Impaired Astrocyte Maturation and Synaptic Coupling Following In-vitro Ethanol Exposure

43. **Ishita Sharma/Biomedical Sciences/Basic Science**
Behavioral Effects of Exercise on a Novel "stress-less" Obese Mouse Model

44. **Ean Bills/Biomedical Sciences/Basic Science**
Evaluating Sex Differences in Astrocyte-Regulated Synapse Formation

45. **Mason Dial/Biomedical Sciences Toxicology Research Cluster/Basic Science**
Examination of Resveratrol Protection of Mitophagy and Mitochondrial Changes Mediated by Cisplatin in Human Proximal Tubular Cells

46. **Nana Bosomtwe/JCESOM/Basic Science**
In Vitro Antitumor Activity of Natural Extracts on Head and Neck Cancer Cells

47. **Adam Belcher/Biomedical Sciences/Basic Science**
Thymidine Phosphorylase Plays a Mechanistic Role in Diabetes-associated Thrombotic Diathesis

48. **Sarah Stevens/Pharmaceutical Sciences/Basic Science**
Assessing Physiological and Behavioral Changes in Rodents Following In Utero Opioid Exposure

49. **Tanner Bakhshi/Biomedical Research/Basic Science**
A Role For Omega-3 Fatty Acids in the Treatment of Diffuse Large B-cell Lymphoma

50. **Christian Harris/Biomedical Sciences/Basic Science**
Are sensory systems tuned to body weight and size?

51. **Sarah Brunty/Biomedical Research/Basic Science**
Exploring and Targeting Epigenetic Mechanisms in Endometriosis

52. **Utibe-Abasi Udoh/Surgery/Marshall Institute for Interdisciplinary Research/Basic Science**
THE ROLE OF THE Na/K-ATPase-α1-caveolin-1/SMAC/Survivin PATHWAY IN NASH RELATED HCC GENESIS

53. **Alicia Avelar/Biomedical Sciences/Basic Science**
Effects of nicotine + morphine on reward-related behavior and nicotinic acetylcholine receptor regulation in mouse midbrain.

54. **Niraj Nepal/Clinical and Translation Science/Basic Science**
Mechanism of inhibition of villus cell Na/KATPase by PGE2 in the chronically inflamed intestine

55. **Tammy Minor/MUSON/Basic Science**
Engaging Community Health Students in Active Learning in a Partnership Research Study

56. **Emily Hendricks/Internal Medicine/Clinical Science**
A Randomized Open Label Study of Tapering Proton Pump Inhibitors in GERD

57. **John Castillo/Medical Student Assisting Marshall Sports Medicine/Clinical Science**
Assessment of Commercially Available Computerized Neurocognitive Testing in the Adolescent Concussed Athlete: A Retrospective Comparative Analysis

58. **E. Hannah Casto/JCESOM- Student/Clinical Science**
Attention Deficit Hyperactivity Disorder (ADHD), Disordered Eating (ED) and Food Insecurity (FI): A Controlled Study of Prevalence and Risk Factors.

59. **Jake Kuzbel/Department of Urology/Clinical Science**
Sexual Health Inventory for Men (SHIM) Questionnaire as a Screening Method for Erectile Dysfunction in the General Urology Clinic

60. **Austin Nichols/Family Medicine/Clinical Science**
Identifying Prevalence of Pneumococcal Vaccinations Among Rheumatoid Arthritis Patients of the Rural Appalachian Population in an Acdemic Rheumatology Clinic

61. **Justin Spradling/Joan C. Edwards School of Medicine/Clinical Science**
Parent-Reported Bupropion Safety and Effectiveness in Pediatric Complex Attention Deficit Hyperactivity Disorder (ADHD): A Controlled Study

62. **Katina Nicoloudakis/School of Medicine/Clinical Science**
Does Subtyping Attention Deficit Hyperactivity Disorder (ADHD) Using Biologically Based Temperament Patterns Correlate with Co-Existing Conditions of Oppositional Defiant Disorder (ODD) or Generalized Anxiety Disorder (GAD)?

63. **Melissa Ashman/Neuroscience, WVU/Clinical Science**
Correlating genotype with phenotype in childhood cases of autism spectrum disorder in WV

64. **Jett MacPherson/Wilderness Medicine/Clinical Science**
Assessment of Emergency Preparedness and Healthcare Experience on Colorado 14ers

65. **Rodrigo Aguilar/Internal Medicine/Clinical Science**
In-hospital mortality of transcatheter versus surgical aortic valve replacement: A Nationwide Analysis

66. **Milad Modarresi/Internal Medicine/Clinical Science**
Management of Cardiogenic Shock Due To Thyrotoxicosis: A Systematic Literature Review

67. **William Fravel/Orthopaedics/Clinical Science**
Which of the recommended tests based on the 2018 definition of periprosthetic joint infection has the best performance?

68. **Syed Ali Adil/Orthopaedics/Clinical Science**
Serum D-Dimer: A New Test for Timing of Reimplantation in Patients Who Undergo a Two Stage Exchange for Periprosthetic Joint Infection

69. **Baylor Blickenstaff/Orthopaedics/Clinical Science**
Direct Anterior Total Hip, Significantly Lower Rates of Deep Venous Thrombosis and Pulmonary Embolism

70. **Vishavpreet Singh/Orthopaedics/Clinical Science**
Total Knee Arthroplasty Can Save Lungs

71. **Char-Leigh Arnold/Pediatrics/Clinical Science**
Improving Admission Medication Reconciliation Completion Among Pediatric Residents

72. **Kamran Zaheer/Internal Medicine/Clinical Science**
Head CT in syncope and near-syncope workup in the Emergency Department: A Rural vs Urban Comparison

73. **Dipali Nemade/Neurology/Clinical Science**
Make Kids Stroke-Smart: A Community Based Interventional study.

74. **Maya Menking-Colby/Orthopedics/Education**
The relationship between diet, gut microbiota, and chronic disease

75. **Morgan Efaw/Family Medicine - Holzer/Education**
Filling in the Gaps: Family Medicine Resident QI Project to Increase Knowledge of Skin Cancer Screening Techniques

76. **Abdul Rana/Internal Medicine/Case Study**
Severe Ketoacidosis From Ketogenic Diet and Surreptitious Acetic Acid Ingestion

77. **bdulrahman Katabi/Intenal Medicine/Case Study**
Unusual clinical presentation of periodic paralysis, case report and literature review

78. **Ashar Farooqi/Neurology/Case Study**
Unique Ictal Signature: Delta Brush as an Ictal Morphology in a Patient with Hypoxic Ischemic Encephalopathy

79. **Natalie Perry/Nursing/Education**
Continuing Education Model for Nurses Regarding Substance Use Disorder

80. **Franklin Shuler/Department of Orthopedic Surgery**
Wound healing augmented with blue light

**ORAL SESSION I • 8:30 AM – 9:45 AM**

# 32ND ANNUAL RESEARCH DAY ORAL SESSION

**Electronic Cigarette Flavors Enhance Nicotine Reward by Altering Ventral Tegmental Area (VTA) Dopamine Neurons**

Skylar Cooper, Brandon Henderson
Department of Biomedical Research, Joan C. Edwards School of Medicine, Marshall University

**Background**

When comparing combustible and electronic cigarettes, only menthol flavor is allowed in combustible cigarettes, while >7000 flavors are available for electronic nicotine delivery systems (ENDS). With the growing number of ENDS users there is an increased need to understand how flavor additives alter behaviors related to abuse liability and dependence. This is especially true given that there is a growing number of ENDS users preferring zero-nicotine flavored e-liquids.

**Hypothesis**

We hypothesize that popular ENDS flavors induce neurological changes that enhance nicotine reward and reinforcement, while also displaying these effects in the absence of nicotine.

**Methods**

We used conditioned place preference (CPP) and vapor self-administration assays with adult mice (male and female) to study how flavors alter reward- and reinforcement-related behaviors. Whole-cell electrophysiology was used to examine how ventral tegmental area (VTA) dopamine neurons are altered in mice that completed behavioral tasks.

**Results**

Menthol and green apple ENDS flavors enhanced nicotine reward-related behavior in a CPP assay and reinforcement-related behavior in self-administration assays. Additionally, green apple flavor alone produced reward- and reinforcement-related behaviors in the absence of nicotine. In vapor self-administration assays, we observed that male mice failed to acquire self-administration behavior with nicotine alone but escalated with flavored ENDS products. In electrophysiology assays, green apple flavors stimulated elevations of dopamine neuron firing frequency and facilitated enhanced excitability when stimulated by nicotine. Furthermore, one green apple flavorant was found to stimulate $\alpha4\beta2$ nicotinic acetylcholine receptor activation in the absence of nicotine.

**Conclusion**

We observed that ENDS flavors cause direct changes in VTA dopamine neurons, an integral region in the rewarding properties of addictive drugs. Further, our behavioral assays exhibited the addictive-like properties ENDS flavors have and demonstrate the urgent need to increase our understanding of how ENDS flavors alter vaping-related behaviors.

**Moderate Ethanol Differentially Regulates Glucose and Amino Acid Absorption in the Mammalian Small Intestine**

Molly Butts, Soudamani Singh, Uma Sundaram
Department of Clinical and Translational Sciences, Joan C. Edwards School of Medicine

**Background**

Chronic alcoholism leads to malnutrition. This may be in part due to alcohol directly diminishing the intestinal absorption of primary nutrients like glucose and amino acids. Glucose is absorbed by the sodium-dependent glucose co-transporter SGLT1 (SLC5A1) in the brush border membrane (BBM) of absorptive villus cells. Glutamine, an amino acid, is absorbed via the sodium-dependent glutamine co-transporter B0AT1 (SLC6A19) in the BBM of villus cells. Whether ethanol may differentially regulate the absorption of these nutrients is unknown.

**Hypothesis**

Ethanol differentially regulates intestinal glucose and glutamine absorption.

**Methods**

Rat intestinal epithelial cells (IEC-18) and sixteen-week-old Sprague Dawley rats were exposed to moderate ethanol (8.68 mM; 2 g/kg) for one hour. SGLT1 and B0AT1 activities were measured as Na-dependent 3H-glucose or 3H-glutamine uptakes, respectively. Western blots used rat-specific SGLT1 and B0AT1 antibodies.

**Results**

In vitro, ethanol inhibited both SGLT1 and B0AT1 in IEC-18 cells (SGLT1: control: 502±27 pmol/mg protein*2 min, ethanol: 243±14, n=6, $p<0.01$; B0AT1: control: 1285±37 pmol/mg protein*2 min, ethanol: 874±75; n=6, $p<0.01$). Ethanol also inhibited both co-transporters in vivo (SGLT1: control: 122±8.67 nmol/mg protein*2 min, ethanol: 70.8±3.4, n=4, $p<0.01$; B0AT1: control: 139±7.5 pmol/mg protein*2 min, ethanol: 74.0±5.3; n=4, $p<0.01$). However, in vitro and in vivo, glucose absorption was inhibited due to decreased affinity (1/Km) of the co-transporter for glucose, without a change in the maximal rate of velocity (Vmax). In contrast, glutamine absorption showed inhibited Vmax, and unchanged Km. Further, both in vitro and in vivo, ethanol decreased B0AT1 protein expression while SGLT1 expression was unaffected.

**Conclusion**

Ethanol uniquely regulates glucose and amino acid absorption in the small intestine. Ethanol may differentially regulate SGLT1 and B0AT1 at the co-transporter level and/or via different intracellular signaling pathways. Future studies providing additional insights may lead to nutritional therapeutic possibilities to treat malnutrition from alcoholism.

**Investigating The Relationship Between Astrocyte-Neuronal Decoupling and Synaptic Homeostasis Following Repeated Adolescent Ethanol Exposure**

C.D. Walker, B.J. Henderson, M-L Risher.

Joan C. Edwards School of Medicine, Hershel Woody Williams Veteran Affairs Medical Center, Department of Psychiatry and Behavioral Sciences, Duke University Medical Center

**Background**

Binge drinking is highly prevalent among adolescents and a pivotal time for neuronal maturation. Binge drinking is associated with increased risk of alcohol dependence and cognitive impairment later in life. Animal models have shown disruption of neuronal structure and function resulting from repeated binge-level ethanol (EtOH) exposure. However, the underlying mechanisms that elicit these changes are not well understood. Furthermore, astrocytes' contribution to EtOH induced neuronal dysfunction is unknown. Astrocytes have complex morphologies with extensive peripheral astrocytic processes (PAPs) that allow for wide-ranging interaction with synapses across neuronal circuits. PAPs ensheathe pre- and postsynaptic terminals where they play an essential role in neuronal survival, signal transmission, and synaptic homeostasis. Our previous work has revealed adolescent intermittent binge EtOH exposure results in changes in astrocyte morphology and chronic dysregulation of astrocyte-secreted signaling factors.

**Hypothesis**

Adolescent binge EtOH exposure results in astrocyte-neuronal decoupling and the disruption of synaptic homeostasis.

**Methods**

Male Sprague-Dawley rats received intracranial injections of an astrocyte-specific adeno-associated virus (AAV). Beginning PND30, animals received intermittent EtOH (5g/kg i.g.) or water over 16 days. Hippocampal slices were prepared for whole-cell electrophysiology. Current recordings were obtained from AAV+ astrocytes following Schaffer collateral stimulation and administration of exogenous glutamate then back-filled with Lucifer Yellow. Tissue was cleared using fast Free-of-Acrylamide Clearing Tissue (FACT) technique, and immunohistochemistry with a postsynaptic marker was performed. 3D reconstructions of double labeled Lucifer Yellow+ and AAV+ astrocytes were generated using IMARIS. Astrocyte-synaptic proximity was quantified.

**Results**

Results show significant changes in astrocyte peak current amplitude in EtOH-treated animals, suggesting dysregulation of astrocyte dependent K+ homeostasis. These data were correlated with immunohistochemistry to understand the consequences of astrocyte-neuronal decoupling on synaptic homeostasis.

**Conclusion**

These findings may aid in our understanding of the relationship between EtOH-induced astrocyte dysfunction and synaptic impairment.

**Reimbursement of Common Plastic and Reconstructive Surgical Procedures Compared to Other Surgical Specialties from Centers for Medicare and Medicaid**

Andrew J Weaver, Reagan M Stafford, Kristopher Day
Department of Surgery, Joan C Edwards School of Medicine, Huntington, WV.

**Background**

Price transparency and cost-effective, value-based treatment has become high priority in our current healthcare system. The Center for Medicare and Medicaid Services (CMS) often pays different amounts for the same procedures based on various factors, which may be specialty-specific. The federal government now publishes a public database of physician reimbursements made to healthcare providers through CMS, known as Provider Utilization and Payment Data Public Use Files (PUF).

**Hypothesis**

We predict that there is a cost savings to CMS with the use of plastic surgery when compared to other surgical specialties for surgical procedures done by both specialties.

**Methods**

We investigate the 2015-2017 PUF database for differences in CMS reimbursements between surgical disciplines for the procedures most commonly performed by plastic and reconstructive surgery (PRS) and related other surgical specialties (OSS), including dermatology, otolaryngology, and orthopedics. Healthcare common procedure coding system (HCPCS) codes were used to group procedures and compare PRS and OSS CMS reimbursements using an equal-variance, two-tailed Student's t-test with p-value $<0.05$ indicating statistical significance.

**Results**

Reimbursement for PRS was significantly lower than dermatology for the same HCPCS codes in 78.9% of overlapping procedures. Compared to otolaryngology, 20% of PRS procedures received relatively lower reimbursement. For PRS compared to orthopedics, 40% of procedures were reimbursed by lower CMS.

**Conclusion**

The CMS PUF exhibits significantly lower reimbursements to PRS compared to OSS. Further research is needed to determine the cause of CMS reimbursement differences. Relatively lower CMS reimbursement may present an opportunity for federal healthcare cost savings through greater service delivery by PRS.

**Improving Resident Attendance at Neonatal Resuscitations**

Casey Fitzpatrick, Lauren Tufts
Department of Pediatrics Joan C Edwards School of Medicine, Huntington, WV.

**Background**

Graduating Pediatrics residents face the responsibility of newborn resuscitation, which can be difficult when practicing in locations that don't have a NICU. A 2011 study by the Journal of Graduate Medical Education found that provider comfort with neonatal resuscitation directly correlated with how many resuscitations they participated in.

**Hypothesis**

This is an ongoing QI study. Initial efforts in PDSA 1-6 set a goal of 85% attendance. Our aim in continuing the study was to maintain an 85% attendance rate by residents at neonatal resuscitations over the 5 months following PDSA 6.

**Methods**

Data was collected from required resuscitation attendance sheet.

PDSA 1-6 gathered 35 months of data.
PDSA 1: placement of a sign near the NICU elevator to Labor and Delivery that said "Do not forget the resident."
PDSA 2: Residents sign attendance sheet themselves.
PDSA 3: incorporate a 24-hour shift in the NICU rotation to increase resuscitation opportunities. PDSA 4: resident-paging system.
PDSA 5: Unit clerk notified residents of deliveries.
PDSA 6: reward system for NICU staff who alerted residents of deliveries.

**Results**

Prior to interventions, resident attendance was 29%. This increased to as high as 88% after PDSA 6.
A comparative Chi-square subgroup analysis was done to verify the change in attendance between PDSA cycles and the results were confirmed as statistically significant (p-value=<0.001).

**Conclusion**

Simple changes in the NICU rotation and unit can increase resident attendance and comfort with neonatal resuscitation. By July 2019, attendance hit a high at 88% of deliveries, exceeding our goal. Recently, attendance has again declined. New issues were identified, such as a defective delivery-paging system. Continued efforts and new interventions will be needed to maintain our goal.

**ORAL SESSION II • 10:30 AM – 11:30 AM**

# 32ND ANNUAL RESEARCH DAY ORAL SESSION


ations in Diffuse Large B-Cell
3 Fatty Acids


ymatic function in proximal tubule
m handling
MIIR
Results
Results
Conclusions
Literature Cited

**Regulation of Adipogenesis by α1 Na+/K+-ATPase via Its Conserved Caveolin Binding Motif**

Minqi Huang, Liquan Cai, Sandrine V. Pierre and Zijian Xie
Marshall Institute for Interdisciplinary Research (MIIR)

**Background**

In addition to its role as an ion pump, the Na/K-ATPase (NKA) α1 isoform forms a signal receptor complex with the non-receptor tyrosine kinase Src and the scaffolding protein caveolin-1 (Cav1). Pharmacological inhibition of NKA-mediated signaling transduction has been shown to inhibit adipogenesis in 3T3-L1 cells and high fat diet-induced obesity in mice. Moreover, mice carrying a mutation on a caveolin-binding motif (CBM) of the ATP1A1 gene were also resistant to high-fat diet induced weight gain. In addition to its role as an ion pump, the Na/K-ATPase (NKA) α1 isoform forms a signal receptor complex with the non-receptor tyrosine kinase Src and the scaffolding protein caveolin-1 (Cav1). Pharmacological inhibition of NKA-mediated signaling transduction has been shown to inhibit adipogenesis in 3T3-L1 cells and high fat diet-induced obesity in mice. Moreover, mice carrying a mutation on a caveolin-binding motif (CBM) of the ATP1A1 gene were also resistant to high-fat diet induced weight gain.

**Hypothesis**

These suggest a critical role of NKA/Cav1 interaction in adipogenesis.

**Methods**

To address this issue in a model with relevance to human physiology, we employed CRISPR/Cas9 system to mutate a conserved caveolin-binding motif (F97A and F100A) in the gene coding for α1 NKA (ATP1A1), and measured the effects of this loss-of-function mutation on pathways relevant to adipogenesis during the differentiation of human induced pluripotent stem cells (iPSC) to adipocytes.

**Results**

We found that the CBM mutant human iPSC-derived adipocytes expressed adipogenesis marker genes characteristic of adipocytes. However, Oil Red O staining indicated a significant reduction in lipid accumulation in the mutant cells, which was further confirmed by electron microscopy. Reduced glucose metabolism, resistance to insulin induced signaling, mitochondrial dysfunction, and cell extracellular matrix (ECM) fibrosis were detected in the mutant adipocytes by Seahorse Extracellular Flux Analysis, Fluorescence-activated cell sorting, immune staining, western blot, RT-qPCR, and RNA sequencing data analysis.

**Conclusion**

Taken together, the CBM mutant in adipocytes causes ECM fibrosis and mitochondrial ROS generation, which further leads to insulin resistance, metabolic dysfunction, and adipogenesis impairment via the activation of hypoxia inducible factor 1 (HIF-1α). Thus, we suggest that NKA-mediated signal transduction may serve as a critical regulator of adipogenesis and a new target for developing therapeutic avenues in the management of obesity and metabolic syndromes.

**High-fat diet alters serum cytokines before the onset of obesity**

Cassaundra A. Song, Allison L. Machnicki, Sarah Evans, Darby McCloud, Maria A. Serrat
Department of Biomedical Sciences, Marshall University Joan C. Edwards School of Medicine

**Background**

Accelerated skeletal maturation is a hallmark of childhood obesity that can cause permanent musculoskeletal damage. Obesity-induced inflammation is caused by cytokines such as interleukin-6 (IL-6), which alters insulin like growth factor-1 (IGF-1)-driven bone growth. We found that a high-fat diet (HFD) accelerates bone elongation in mice before they had excess body fat.

**Hypothesis**

Our HYPOTHESIS is that mice on a HFD have increased inflammatory cytokines before they exhibit overt obesity.

**Methods**

3-week-old C57BL/6 mice were given high-fat or control diets for 1 or 2 weeks. Serum cytokines were measured by ELISA, and glucose was measured with a blood glucometer. Statistical significance ($p<0.05$) was determined in SPSS.

**Results**

At 4 weeks, tibial elongation rate was over 20% higher in mice on a HFD and body mass was 16% greater, though mice were not yet obese. By 5-weeks, tibial elongation rate was still over 10% higher in HFD mice but with no difference in body mass. At 4-weeks, IGF-1, IL-6, and IL-1α were all significantly decreased in the HFD mice. At 5-weeks, TNF-α and IL-6 were decreased in the HFD group, while VEGF was increased. There were no differences in glucose.

**Conclusion**

Our results support the hypothesis that a HFD alters inflammatory cytokines before the overt onset of obesity. Unexpectedly, most cytokines were decreased rather than increased. The most robust finding was the 2-fold and 1.5-fold decrease in IL-6 at the 4- and 5-week age points, respectively. In addition to inflammation, IL-6 can regulate energy metabolism, with low IL-6 possibly contributing to human obesity. Decreased IL-6 is also consistent with our finding of increased bone elongation since high IL-6 suppresses growth.

**pNaKtide elongates RBC half-life in Sham and PNx mice without changes of iron homeostasis**

Justin Chuang, Muhammad A. Chaudhry, Hibba Chaudhry, Fang Bai, Ying Nie, Komal Sodhi, Jiang Liu, and Joseph I. Shapiro

Department of Biomedical Sciences, Marshall University

**Background**

Na/K-ATPase signaling-mediated oxidant amplification loop contributed by 5/6th renal partial nephrectomy(PNx) induced anemia, which could be improved by pNaKtide (Na/K-ATPase signaling antagonist). Iron deficiency has been a major factor in anemia. However, we have found that there was no difference, between Sham and PNx groups, in terms of iron levels. These data suggest that PNx-mediated anemia might not be dependent on iron homeostasis but instead due to the effects of reactive oxidative species (ROS). Here we report that the administration of pNaKtide in Sham and PNx mice resulted in an increased half-life of RBCs.

**Hypothesis**

Anemia via PNx surgery is due to reactive oxygen species without changes in iron homeostasis.

**Methods**

C57BL/6 mice were randomly divided and processed for Sham surgery (Sham, n=8) or PNx surgery (PNx, n=12), Sham+pNaKtide (n= 5), PNx+pNaktide (n=7). After 3 days, Sham and PNx mice received biotin via cardiothoracic puncture. pNaKtide was injected subcutaneously (25mg/kg weekly after surgery for a total of three doses). Blood was collected through submandibular puncture at days 3, 7, 14, 21, 28, and 35.

**Results**

RBC half-life was reduced in PNx animals (17 days PNx vs. 24 days sham group). pNaKtide treatment increases RBC half-life of Sham group to 28 days vs. PNx group to 27 days. Plasma EPO showed that PNx increase EPO levels (Sham 14.63±1.175 pg/mL, n=9, vs. PNx 20.49±1.452 pg/mL, n=12; p=0.0077). pNaKtide changed minimally compared to Sham (Sham 14.63±1.175 pg/mL, n=9, vs. Sham+pNaKtide 11.42±3.525 pg/mL, n=5; p=0.3060), but increased in PNx(PNx 20.49±1.452 pg/mL, n=12, vs. PNx+pNaKtide 27.63±3.189 pg/mL, n=7; p=0.0322).

**Conclusion**

We were able to show improvement in the half-life of RBC in the Sham+pNaKtide and PNx + pNaKtide groups. This can be explained by preventing the generation of ROS by blocking the Na/K-ATPase–Src signaling pathway with pNaKtide.

**Obesity Does Not Impact Continuation rates of Long Acting Reversible Contraception**

Amy Smith, Preeya Shah, Anne DeFruscio, Todd Gress MD, Jennie Yoost MD
Marshall Department of Obstetrics & Gynecology

**Background**

Preventing unplanned pregnancy in obese females is important due the associated pregnancy comorbidities in this population. Estrogen containing methods may convey additional risk, therefore, obese patients may preferentially choose long acting reversible contraceptives (LARC), such as the intrauterine device (IUD) and implant. There is limited data on continuation rates of LARC methods among women with obesity.

**Hypothesis**

It is hypothesized that continuation rates among implant users will be negatively affected by obesity due to excess endogenous hormone from adiposity; while continuation rates among IUD users will be unaffected.

**Methods**

This is a retrospective chart review of patients with either a subdermal implant or IUD between 2013- 2016. Data included age, race, type of LARC, date of LARC, BMI, parity, and discontinuation date and reason. BMI was dichotomized into obese (BMI >30) and nonobese (BMI <30). Discontinuation was analyzed among both IUD and implant users with a failure plot over time in months. Regression analysis was also utilized to evaluate the impact of BMI, parity, age and race on discontinuation.

**Results**

Of 1744 subjects, 586 (33.6%) received subdermal implants, and 1158 (66.4%) received IUDs.
The mean BMI of was 29.1 kg/m2 (SD 7.7) with a range of 16.4 kg/m2 to 62.8 kg/m2.
36.8% had a BMI > 30kg/m2, and 10.5% had a BMI > than 40kg/m2.
Overall 914 (78.9 %) of IUD users continued that method at least 12 months, while 444 (75.8%) of implant users continued for at least 12 months. Failure plots over time showed no difference in IUD or implant discontinuation between obese and non-obese subjects.

**Conclusion**

Obesity, age, race and parity did not affect discontinuation of the implant. However, parity and younger age impacted IUD discontinuation. Obesity has no impact on continuation rates of both IUDs and implants. These methods should be strongly considered for women with obesity.

**Stroke Incidence and Outcome Disparity in Rural Regions of Southern West Virginia**

Frank Annie, Mark C. Bates, Aravinda Nanjundappa, Muhammad Khan, Joshua Wyner, Elise Anderson, Ali Farooq, Megan Wood, Abhiram Challa

Department of Cardiology, Charleston Area Medical Center

**Background**

West Virginia has the highest incidence of obesity, smoking, and diabetes within the United States, placing its population at higher risk of stroke. In addition to these endemic risk factors, Appalachia faces various socioeconomic and health care access challenges that could negatively impact stroke incidence and outcomes. We set out to quantify Appalachian geographic patterns of stroke incidence and outcomes.

**Hypothesis**

Stroke incidence and mortality will occur in higher frequency in rural areas associated with increased distance from West Virginia's largest tertiary healthcare centers and lower income.

**Methods**

This is a retrospective analysis of all patients hospitalized with a diagnosis of stroke in West Virginia's largest tertiary hospital. During the study period (2000 to 2018), 14,488 patients were analyzed, with an emphasis on those who died from stroke (n = 1,022). We first used institutional ICD-9/10 data alongside demographics information and chart reviews to evaluate disease patterns while also exploring emerging hot spot pattern changes over time; we then exploited an emerging time series analysis using temporal trends to assess differing instances of stroke occurrence regionally with hot spots defined as higher than expected incidences of stroke and stroke death.

**Results**

Data analysis revealed several hot spots of increasing stroke and mortality rates, many of which achieved statistically significant variance compared to expected norms ($p = 0.001$). Moreover, this study revealed high-risk zones in rural West Virginia wherein the incidence and mortality rates of stroke are suggestively higher and less resistance to economic change than urban centers.

**Conclusion**

Stroke incidence and mortality were found to be higher than expected in many areas of rural West Virginia. The higher stroke risk populations correlate with area that may be impacted by socioeconomic factors and limited access to primary care. These high-risk areas may therefore benefit from investments in infrastructure, patient education, and unrestricted primary care.


39/40
102
DIABETIC MUSCLE INFARCTION

**ORAL SESSION III • 1:15 PM – 2:30 PM**

# 32ND ANNUAL RESEARCH DAY ORAL SESSION

**Mitochondrial Translation impairs Oxidative Phosphorylation and Apoptosis in ER/PR(+) Breast Cancer Cell lines**

Fatih C. Koc, Funda Kartal, Maria Tirona, Hasan Koc, and Emine C. Koc
Departments of Biomedical Science and Oncology Marshall University Joan C. Edwards School of Medicine and
Department Pharmaceutical Research and Science Marshall University School of Pharmacy

**Background**

Remodeling of energy metabolism is described as one of the major hallmarks of cancer and contributes to their heterogeneity and survival in a dynamic environment with reduced nutrient and oxygen levels. Defects in oxidative phosphorylation (OXPHOS) can also cause a switch in energy metabolism from oxidative to aerobic glycolysis, also known as the Warburg effect in cancer.

**Hypothesis**

Mitochondrial translation plays a crucial role in the biogenesis of OXPHOS complexes by synthesizing 13 mitochondrial encoded subunits of complexes I, III, IV, and V (ATP synthase). Interestingly, changes in expression of mitochondrial translation components and single nucleotide polymorphisms (SNPs) of their genes have been associated with breast cancer. Mitochondrial translation regulates energy metabolism and contributes to induction of apoptosis in breast cancer.

**Methods**

To test our hypothesis expression of mitochondrial translation components and ribosomal proteins (MRPs) were evaluated by immunoblotting analyses of breast tumor biopsies and cancer cell lines. To identify the key factors involved in mitochondrial translation in breast cancer, genomics and proteomics data mining analyses of publicly available databases at the Cancer Genome Atlas (TCGA) and The Clinical Proteomic Tumor Analysis Consortium (CPTAC) were also performed.

**Results**

In this study, we discovered that the changes in the expression of mitochondrial translation factors and ribosomal proteins (MR contribute to the remodeling of oxidative energy metabolism in breast cancer. The two pro-apoptotic MRPs, DAP3 and MRPS30, and their contribution to energy metabolism and apoptosis in ER/PR (+) breast tumors and cell lines were also investigated. Reduced expression of both DAP3 and MRPS30 impaired mitochondrial translation and therefore OXHOS while their ectopic expression increased apoptosis in ER/PR (+) MCF7 cell lines.

**Conclusion**

Understanding the role of mitochondrial translation components and MRPs in remodeling of energy metabolism and apoptosis will be essential in characterization of breast tumor heterogeneity at molecular levels.

**Role of endometriotic peritoneal components in ovarian cell transformation**

Catherine Cavender, Julie Blaylock, Sarah Brunty, Nalini Santanam
Department of Biomedical Sciences, Marshall University School of Medicine

**Background**

Endometriosis is a common gynecological disorder among women of reproductive age with a frequency of about 10%. Endometriosis shares several characteristics with cancer and has been associated with an increased risk of ovarian carcinoma, particularly clear cell ovarian carcinoma.

**Hypothesis**

We hypothesize that the endometriosis peritoneal fluid has the capability to induce epigenetic pathways leading to proliferation and/or transformation of ovarian cells.SDF1 (CXCL12) binding to CXCR4 will initiate downstream signaling pathways that result in cell survival and proliferation.

**Methods**

Clear cell carcinoma ovarian cancer cells (TOV21G) were treated with the following compounds: AMD3100 (CXCR4 inhibitor), and SDF1 (CXCL12- ligand for CXCR4). MTT, a measure of cell proliferation and viability were performed at 48 hours and 96 hours after treatment. Treatments included (i) with only the compounds; (ii) treatment with peritoneal fluid (PF) from women with or without endometriosis, (iii) PF plus the compounds. Separate experiments with similar treatments were also performed to isolate RNA for mRNA expression studies.

**Results**

Our results from the MTTs with the PF first shows SDF1 to cause a significant increase in cell growth after 96 hours. The AMD3100 showed an initial decrease in cell growth, but cells begin to grow again after 96 hours. The PCR showed an upregulation of CXCR4 with SDF1 and a downregulation with AMD3100.

**Conclusion**

Pilot studies show a possible role for the CXCR4 pathway to play a role in ovarian cancer. Future studies will further explore the role of peritoneal microenvironment in the regulation of this pathway in cancer.

**Primary Endocrine Therapy (PET) with no Surgery for Elder Women with Hormone Receptor-Positive, Non-Metastatic Invasive Breast Cancer, a Rural-Healthcare Experience.**

Mina Shenouda, Andrew Venardi, Toni Pacioles, Brett Williams, Mary Legenza.
Hematology/ Oncology-Marshall University, Surgery-Marshall University.

**Background**

Breast cancer (BC) is the most common malignancy affecting women in the US. With the aging population living longer, the incidence of BC among the elderly is expected to increase. Currently, over 30% of breast carcinomas are reported in women over the age of 70. Treating elderly BC patients is complex and involves defining the treatment goals while also weighing risks. Limited evidence-based guidelines exist for the management of this patient population.

**Hypothesis**

Previous studies have shown that in hormone-receptor unselected BC, medically fit older patients, PET is inferior to surgery plus endocrine therapy regarding local BC control. However, there was no significant difference in survival. This study aimed to investigate whether PET can be considered a reasonable alternative to surgery in elderly women who would not tolerate or refuse surgery.

**Methods**

This is a single-institution, retrospective-study that was approved by the Marshall University Institutional Review Board. Data were collected from medical charts of BC patients age 70 years and older who received treatment at Edwards Comprehensive Cancer Center (ECCC) in Huntington, West Virginia.

**Results**

Between 2010-2016, 340 women 70 years and older were diagnosed with hormone receptor-positive, non-metastatic invasive BC at ECCC. Only 22 (6.5%) patients had PET with no surgery. The median age of patients upon treatment initiation was 85 years old. With an average follow-up period of 23 months, 18 pts (82%) had disease regression by clinical exam. 12 patients died at the time of this report, but only 2 died of BC progression.

**Conclusion**

PET with no surgery can be a viable option for elder women with hormone receptor-positive, non-metastatic invasive BC, who cannot tolerate or refuse surgery, in a rural-healthcare setting.

**Value Assessment and Cost Analyses for Colon Resections On Patients at A Tertiary Medical Center.**

Abdelmasseh M1,2 & Iqbal A1,2, Hill G1, Melton D2, Willis J2,3, Kadiyala V2,3, and Sanabria J1-4
1Department of Surgery and Marshall Institute for Interdisciplinary Research (MIIR), 2Marshall University Randomized Control Trials Enterprise, 3Department of Informatics and Biostatistics, Marshall University School of Medicine, Huntington WV; 4Department of Nutrition and Metabolomics/Proteomics Core Facility, Case Western Reserve University School of Medicine, Cleveland OH

**Background**

It is estimated more than 300,000 colectomies will be performed in USA in 2019 at an estimated average reimbursement of $30,000 for a non-complicated case. Healthcare policies are assessing the value to determine schemes connecting reimbursement to performance.

**Hypothesis**

Our aim is to evaluate the value of colorectal procedures at our Institution after the introduction of enhanced recovery after surgery (ERAS) protocols for all types of procedures (laparoscopic, robotic-assisted and open), and to determine variables that affect their cost.

**Methods**

Clinical variables (v=85) were defined in advance and records from patients (>18yo) who underwent colorectal surgery were reviewed, retrospectively (Aug-2010 to July-2016, n=228), and prospectively (Aug-2016 to Dec-2018, n=106) under IRB-approved protocols. Value defined as Quality/Cost was assessed where post-operative complications were graded using a classification system. Quality of procedures with no complications=1 value unit; other procedures with complications were given a quality score as Grade 1=0.95, Grade 2=0.75, Grade 3=0.60, Grade 4=0.50, and Grade 5=0 (Death=5). Cost was defined as hospital charges accrued for admission/re-admission up to 30 days post index procedure. Cost was corrected for inflation at a 5% APR. Bivariate and multivariate analyses were performed using R-lab software. Patients with no submitted billing cost (n=9) were excluded.

**Results**

The unit value for uncomplicated robotic assisted colectomy with no readmission and a LOS ≤ 4days was $51,392 (value unit=1). The values for open and laparoscopic procedures (uncomplicated vs complicated) are displayed in Figure 1. Bivariate and multivariate analyses were performed by complications and type of procedure (laparoscopic (14%), robotic-assisted (23%) or open (63%) averaging 60.8±13.9 years of age and 54% females. Modeling for the prediction of complications that accomplished the best value was constructed and predictors are being validated.

**Conclusion**

Under ERAS protocols, open colorectal procedures appear to have higher value than minimally invasive procedures.

**Thymidine phosphorylase plays a mechanistic role in obesity and atherogenesis**

Hong Yue, Wei Li
Department of Biomedical Sciences

**Background**

Imbalanced lipid metabolism and chronic inflammation are the major contributing factors for developing obesity and atherogenesis. Thymidine phosphorylase (TYMP) plays an important role in platelet activation and thrombosis in response to vascular injury. TYMP is significantly increased in the fat tissue of obese patients and is present in the lipid-rich core of human atherosclerotic lesions.

**Hypothesis**

TYMP is essential for the development of obesity and atherosclerosis.

**Methods**

WT and Tymp-/- mice were fed with a western diet with or without tipiracil, a TYMP inhibitor, and weight gain was monitored for 8 weeks. Organ weight was measured upon sacrifice. The role of TYMP on inflammation was studied using vascular smooth muscle cells (VSMCs) and human liver cells, THLE-3.

**Results**

TYMP deficiency dramatically reduced the gain of body weight, liver and visceral fat weight in male, but not female mice. TYMP deficiency significantly reduced the expression of lipogenesis markers, increased expression of lipolysis proteins, and attenuated plasma levels of triglyceride and LDL/VLDL. WD-induced activation of MAPKs was significantly reduced in the liver of Tymp-/- mice. Overexpression of TYMP induced constitutive NF-κB p65 phosphorylation in VSMCs, which is further enhanced by Pam3CSK4, a Toll-like receptor 1/2 agonist. TYMP is co-precipitated with several key enzymes in the glycolysis pathway including PKM2 in nuclei, renders TYMP a potential moonlighting function. Overexpressing TYMP dramatically increased the expression of the glycolytic enzymes identified in THLE-3 cells further demonstrated that TYMP is essential for metabolism. Tipiracil dramatically reduced weight gain and attenuated abdominal lipid deposition in WD-fed WT mice, and attenuated atherosclerotic lesion in the Apoe-/- mice.

**Conclusion**

We conclude that TYMP plays a key role in regulating glucose and lipid metabolism as well as inflammation, thus leads to the development of obesity, which is essential for atherogenesis. Targeted TYMP-inhibition may be a novel anti-obesity and anti-atherosclerosis therapy.

**ORAL SESSION IIII • 3:15 PM - 4:15 PM**

# 32ND ANNUAL RESEARCH DAY ORAL SESSION

**Bacteremia Is Not Commonly Detected in Ebola Virus Disease**

M. Jeremiah Matson, Moses Massaquoi, Armand Sprecher, Ruggero Giuliani, Jeffrey K. Edwards, John P. Dekker, Emily Ricotta, Friederike Feldmann, Heinz Feldmann, Vincent J. Munster, Daniel S. Chertow

Marshall University Joan C. Edwards School of Medicine, Huntington, WV, USA; National Institutes of Health, Hamilton, MT, USA; Clinton Health Initiative - Liberia, Boston, MA, USA; Médecins Sans Frontières, Brussels, Belgium; National Institutes of Health, Bethesda, MD, USA

**Background**

Rates of bacteremia in Ebola virus disease (EVD) are not currently known. Given the potential for secondary bacterial infection during acute EVD, current treatment guidelines recommend empiric use of broad-spectrum antibiotics. We sought to determine rates of bacteremia among patients evaluated for EVD at the ELWA-3 Ebola Treatment Unit in Monrovia, Liberia during the 2013-16 West Africa epidemic.

**Hypothesis**

Severe Ebola virus disease predisposes patients to the development of bacteremia, possibly via translocation across disrupted gut barriers.

**Methods**

Deidentified blood samples and matched clinical data from 235 Ebola virus (EBOV)-positive patients and 102 EBOV-negative patients were evaluated under a University of Liberia Pacific Institute for Research and Evaluation IRB-approved protocol. 0.2 mL aliquots of frozen whole blood samples collected at triage, prior to the administration of antibiotics, were inoculated into BD BACTEC Peds Plus bottles and incubated in a BD BACTEC FX40 for five days in the National Institute of Allergy and Infectious Disease Biosafety Level 4 Laboratory in Hamilton, MT. Positive samples were sub-cultured on non-selective sheep blood agar and chocolate agar and pure colonies were selected for identification by 16S sequencing and by matrix assisted laser desorption ionization time-of-flight mass spectrometry.

**Results**

No difference in rates of bacteremia was detected among EBOV-positive versus EBOV-negative patients – 3.8% and 3.9% respectively. Predominant isolates included Staphylococcus epidermidis and other coagulase-negative staphylococci, thought consistent with contaminants. Pathogenic species included S. aureus and possibly Paenibacillus spp.

**Conclusion**

These data suggest that bacteremia does not commonly complicate EVD. However, as both prolonged sample storage and low culture volume may negatively affect sensitivity, an age- and gender-matched cohort of 45 EBOV-positive and 45 EBOV-negative patients from ELWA-3 has been deep sequenced utilizing the positive-selection approach BacCapSeq, with final analysis underway.

**Extracellular acidification promotes CD4 T cell survival in a GPR68-dependent manner**

William Foster*, Nosakhere Griggs*, Xiangming Zha^, Yan Xu**, Jeremy P. McAleer*

*Department of Pharmaceutical Sciences, Marshall University School of Pharmacy, Huntington, WV. ^University of South Alabama College of Medicine, Mobile, AL. **Indiana University School of Medicine, Indianapolis, IN.

**Background**

CD4 T cells are required for host defense against pathogens, but are also implicated in autoimmunity and allergies when directed against innocuous antigens. Identifying genes involved in T cell activation, proliferation or survival may lead to the development of novel therapies for chronic inflammatory diseases. We previously demonstrated that the aryl hydrocarbon receptor increases expression of GPR68 in human CD4 T cells. GPR68 is a proton-sensing receptor that is activated by extracellular acidification. Since T cell activation causes metabolic changes that promote acidification, we studied the effects of pH on CD4 T cell responses in vitro.

**Hypothesis**

Extracellular pH regulates CD4 T cell activation and differentiation in a GPR68-dependent manner.

**Methods**

Naïve CD4 T cells from conditional GPR68+/+ and GPR68-/- mice were purified from spleens and lymph nodes, and cultured under Th1, Th17, Treg or Th0 conditions at varying pH levels. Cell numbers were measured daily, with cytokines and apoptosis measured on day 4 by ELISA and flow cytometry, respectively.

**Results**

Th0 and Th1 cells proliferated better under slightly acidic (pH 6.7) conditions, whereas growth of Th17 and Treg cells appeared to be independent of extracellular pH. Compared to GPR68+/+ controls, GPR68-/- T cells had impaired proliferative responses under Th1 and Th17 conditions. This was associated with increased frequencies of apoptotic cells from GPR68-/- mice cultured at pH 6.7. Despite having impaired proliferative responses, GPR68-/- T cells produced normal or elevated levels of IFN-g, IL-17 and IL-22, suggesting that effector differentiation is GPR68-independent.

**Conclusion**

Extracellular pH significantly impacts T cell proliferation and cytokine production. The finding that GPR68 regulates T cell proliferation suggests a possible role in modulating survival signals downstream of the T cell receptor.

**The Utility of Leukocyte Esterase Test In The Diagnosis of Culture Negative PJI**

Vishavpreet Singh, Alisina Shahi, Javad Parvizi, Ali Oliashirazi
Marshall Orthopaedics

**Background**

Diagnosis of periprosthetic joint infection (PJI) is very challenging especially when the cultures are negative. The Leukocyte Esterase (LE) test strip has emerged as a cost-effective modality for diagnosing PJI and is one of the minor Musculoskeletal Infection Society (MSIS) criteria for the diagnosis of PJI.

**Hypothesis**

The purpose of this study was to assess the performance of the LE strip test in identifying culture negative PJIs.

**Methods**

We conducted a retrospective study and identified 1,094 revision arthroplasties that were performed in our institution between 2009-2018. Of these revisions 261 were MSIS positive PJIs and 87 had negative cultures. The included patients had negative cultures and available results of LE strip test. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), positive likelihood ratio (+LR), and negative likelihood ratio (-LR) were calculated using both the ++ and ++/+ cutoff for the LE strip test.

**Results**

Using the ++ threshold, LE test had a sensitivity of 32.0%, specificity of 96.8%, PPV of 42.1%, NPV of 95.0%, +LR of 11.3, and –LR of 0.8. When the ++/+ threshold was used the LE test had 96.0% sensitivity, 87.8% specificity, 33.7% PPV, and 99.48% NPV. The +LR and –LR were 6.57 and 0.04 respectively.

**Conclusion**

Our overall results were inline with the current literature demonstrating that the LE test with ++ threshold has a great specificity with low sensitivity whereas the ++/+ cutoff delivers a high sensitivity but lacks specificity. However, based on the results of this study it appears that the LE test could effectively rule out PJI in culture negative patients given its high NPV and sensitivity and very low -LR when the ++/+ threshold was used. Therefore, we recommend considering LE test especially when encountering questionable cases with negative cultures.

**Synovial Fluid Absolute Neutrophil Count a Promising Marker for Diagnosing Periprosthetic Joint Infection**

Alisina Shahi, Collin Lamba, Javad Parvizi, Ali Oliashirazi
Marshall Orthopaedics

**Background**

Clinicians who encounter a suspected periprosthetic joint infection (PJI) case have to use a combination of tests to confirm or refute the diagnosis of PJI. Several studies have indicated the importance of absolute polymorphonuclear leukocyte (PMN) count in systemic infections.

**Hypothesis**

The aim of this study was to assess the performance of synovial fluid (SF) absolute PMN count and compare it to SF PMN% and SF white blood cell (WBC) count.

**Methods**

The aim of this study was to assess the performance of synovial fluid (SF) absolute PMN count and compare it to SF PMN% and SF white blood cell (WBC) count. A retrospective multicenter study was conducted reviewing patients undergoing revision surgery from 2009 to 2018. 231 patients were enrolled and divided into two groups: aseptic revisions (N=136) and septic revisions (N=95). PJI was defined based on the MSIS diagnostic criteria. Sensitivity, specificity, positive and negative likelihood ratio(LR), and diagnostic odds ratio(DOR) were calculated for each test. The recommended thresholds by the modified MSIS diagnostic criteria were used for SF WBC(>3000 cells/μL) and SF PMN%(>80%). The cutoff for SF absolute PMN was calculated using the Youden's Index(>1950 cells/μL).

**Results**

SF absolute PMN count had a sensitivity of 88.4%, specificity of 85.2%, positive and negative likelihood ratio (LR) of 6.0 and 0.1, and a DOR of 44.2(95%confidence interval[CI]:20.1-97.3). SFWBC showed 84.2% sensitivity, 83.8 specificity, 5.2 +LR, 0.1 –LR, and 27.6(95%CI:13.5-56.5) DOR. Synovial PMN% had a sensitivity of 80.0%, a specificity of 80.8%, positive and negative LR of 4.1 and 0.2 respectively, and a DOR of 16.9(95%CI:8.7-32.7).

**Conclusion**

SF Absolute PMN count with an area under the curve (AUC) of 0.93 was a significantly better predictor of PJI than both SFWBC (AUC=0.91, p=0.007) and SFPMN%(AUC=0.88, p=0.016). SF absolute PMN count has a better performance for diagnosing PJI.

**Pseudomonas aerosol infection in DBA/2 mice causes an elevated lung inflammation via complement C5a independent pathway**

Renat Roytenberg, Brandon D. Kirby, Angela Theiss, Cameron Felty, Kari R. Wilson, and Hongwei D. Yu
Marshall University Joan C. Edwards School of Medicine, Huntington, WV, USA; Lincoln Memorial University-DeBusk College of Osteopathic Medicine, Harrogate, Tennessee, USA.

**Background**

Pseudomonas aeruginosa is an opportunistic bacterial pathogen which can cause acute and chronic lung infections. Previous publications indicate DBA/2 (D2) mice susceptibility to an acute respiratory infection by P aeruginosa, a lack of functional complement component 5 (C5), and reduced bactericidal activity compared to those of C57BL/6 mice (B6) resistant to infection.

**Hypothesis**

Lung infection in C5 deficient D2 mice leads to adverse immune responses through dis-regulation of cytokine production.

**Methods**

B6 and D2 mice were exposed to aerosolized Pseudmonas aeruginosa PAO1 in a GlasCol Inhalation Exposure System. Mice were sacrificed following exposure immediately then every 12 h for 72 h. Lungs were collected and either prepared on tissue slides for immunohistochemsitry and/or homogenized and processed for protein collection for ELISA and Western blot.

**Results**

D2 mice showed a delayed activation of inflammasomes by producing IL-1β, IL-18, and interferon-γ at a slower rate than the resistant B6 mice, suggesting the absence of C5a somehow affects the production of these cytokines in the lungs. Furthermore, D2 mice showed a switch from CD163 (M2) macrophages early on to CD68 (M1) macrophages throughout the infection while B6 mice expressed M1 macrophages until clearance. Further studies into C5 differences between D2 and B6 mice showed lack of C5a in D2 mice compared to B6 mice.

**Conclusion**

These results indicate that C5 deficiency in D2 mice is not required for the production of IL-1β, IL-18 or an inflammatory response but may cause a delay in production of these two cytokines during acute lung infection with P. aeruginosa. Future studies will aim to determine the mechanisms responsible for the immune activity compensation of C5a deficiency in D2 mice.

**POSTER SESSION 1 - 9:30AM - 10:30AM**

# 32ND ANNUAL RESEARCH DAY POSTER SESSION

**Long-Term Effects of Prenatal Drug Exposure on Brain Connectivity in a Rodent Model of Neonatal Abstinence Syndrome**

Taylor C. Boggess, Anna Mazur, Hannah Sexton, W. Christopher Risher
Biomedical Sciences, Marshall University Joan C. Edwards School of Medicine

**Background**

Neonatal abstinence syndrome (NAS) has become a major health concern as a result of the opioid epidemic, but little is known about the long-term effects of prenatal opioid exposure on brain development. Recently, Marshall University physicians have noted a specific clinical presentation of NAS in infants prenatally exposed to opioids and gabapentin, an anti-epileptic drug commonly prescribed to treat pain. Gabapentin is also known to inhibit development of synaptic pathways in the brain by interfering with secreted proteins (i.e. thrombospondins) from astrocytes.

**Hypothesis**

We hypothesize that prenatal exposure to drugs of abuse results in long-term deficits in synaptic connectivity in reward/addiction pathway-related areas in the developing brain.

**Methods**

We developed a mouse model of NAS using mice transgenic for the thrombospondin/gabapentin receptor, α2δ-1, so that the effects of co-abuse of the opiate buprenorphine and gabapentin on synaptic development could be examined. First-time pregnant dams were given daily access to buprenorphine and gabapentin in a condensed milk mixture from gestational day 7 until 11 days following litter birth. Control dams received vehicle mixture. Pups were sacrificed at postnatal day 21 and brains were harvested and fixed for immunohistochemistry. Brain cryosections including addiction related areas (prefrontal cortex [PFC], anterior cingulate cortex [ACC] and nucleus accumbens [NAc]) were cut and then stained for excitatory and inhibitory synaptic markers.

**Results**

Heterozygous α2δ-1 mice had significantly increased excitatory synapse number in the ACC and NAc with a concomitant decrease in synapses in the PFC following combined prenatal buprenorphine/gabapentin exposure. These same mice had significantly increased inhibitory synapse number in the ACC with a concomitant decrease in synapses in the PFC and NAc.

**Conclusion**

Co-exposure to buprenorphine and gabapentin during prenatal development is associated with a general increase in excitatory synapses and decrease in inhibitory synapses within addiction/withdrawal-related brain regions in α2δ-1 transgenic mice.

**Na-Glucose co-transport is stimulated in response to adipose-derived secretome (ADS) in intestinal epithelial cells during obesity**

Vijaya Lakshmi Sundaram, Soudamani Singh, Molly Butts, and Uma Sundaram
Clinical and Translational Sciences, Joan C. Edwards School of Medicine

**Background**

Obesity is a national epidemic. The most common complication of obesity is diabetes, caused by altered glucose homeostasis. Along the mammalian small intestine, glucose is absorbed via the Na-dependent glucose co-transporter SGLT1 (SLC5A1). While SGLT1 has shown to be stimulated in obese Zucker rats, the mechanism of SGLT1 stimulation is not known.

**Hypothesis**

In obesity, adipose-derived secretome (ADS) is known to affect multiple physiological processes. Whether ADS may mediate SGLT1 stimulation during obesity is unknown. In intestinal epithelial cells, can ADS mediates SGLT1 stimulation.

**Methods**

Four-day post-confluent rat intestinal epithelial cells (IEC-18 cells) were treated with ADS media derived from lean and obese Zucker rats. SGLT1 activity was measured as phlorizin-sensitive O-methyl-D-glucose uptake. Since Na-K-ATPase provides the favorable transcellular Na-gradient for SGLT1, it's activity was measured via inorganic phosphate release. Western blots for SGLT1 were performed using rat specific antibodies.

**Results**

ADS from obese rats stimulated SGLT1 in IEC-18 cells (Lean-ADS: 693±66 pmol/mg protein●2 min, Obese-ADS: 3507±81, n=3, $p<0.05$). Na-K-ATPase activity was inhibited by ADS from obese rats (Lean-ADS: 19.9±1.3 nmol/mg protein/min, Obese-ADS: 9.1±1.0, n=4, $p<0.05$). Preliminary kinetics indicate that the mechanism of stimulation of SGLT1 by Obese-ADS is due to an increase in the affinity (1/Km) of SGLT1 for glucose. Western blots did not show a change in SGLT1 protein expression between lean and obese ADS-treated IEC-18 cells.

**Conclusion**

SGLT1 activity is increased in obese-ADS-treated IEC-18 cells due to an increase in SGLT1 affinity, which is identical to that in vivo in obese Zucker rats. Also, as in obese Zucker rats, altered Na-extruding capacity of the cells is not the reason for stimulation of SGLT1 by ADS. These results indicate that ADS likely mediates SGLT1 stimulation in the intestine during obesity.

**The Inhibition of the Na-K-ATPase beta-1 subunit in Response to Moderate Ethanol Exposure in Intestinal Epithelial Cells**

Macaela Barnett, Aaron Cecchetti, Molly Butts, Soudamani Singh, Uma Sundaram
Clinical and Translational Sciences, Joan C. Edwards School of Medicine

**Background**

On average, approximately nine alcoholic beverages are consumed per occasion in West Virginia, which ranks among the highest binge drinking states in the US. Excessive alcohol consumption can lead to chronic alcoholism, which often presents with malnutrition. This malnutrition is in part due to suboptimal dietary intake, but also due to the inhibition of nutrient absorption along the small intestine. Nutrient absorption occurs via specific nutrient transporters along the small intestine, many of which are inhibited by ethanol. Many nutrient co-transporters function based on an essential intracellular sodium-gradient, maintained by the Na-K-ATPase on the basolateral membrane of intestinal epithelial cells. However, how ethanol affects the intestinal Na-K-ATPase is unknown.

**Hypothesis**

The Na-K-ATPase is altered by exposure to moderate ethanol.

**Methods**

Moderate ethanol (8.68 mM) was exposed to four-day post-confluent rat intestinal epithelial cells (IEC-18) for one hour. Na-K-ATPase activity was measured by 86-Rubidium uptake. The protein expression of the Na-K-ATPase alpha-1 and beta-1 subunits were measured with Western blots.

**Results**

At one-hour, moderate ethanol exposure significantly inhibited Na-K-ATPase activity (1070±10.1 pmol/mg protein•min in controls vs 603±122 in ethanol-treated cells, $p<0.05$, $n=3$). Furthermore, the protein expression of the beta-1 subunit was decreased, but the protein expression of the alpha-1 subunit was unchanged.

**Conclusion**

Moderate ethanol inhibits Na-K-ATPase activity through a decrease in the protein expression of the beta-1 subunit, which is vital for proper trafficking of the alpha-1 subunit of the Na-K-ATPase to the basolateral membrane. Furthermore, the inhibited intracellular sodium-gradient contributes to the inhibition of sodium-dependent nutrient absorption present in chronic alcoholics. This inhibition in Na-K-ATPase activity via the beta-1 subunit may provide therapeutic pathways for the treatment of malnutrition in chronic alcoholics.

**Effects of a High-Fat Diet on the Growing Skeleton**

Maria A. Serrat, Darby J. McCloud
Department of Biomedical Sciences, Joan C. Edwards School of Medicine, Huntington, WV.

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**Background**

One-third of children in West Virginia are overweight or obese by age 10. Tall stature and accelerated bone growth are hallmarks of obesity, which causes painful conditions such as slipped epiphyses and fractures. The mechanisms underlying these effects are unclear. Our lab uses a mouse model of excess dietary fat to study juvenile obesity in growing mice.

**Hypothesis**

We focused on skeletal growth plates where bone lengthening occurs and tested the hypothesis that weanling mice exposed to a high-fat diet will exhibit increased bone elongation rate before the onset of obesity.

**Methods**

C57BL/6 mice (N=32) were fed control (10% kcal fat) or high-fat (60% kcal fat) diets for two-weeks. Bones were collected at 5-weeks age to measure length, elongation rate, and immunostaining for the phosphorylated IGF-1 receptor (pIGFR) as a biomarker of IGF-1 activity. Since IGF-1 is the major growth-promoting hormone, we expected to find increased pIGFR expression and enhanced bone elongation in high-fat diet mice.

**Results**

Limbs ($t = 2.4$, $p < 0.05$) and tails ($t = 2.9$, $p < 0.01$) were 2% and 14% longer, respectively, in the high-fat diet group and bone elongation rate was over 16% greater ($t = 4.1$, $p = 0.001$). Immunostaining revealed a significant increase in pIGFR levels ($t = 2.4$, $p < 0.05$). These changes occurred without increasing body mass.

**Conclusion**

These results support our hypothesis that a high-fat diet alters the skeleton before mice become obese. These findings are important because they highlight the role of diet in the earliest stages of developing obesity-related skeletal complications

**Quantification of cannabis in infused consumer products and their residues on skin**

Sara Moreno
Chemistry, Marshall University

**Background**

Cannabis sativa is an illegal drug under federal law, but under state laws this drug has become less criminalized. States have begun to allow the medical and recreational use of cannabis to the point that products made from its components like Cannabidiol (CBD) and tetrahydrocannabinol (THC) have been commercialized. These products are sold in chain stores and online ranging from lotions to lip balms and across state lines. But each state has different regulations on the presence of CBD and THC in products and some states do not even allow medical use of these products.

**Hypothesis**

The anticipated outcome is a more comprehensive interpretation of products claiming to be infused with hemp, weed or cannabis and to have a more quantified understanding of the cannabinoids present and the residues they may leave. This project is also anticipated to help understand the more the undefined areas of the law in which CBD and THC products are consider both legal and illegal depending on the product use or the branch of government prosecuting a case. The goal is to discern whether these products may fit in a legal threshold and whether travel can be impended due to a passenger carrying these infused cannabinoid products.

**Methods**

To accomplish this goal, various characterization and quantification techniques have been employed such as Chromatography, Mass Spectrometry, Spectroscopy, and particle sizing.

**Results**

Preliminary results have showed that products have cannabinoids present even without having a product claim but the THC present was only quantifiable in all trials for one product.

**Conclusion**

Each technique will be used to help gain a better understanding of the cannabinoid presence in the products. They allowed for the characterization and quantification of cannabinoids within the 12 consumer products purchased, and showed that all are within legal limits.

**Regulation and Function of L-Type Amino Acid Transporter in Breast Cancer in Obesity**

Cecilia G. Sierra, Chelsea Thompson, Ashley Cox, Travis Salisbury
Biomedical Research, Marshall University Joan C Edwards School of Medicine.

**Background**

In 2016 the Nation Cancer Institute reported that more than three million (3,477,866) women in the U.S. have breast cancer. In the latest report (2019) 268, 600 new cases of breast cancer were reported in the United States and over 40,000 deaths. In West Virginia and central Appalachia breast cancer is the second leading cause of cancer death among women. Obese women, especially post-menopausal women, have higher rates of breast cancer incidence, are less responsive to treatment, and have worse breast cancer clinical outcomes. Obesity is a major risk factor for ten different cancers, though the mechanisms by which obesity promotes cancer progression are not fully understood.

**Hypothesis**

We hypothesize that the regulation and function of L-type amino acid transporter 1 (LAT1) in obesity leads to increases in leucine uptake by breast cancer cells and promotes breast cancer progression.

**Methods**

To investigate our hypothesis adipose tissue samples from women with breast cancer were obtained post-surgery and processed for cell culture. Adipose conditioned media (ACM) was used to treat luminal breast cancer cells (MCF7) and western blot was used to assess levels of LAT1 expression and mTOR activity. MCF7 cell growth and cell migration were also measured after treatment with ACM. MCF7 cells were treated with interleukin-6 (IL6), a pro-inflammatory adipose associated cytokine, and its effect in cell growth and migration measured. Our results show that adipose secreted factors increase LAT1 and mTOR activity, and migration of MCF7 cells.

**Results**

Our results for IL6 showed an increase in MCF7 cell migration and inhibition of mTOR reduced cell migration in the presence of IL6.

**Conclusion**

In conclusion, adipose secreted factors such as IL6 can increase cancer cell migration through an increase in LAT1 and mTOR activity, without affecting cancer cell growth.

**Src-phosphorylation at the α1-Na/K-ATPase Modulates Microbiota Communities and CD4/CD8 Lymphocyte Variation in the NASH Murine Model.**

Sanabria JD 1-2, Schade M 2-3, Sanabria JA 1-2, Piaskowski M 1-2, Aguilar R 1-2, Andryka M 1-2, Schlatzer D 4, Li X 4, Hazlett FE 4, Kachman M 5, Raskind A 5, Brunengraber H 4, Sodhi K 1-3, Pierre S 2-3, Udoh U 1-2, Rajan PK 1-2, Smith G 2, Xie Z 2-3, Shapiro J 2-3, and Mallick A 1-2 & Sanabria J 1-4.

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**Background**

It is estimated by the year 2030 that 1.1 billion people around the world will be obese. Obesity represents the core component of the metabolic syndrome associated with liver disease, such as non-alcoholic steatohepatitis (NASH) and progression to hepatocellular carcinoma (HCC). Recent studies have shown a link between gut microbiota and these obesity-associated liver diseases.

**Hypothesis**

We hypothesize Src-phosphorylation at the α1-Na/K-ATPase induced by a high fat diet (HFD) increases cellular oxidation and modulates both microbiota cell communities and CD4/CD8 lymphocyte quantity.

**Methods**

C57Bl 6J ♀ mice were exposed to normal mouse chow (NMC) or high fat diet (HFD). Liver, plasma, terminal ileum (TI) and associated microbiota were collected at 24 and 48 weeks. Microbial community profiling was achieved by rRNA sequencing from TI DNA contents, and TI tissue was stained and analyzed for CD4 & CD8 lymphocytes. Hepatic oxidative stress was determined by glutathione sp. and pNaKtide was administered to block Src-phosphorylation. Statistical significance was set at the 0.05 level by ANOVA/t-test.

**Results**

Morphological changes and glutathione sp. correlated with Src peak gene expression and Na/K-exchange pump activity ($p<0.05$). A shift in the gut-microbiota communities was observed in the HFD mouse group. A significant increase in Verrucomicrobia was observed in the HFD group when compared to the NMC group ($p<0.05$), as well as a significant decrease in Bacteroidetes ($p<0.05$). pNaKtide abrogated metabolic, genetic and morphologic changes establishing a wild microbiota community phenotype. HFD significantly decreased CD4 & CD8 lymphocytes when compared to NMC ($p<0.05$).

**Conclusion**

Src-phosphorylation at the α1-Na/K-ATPase induced by HFD modulates microbiota communities and CD4 & CD8 response. Inhibition of this α1-Na/K-ATPase//Src amplification loop by pNaKtide restores normal phenotypes in a NASH murine model.

**Examination of Resveratrol Attenuation of Doxorubicin Cytotoxicity and Mitochondrial Dysfunction in Noncancerous Human Proximal Tubular Epithelial Cells**

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**Background**

Doxorubicin (DOX), is a cancer chemotherapy agent. DOX can induce cardiomyopathy and renal impairment. Resveratrol (RES) is a compound found in fruits reported to impair cancer cell growth and reduce the adverse effects of some drugs.

**Hypothesis**

Our studies tested the hypothesis that RES protection for DOX renal cytotoxicity, was mediated by maintaining mitochondrial function.

**Methods**

All studies were conducted in human noncancerous renal proximal tubular epithelial cells (HK-2). HK-2 cells were plated, equilibrated for 48h followed by a 1h pretreatment with with 0 (DMSO), 5 or 7.5 uM RES. Cells were next co-incubated for 24h with 0-5 uM DOX. Viability was assessed using MTT leakage and tyrpan blue exclusion using a Cell Countess. Western analysis probed for protein carbonylation as a biomarker for oxidative stress. Mitochondrial function was assessed as changes in Oxygen Consumption Rate (OCR) using a MitoStress Test kit with a Seahorse analyzer system. All results were obtained from 3 independent experiments using different cell passages. Difference between groups were analyzed using ONE and TWO WAY ANOVA followed by a post hoc Tukey test at a 95% confidence interval.

**Results**

RES did not alter cell viability at the concentrations tested as indicated by comparable values between DMSO and RES groups ($p>0.05$). DOX was cytotoxic to HK-2 cells within 24h. Pretreatment with RES provided protection from DOX to HK-2 cells. Basal and maximal mitochondrial respiration OCR was diminished by 4 uM DOX relative to vehicle control. Mitophagy mediated by DOX and the effect of RES showed a trend for altered protein expression between groups for LC3BI, LC3BII and the ratio of LC3BII/I.

**Conclusion**

DOX was cytotoxic to HK-2 cells. RES attenuated DOX renal cytotoxicity by maintaining mitochondrial function.
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**Renal Proximal Tubule-Specific Ablation of Atp1a1 Reveals a Novel Tonic Inhibitory Mechanism of Sodium Reabsorption**

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Marshall Institute for Interdisciplinary Research

**Background**

Endogenous cardiotonic steroids (CTS) increase markedly during volume expansion and renal insufficiency, suggesting a role in renal Na+ handling.

**Hypothesis**

Rather than the classic CTS-mediated inhibition of Na+/K+-ATPase alpha1(NKAa1) ion-transport in the renal proximal tubule (RPT), in vitro pharmacological approaches have suggested that low concentrations of CTS (in the physiological range) may initiate NKAa1/Src-mediated signaling to reduce apical Na+/H+ Exchanger-3 (NHE3) and transepithelial Na+ flux in the RPT.

**Methods**

To assess the physiological impact of this putative NKAa1/Src mechanism in the RPT, we used a knockdown and rescue approach in pig renal epithelial cells (LLC-PK1) and generated a RPT-specific NKAa1 knockout mouse (RPTa1-/-) by crossing SGLT2 (sodium glucose co-transporter-2)-Cre mice with Floxed Atp1a1 mice.

**Results**

In cells with 90% NKAa1 knockdown (PY-17), we observed a 50% decrease in NHE3 inactivation. Comparable NHE3 activation was observed in cells expressing a Src-binding NKAa1 null-mutant or non-Src binding NKAa2 but not Src-binding gain-of-function a2 mutant, suggesting a role for NKAa1/Src receptor function in the tonic inhibition of NHE3. In RPTa1-/- mice, we observed a decrease in inactive NHE3 and increased membrane NHE3 in the renal cortex. Functionally, the mice exhibited a 65% decrease in daily urine output and absolute Na+ excretion. A 65% decrease in urinary lithium clearance in RPTa1-/- indicated increased RPT Na+ reabsorption, with no change in glomerular filtration rate measured by FITC-sinistrin clearance.

**Conclusion**

These studies reveal a novel mechanism of tonic inhibition of NHE3 by Atp1a1. In vitro results provide genetic evidence that NKAa1/Src receptor function is critical to this mechanism, which was corroborated in vivo. Animal studies further indicate a significant physiological impact of this hitherto unrecognized regulation of Na+ reabsorption in the RPT, which may be regulated by endogenous CTS in health and disease.

**Tart Cherry, Fish Oil, and Their Combined Effect on Indicators of Obesity and Type 2 Diabetes in TALLYHO Mice Fed High Fat Diets**

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**Background**

The co-epidemic of obesity and type 2 diabetes is associated with numerous health detriments, necessitating the search for feasible interventions. Obesogenic and diabetogenic environments, such as high fat diets, can substantially influence genetic factors involved in disease development.

**Hypothesis**

The present study sought to investigate possible therapeutic effects of tart cherry (TC) and fish oil (FO) supplementation on indices of obesity and type 2 diabetes in the polygenic mouse model of TALLYHO (TH).

**Methods**

At 4 weeks of age, male and female TH and C57BL/6J (B6) mice were weaned onto five different diets: low fat (LF), high fat (HF), and HF supplemented with TC, FO, or TC+FO. After 12 weeks of feeding, body weight and fat mass, glucose tolerance, energy expenditure, and plasma glucose, insulin, lipid, and IL6 levels were measured. Data were analyzed via ANOVA.

**Results**

Compared to LF, HF diets significantly increased body weight and fat mass in both sexes of B6 and TH mice, with the greatest increases in TH males. However, no TC, FO, or TC+FO supplementation effects were noted in body weight or fat. HF diets significantly decreased energy expenditure (kcal/kg/hr) in all groups of mice compared to LF, but no preventive effects of TC, FO or TC+FO were noted. TH male mice, but not others, developed severe glucose intolerance and hyperglycemia on HF diets; FO demonstrated a preventive effect, though not statistically significant. HF diets increased plasma IL6 levels in all groups of mice, but TC, FO, and TC+FO equally exerted preventive effects in TH females only. Plasma total cholesterol levels were increased in TH males on HF compared to those on LF, without TC or FO effects.

**Conclusion**

We conclude that TC and FO supplementation did not demonstrate significant anti-obesogenic or anti-diabetogenic effects in TH mice fed HF, but confers anti-inflammatory effects, especially in females.

**Biased Effect of Cardiotonic Steroids on Na/K-ATPase-mediated Signal Transduction**

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**Background**

Beside pumping function, Na/K-ATPase (NKA) also acts as a membrane receptor. Cardiotonic steroids (CTS) are traditionally regarded as NKA pumping inhibitors. While additional effects have long been suspected, we are beginning to understand the ligand effects of CTS on signaling transduction. While all CTS bind to the E2P state of NKA, they induce different structural changes. We have shown that NKA works as a receptor via direct protein interaction with effectors in a conformation-dependent manner. As such, different CTS could trigger its own set of NKA/effector interactions, resulting in biased signaling responses.

**Hypothesis**

We suggest that the structural rearrangement triggered by individual CTS may trigger different NKA/effector interaction, leading to biased activation of a specific signaling pathway as exampled by biased GPCR ligands

**Methods**

The activation of ERK and PKCε, and the stimulation of NKA endocytosis are used to addressing whether CTS activate biased signal transduction in vitro. Isoproterenol and Angiotensin II-induced C57BL/6J mouse heart adverse remodeling are used to corroborate the biased signal transduction effect of CTS in vivo.

**Results**

We found that digitoxigenin favored protein kinase activation and somalin had a bias toward NKA endocytosis without much effects on protein kinases. Importantly, they can stimulate these signaling events at doses (ten times lower than IC50) without affecting the cellular pumping capacity. At the end, the biased signaling properties triggered by structurally difference of CTS that mediated by NKA selectively protect against vasoconstrictor agents-induced cardiac adverse remodeling.

**Conclusion**

It's the first demonstration of CTS-induced bias in signaling through a1 NKA. The data also provided strong support of our hypothesis that NKA/effector interaction is a key to CTS-induced signal transduction and gave us a new tool kit to probe the molecular basis of biased signal transduction. We also shown that CTS with biased signaling properties have different therapeutic potentials in the heart adverse remodeling.

**α1-S-Glutathionylation's role at the Na/K-ATPase and protein's function in high fat diet induced oxidative stress**

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**Background**

Nonalcoholic Fatty Liver Disease (NAFLD) progresses to NASH and ESLD (cirrhosis), becoming worldwide the most prevalent diagnosis for chronic liver disease. Our laboratory has shown a cause-effect association between obesity and related metabolic alterations. Protein glutathionylation caused by the redox sensitivity of the hepatic Na/K-ATPase α1-subunit, may lead to alterations in cellular and molecular pathways associated with obesity related liver damage, and signaling cascades involved in the regulation of protein expression/activity.

**Hypothesis**

We aim to evaluate the effect of Na/K-ATPase/Src-phosphorylation blockage redox signaling, on hepatic Na/K-ATPase expression/activity by high fat diet (HFD).

**Methods**

C57B6J ♀ mice were exposed to normal mouse chow (NMC) or HFD± interventions (pNaKtide/exercise) for 24 weeks. α1 Na/K-ATPase expression was evaluated by mRNA expression and western blots. The glutathionylation of the α1-Na/K-ATPase was assessed by immunoprecipitation followed by immunoblotting (α1-P-antibody and M-anti-GSH, respectively). Na/K-ATPase activity was determined on livers homogenize. Significant differences among groups were established at $p<0.05$ using ANOVA/t-test.

**Results**

Even though Na/k-ATPase activity was significantly restored at 24 weeks by pNaKtide when compared to HFD and Exercise ($p<0.05$), glutathionylation of the α1 subunit at the Na/K-ATPase was not significantly different when compared to the other HFD groups ($p>0.05$).

**Conclusion**

Src-phosphorylation blockage at the α1-Na/K-ATPase restored pump activity independently of protein glutathionylation. The findings of the present study provide a lead for future mechanistic studies to explore the role of pNaKtide in hepatic Na/K-ATPase function and related metabolic disorders.

**Transplantation of Na/K-ATPase signaling antagonist, NaKtide, transfected adipose tissue attenuates experimental uremic cardiomyopathy**

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**Background**

We have recently demonstrated that administration of NaKtide, antagonist of Na/K-ATPase (NKA) signaling, coupled to adiponectin promoter can improve adipocyte phenotype. In uremic cardiomyopathy, uremic toxin exposure of adipocyte will generate ROS, subsequently activating adipocyte NKA signaling and causing adipocyte dysfunction and oxidative stress. Studies have shown that adipose tissue transplantation in mice reduced obesity and improved whole energy metabolism.

**Hypothesis**

We hypothesize that the transplantation of NaKtide transfected subcutaneous fat tissues into mice with partial nephrectomy (PNx) will improve adipocyte phenotype and attenuate uremic cardiomyopathy.

**Methods**

Following 4 weeks of PNx or Sham surgery and lenti-adiponectin-NaKtide treatment, 300mg of fat pads (Sham, Sham+NaKtide, and PNx+NaKtide groups) were subcutaneously transplanted into strain- and age- matched PNx mice. Following 4 weeks after transplantation, tissues were harvested for morphological and molecular analyses.

**Results**

Histological analysis of cardiac tissue shows increased fibrosis with PNx, which was decreased with transplantation of adipose tissue from mice treated with NaKtide. PNx mice developed cardiomyopathy characterized by increased heart weight and decreased cardiac function, assessed by echocardiography measurements, as compared to Sham operated mice. These alterations were reversed in PNx mice, by the transplantation of NaKtide transfected adipose tissues from PNx+NaKtide donor mice. mRNA expression of IL-6, MCP-1 and collagenase in cardiac tissue were also improved by transplantation of NaKtide transfected adipose tissue. Our results also showed that NaKtide transfected adipose tissue from PNx+NaKtide mice, transplanted to PNx recipient mice improved glucose tolerance, hematocrit levels and levels of plasma inflammatory cytokines, including TNFα, IL-6 and MCP-1.Our study demonstrates that adipocyte contribute to the oxidant stress associated with uremic cardiomyopathy by activation of NKA signaling, which is improved by the subcutaneous fat transplantation transfected with NaKtide.

**Conclusion**

These data suggest that the adipocyte NKA signaling may be a viable clinical target for the prevention or treatment of uremic cardiomyopathy.

**Detecting early onset of chemotherapy-related cardiac dysfunction in breast cancer patients in the West Virginian population using a novel panel of biomarkers**

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**Background**

Cardiotoxicity has been linked in breast cancer patients receiving anthracyclines therapy in the clinical setting. Evidence suggests that cardiotoxic manifestation associated with breast cancer treatment increases patients' susceptibility to myocardial injury, reduction in left ventricular ejection fraction and complications associated with heart failure. There is currently no standardized, minimally invasive and cost-effective procedure to monitor cardiotoxicity post-anthracycline therapy, and to detect early onset of irreversible cardiovascular complications.

**Hypothesis**

This study aims to create a panel of biomarkers and circulating miRNAs associated with cardiotoxicity, to assess the correlation between anthracycline agents and development of cardiac dysfunction, which will allow to monitor and detect early-onset of chemotherapy related cardiac dysfunction.

**Methods**

A total of 17 female patients with a clinical diagnosis of invasive ductal carcinoma and 17 healthy controls were enrolled for the study. Blood was withdrawn and echocardiography was performed at baseline (prior to initiation of anthracyclines), 3months and 6months post-initiation of anthracycline agents. ELISA and RT-PCR was performed for biomarker analysis and expression of circulating miRNA levels, respectively.

**Results**

Our results showed that IL-6, MMP2 and MMP9, myeloperoxidase and topoisomerase II beta were significantly upregulated in serum obtained at 3months and 6months study interval post anthracycline initiation, as compared to baseline and healthy controls ($p<0.01$). The circulating levels of miR-34a, miR-208b, miR-126, miR-150, miR-423 and miR-499a showed increased expression at 3months and 6months study interval, while levels of miR-29a were reduced at 3months and 6 months, as compared to control group ($p<0.01$). Assessment of echocardiographic measurements exhibited greater extent of cardiac dysfunction at 3months and 6month study interval.

**Conclusion**

Our results support the clinical application of these serum biomarkers and circulating miRNAs to develop a panel for early diagnosis of chemotherapy related cardiac dysfunction which will enable early detection of disease progression and management of irreversible cardiac damage.

**Evaluation of Factors Affecting Nutritional Status in the Community Dwelling Oldest Old**

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**Background**

Community Dwelling Oldest Old (85 years and older) is the most rapidly growing population in West Virginia and the nation. West Virginia is expected to see an increase in the 85 years and older demographic from 38,404 to 53,375 (39% increase) from 2013 to 2030, further increasing the state's financial healthcare burden. While much is known about this age group living in assisted-care settings, not much has been explored for those living independently. Nutrition impacts the patient's health and is itself impacted by factors such as olfaction and quality of an individual's life.

**Hypothesis**

There is a correlation in Community Dwelling Oldest Olds when comparing Nutritional Status to the factors: Quality of life, Sarcopenia, Frailty, and Gender.

**Methods**

A random, representative population of Community Dwelling Oldest Old in West Virginia from Cabell County, Wayne County, and Lincoln County were asked to anonymously participate in the following: General demographics, Mini-Nutritional Assessment (MNA), and Edmonton Frail Scale (EFS).

**Results**

Of the 40 patients surveyed, 26 were Normal, 11 were At Risk and 3 Malnourished on the MNA. Malnourished patients were statistically male ($p = 0.0398$). No statistical correlation was seen with Frailty ($p = 0.1035$) or living situation ($p = 0.2345$). Malnourished patients were older (93.0 years old) compared to At Risk (89.3 years) and Normal (88.4 years).

**Conclusion**

The data accepts the hypothesis when comparing Nutritional Status to Gender. As expected, there is a suggested increased risk of malnutrition as a patient population grows older. Furthermore, the data indicates that males 85 years and older that live in rural Appalachian communities are at greater risk for malnutrition than their female counterparts. This is significant in comparison to literature of larger non-rural populations which suggests females being at higher risk for malnutrition. Further research is suggested for early intervention strategies in this distinctive group.

**Health Literacy Among Primary Care Patients in an Academic Setting in the Appalachian Region**

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**Background**

Health literacy is the ability of individuals to obtain, process, and understand basic health information needed to make appropriate health decisions. At least 30% of adults in the USA have been identified to have low health literacy, making it difficult for them to engage actively in their health care.

**Hypothesis**

The aim of this cross sectional study was to assess the current rate of health literacy and to identify factors associated with low health literacy among patients in internal medicine clinics in an academic setting affiliated with Marshall University, Cabell county, West Virginia.

**Methods**

About 100 participants were surveyed with inclusion criteria being patients/caregivers between 19-100 years presenting to Marshall University Internal Medicine and Geriatrics Clinics for acute or chronic care visits. Exclusion criteria included patients with hemodynamically unstable medical conditions, moderate to severe dementia without accompanying caregivers, and poorly controlled psychiatric problems that affected cognitive abilities or day to day functioning. Participants were screened for health literacy using a previously well validated tool, Newest Vital sign (NVS), wherein each participant was given a specially designed ice cream nutrition label to review and was asked a series of questions from it. Those who scored above 4 were considered to have adequate health literacy.

**Results**

Results showed that being a non-smoker, having high school education or more, and being in the age group of 30-65 years was associated with higher healthy literacy ($p$ value $< 0.05$). Factors such as gender, BMI, number of medications, having received flu vaccine, and hospitalizations in the past 12 months did not seem to have an association with the degree of heath literacy.

**Conclusion**

We believe that this study will help spread awareness of health literacy in both the patients and health care providers alike. It will also help identify individuals at high risk for poor health literacy and adapt effective strategies to improve communication.

**Stereotactic Body Radiation Therapy (SBRT) for Metastatic Renal Cell Carcinoma: An Analysis of Clinical Outcomes from a Multi-Institutional SBRT Registry**

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**Background**

As lesions from metastatic renal cell carcinoma (mRCC) were traditionally regarded to be radioresistant, stereotactic body radiation therapy (SBRT) has emerged as an effective treatment modality.

**Hypothesis**

SBRT is effective in the treatment of mRCC, with favorable patient outcomes and low toxicity rates across a variety of clinical settings.

**Methods**

A prospectively-maintained multi-institutional registry was queried for mRCC patients treated with SBRT. Potential predictive factors of LC and OS were evaluated with the Kaplan-Meier method and a Cox-proportional hazards model for multivariate analysis (MVA).

**Results**

One-hundred and fifteen patients with 181 lesions treated with SBRT (71 lesions with information on LC) were identified. Median patient age was 66 years (range: 33-84), median GTV was 26.3 cc (range: 0.41-110cc), and the median BED3 was 130 Gy3 (range: 46.67-460 Gy3). Commonly involved areas included the spine (36.5%), lung (25.2%), and non-spinal osseous metastases (22.6%). One- and 2-year OS rates were 69.1% (95% CI: 59.3-76.9%) and 45.2% (95% CI: 34.6-55.1%), respectively. Patients with KPS < 80% (20.3 months vs. 6.6 months; p = 0.007), spinal metastases (27.9 months vs. 12.9 months; p=0.0004), or treated to BED3 < 100 Gy3 (p = 0.037) had inferior OS following univariate analysis. On MVA, spinal metastases were associated with poorer OS (hazard ratio (HR) = 2.54 (95% CI: 1.35–4.76); p = 0.003). One- and 2-year LC rates were 88.2% (95% CI: 73.7-94.9%) and 82.7% (95% CI: 63.1-92.5%). Patients with spinal metastases had superior 1-year LC (100% vs. 84.9% (95% CI: 67.2-93.5%)) on MVA (p<0.0001). Roughly 13% of patients reported acute or late toxicities (one Grade 3 toxicity).

**Conclusion**

SBRT was well-tolerated in the treatment of mRCC. Patients with spinal metastases had superior LC but inferior OS. No dose-response for LC, OS, or toxicity was identified.

**Predictors of Frailty in Individuals Presenting to an Outpatient Geriatric Clinic**

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**Background**

Frailty is a complex geriatric syndrome that is defined as a decrease in physiological reserves. Recognizing frailty early is important to guide the management of geriatric patients.

**Hypothesis**

This study sought to characterize frailty and identify the predictors of frailty in patients presenting to the outpatient geriatric clinic.

**Methods**

Consecutive patients who were 65 years or older and were able to understand English were included in the study. Those with any cognitive impairments, known neurological conditions resulting in permanent disability were excluded. Research fellows were standardized to obtain administer outcome measures. These measures included Tilburg Frailty Indicator, Rapid Assessment of Physical Activity (RAPA), Walking Speed Test (WS), and Grip Strength Test (GS). Participants were categorized as being frail or non-frail using Fried's Phenotype Definition, where more than 2 of the following impairments indicated frailty: 1) WS test score of <1 meter/second, 2) GS score of <18 kg for women or <21 kg for men, 3) self-reported exhaustion, 4) unintended loss of >13 lbs body weight in past 6 months, and 5) Being sedentary as defined by score of <4 on RAPA. Logistic regression analyses examined the associations between demographic and health variables and frailty, where $P < 0.05$ indicated significant association.

**Results**

The sample consisted of 57 participants (47 women and 10 men) who were 78.3 ± 8 years of age. The participants had an average of 3.1 ± 1.7 comorbid conditions and were taking 5.7 ± 3.5 medicines. Having high comorbid burden, h/o hospitalization in past 1 year, and needing gait devices were significant predictors of frailty. Polypharmacy however was not associated with frailty level, which could be due to lack of adequate representation of less impaired subgroup within the study population.

**Conclusion**

It is important to consider these factors in providing a comprehensive care to our geriatric population.

**The Nutritional Status of Geriatric Patients Presenting to an Outpatient Clinic in Appalachia**

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**Background**

Malnutrition is a well-recognized challenge facing geriatric populations often due to both physical and social barriers. Nutritional deficiencies are associated with low mood, decreased cognition, and impaired functioning. This study sought to determine the nutritional status of geriatric patients presenting to an outpatient clinic in Appalachia, an area known for high rates of poverty, obesity, and malnutrition.

**Hypothesis**

We hypothesized that our elderly population will have high rates of malnutrition due to social, physical, and monetary barriers.

**Methods**

We enrolled a convenience sample of 55 people over age 65 who attended an outpatient geriatric clinic, all of whom took the mini nutritional assessment (MNA)(data presented previously). Twenty-eight (51%) patients also completed a seven-day food diary and a lifestyle survey.

**Results**

Of the 28 survey participants, 11% were male with average age 74. Twenty-five percent had others do their food shopping. Transportation (7%) and money for food (7%) were not significant barriers. Roughly half (46%) of patients reported use of dentures. However, only 4% reported restriction to a soft food diet. We found high rates of vitamin D (96%), potassium (79%), and vitamin C (43%) intake deficiency, and high rates of fat (82%) and sodium (68%) excess. Logistic regression analysis did not find correlation between social, physical or monetary variables and nutrient deficiency.

**Conclusion**

Most of our patients had nutrient deficiencies or excesses with some potential for clinical disease, suggesting a role for supplements and diet modification. Surprisingly, transportation, dentures and money for food were not found to be barriers in this sample which we realize may not be representative of Appalachia.

**Trauma and Resiliency in Adolescents and Young Adults with Opioid Use and Eating Disorders**

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**Background**

Eating disorders (ED) and substance use disorders (SUD) are chronic mental health illnesses with onset typically in adolescence or early adulthood. Previous evidence suggests overlap in pathogenesis between ED and SUD. Little is known regarding the trauma and resilience profiles of adolescents and young adults (AYA) receiving treatment for these conditions.

**Hypothesis**

We hypothesize that there will be a difference in trauma and resiliency measures in AYA with ED and opioid use disorder (OUD), as well as compared to otherwise healthy AYA receiving outpatient medical care.

**Methods**

An IRB-approved cross-sectional survey study was conducted of 141 AYA receiving outpatient treatment for ED (n=50), OUD (n=40), or general adolescent care (n=51). Trauma and resiliency were assessed using the Modified Adverse Childhood Experience survey and the Southern Kennebec Healthy Start Resilience Survey. Analysis of variance was used to compare mean ACE and resiliency scores of groups. Multivariable general linear modeling was conducted to explore the independent association between study groups and ACE/resiliency scores.

**Results**

Mean total ACE score for the total sample was 4.3±3.89 and mean total resiliency score was 11.6±2.44. Mean total trauma score was higher in OUD patients compared to ED and control patients (6.9±3.50 OUD, 2.9±3.25 ED, 3.8±3.81 control, p=<.001). Mean total resiliency score was lower in OUD patients as compared to ED and control patients (10.6±2.80 OUD, 12.0±2.13 ED, 12.0±2.25 control, p=<.01). Study group remained significantly associated with total trauma and resiliency scores (OUD vs. ED & control, p<0.01).

**Conclusion**

While previous studies suggest overlap in the pathogenic processes of OUD and ED, our findings indicate that trauma and resiliency do not explain pathogenic similarities. Efforts to include trauma-informed behavioral health treatment for patients with OUD may be beneficial.

**Over-The-Counter Analgesic Medication Habits of Geriatric Patients**

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**Background**

Elderly patients complain of pain more often than younger patients. Over-the-counter (OTC) analgesics are commonly utilized by patients to treat occasional pain due to their low cost and easy attainability. All OTC analgesics have potentially harmful side effects, but physicians often neglect to inquire directly about OTC analgesic use. This practice could be putting patients at an increased risk for preventable adverse health events.

**Hypothesis**

A substantial portion of community-dwelling patients older than 75 years old take OTC analgesics for occasional pain unbeknownst to their physician.

**Methods**

A random, representative population of community-dwelling geriatric patients completed an in-office questionnaire. Data obtained from the questionnaire included demographics, comorbid conditions, OTC analgesic use, and provider's knowledge of use.

**Results**

151 patients were surveyed of which only 25 denied use of any OTC analgesic. Of the 126 OTC analgesic users, 39.94% believed their healthcare provider were unaware and 42.97% took the OTC analgesic as the packaging recommended. Of the NSAID users (defined as Ibuprofen, Naprosyn and Aspirin), 20.00% of those on blood thinners, 24.14% with kidney disease and 15.56% with esophagus or stomach issues did not tell their physician nor took the medication as recommended.

**Conclusion**

Many elderly patients turn to OTC analgesics to treat their occasional pains. A significant number of which have not informed their healthcare provider or take the medications recklessly. This places patients, especially with certain comorbidities, at an increased risk for adverse health events.

**Evaluation of Gram-positive bacterial DNA recovery from a swab collection and transport system for Point-of-Care diagnostic tests.**

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**Background**

Recent genomic technologies have made possible the accurate and rapid assessment of specific pathogens directly at the site of patient care without the time delays associated with diagnostic laboratories. One of the major advantages of recent Point-of-Care (POC) instrumentation is their ease of use, making diagnostic tests accessible to personnel without specialized laboratory training. Gram-positive bacteria have been problematic for POC testing due to the difficulty of obtaining sufficient lysis of the cell wall.

**Hypothesis**

The goal of this study was to assess the ability to detect Methicillin-Resistant Staphylococcus aureus (MRSA) DNA with no pretest preparation following collection in a commonly available swab collection and DNA preservation solution.

**Methods**

A bacterial (Methicillin-Resistant Staphylococcus aureus) suspension was prepared from fresh culture and verified by 0.5 McFarland Standard to obtain 1.5 x $10^8$ CFU/mL suspensions. From the starting suspensions, three hundred-fold dilutions were made. Three replicate aliquots (100 µl) of each dilution were transferred into individual wells of a 96-well microtiter plate. Swabs were immersed in the corresponding wells and allowed to absorb for approximately 30-60 seconds and immediately placed in vials containing the DNA preservation solution.

**Results**

Following incubation for 1 – 7 days, the solutions were diluted 20 fold and used directly for both Quantitative real-time PCR (Qiagen Microbial DNA qPCR Assay) and Loop-Mediated Isothermal Amplification (LAMP) protocols (N=9 for each assay). Following incubation in the DNA preservation solution yields of DNA were sufficient for detection using either QPCR or LAMP assays. QPCR detected a significant linear positive relationship between the initial sample concentration and detected concentration. The LAMP assay provided presence/absence detection at all initial concentrations.

**Conclusion**

These results indicate that the DNA preservation solution allows for the rapid detection of a Gram-positive bacterial pathogen of clinical relevance with minimal extraction procedures for use in QPCR and LAMP based POC testing.

**A Case Based Systems-Based Practice Curriculum for Residents On Geriatrics**

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**Background**

The Accreditation Council for Graduate Medical Education (ACGME) has identified Systems-based Practice (SBP) as one of the six competencies that physicians must possess to deliver safe, high quality healthcare. SBP focuses on principles that encompass an awareness of health care systems and resources relevant to patient care. Efforts to incorporate SBP into resident education are still evolving.

**Hypothesis**

We evaluated the quality of a case based SBP curriculum for Internal Medicine residents on Geriatrics rotation.

**Methods**

All 16 Marshall University JCESOM Internal Medicine senior residents completed an SBP project on a month long geriatrics rotation. Each resident or pair of residents randomly picked 1 of 12 case scenarios to research, addressing an SBP principle. We administered a 10 question pre and post rotation assessment using a 5-point survey scale to determine increase in knowledge.

**Results**

The curriculum increased resident knowledge of SBP by 14% (p-value <0.001). Fifteen out of 16 residents indicated that SBP was valuable to their training. Pre rotation comfort level with answering questions about insurance coverage and nursing home or assisted living facilities was especially low with an average of 2.19 and 2.75 respectively on a 5-point scale. There was a highly significant increase (p-value <0.001) in knowledge of: SBP competency (27.5%), health insurance (27.5%), medical equipment (25%), and nursing home or assisted living facilities (25%). Qualitative comments suggested that the SBP curriculum was informative and helpful.

**Conclusion**

Our case-based curriculum increased resident knowledge of SBP. Residents had prior knowledge of the importance of the individual components of SBP, but not SBP as a whole. Residents knew very little about insurance, nursing home or assisted living facilities, reinforcing the need for education in these areas. Although we showed an increase in knowledge, curriculum enhancements are needed to demonstrate resident skill in applying this knowledge.

**Spirometry on Community Dwelling Oldest-Old: Determining a normal**

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**Background**

Community Dwelling Oldest Old (85 years and older) is the most rapidly growing population in West Virginia and the nation. While much is known about this age group living in assisted-care settings, not much has been explored for those living independently. Pulmonary pathology can affect this population but there are no normalized standards for spirometry past 65 years old.

**Hypothesis**

The measurable pulmonary status of community dwelling patients older than 65 years old by spirometry is not significantly different than patients under the age of 65 years old.

**Methods**

A random, representative population of community dwelling patients older than 65 years old were subjected to office-based spirometry evaluation. Demographic and spirometric data, including forced expiration volume in 1 second (FEV1) and forced vital capacity (FVC), was collected and analyzed to determine an average pulmonary function for each age group and compared to known standards.

**Results**

Twenty-six patients were in this study, ranging from 74 years of age to 94. For patients younger than 85 years old (n=12), the average FEV1 was 1.81 L (88.75% predicted), FVC was 2.51 L (88.83% of predicted), and FEV1/FVC was 0.71. For patients that were 85 years or older (n=14), the average FEV1 was 1.57 L (89.38% of predicted), FVC was 2.15 L (89.21% of predicted), and FEV1/FVC was 0.72.

**Conclusion**

FVC is a measurement of the total volume of air that a patient can blow out with effort and gives an idea for restrictive lung disease. FEV1 represents how much is expired in the first second and the ratio with FVC (FEV1/FVC) is a measurement of obstructive lung disease. We believe that the differences in FEV1 and FVC among the patient populations were consistent with normal aging and it appears that the standard model of prediction applies to these patient populations.

**The Rising Trend of Hypertension in Pediatric and Adolescent Patients**

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**Background**

The sequelae of prolonged uncontrolled hypertension are devastating and include the development of vascular disease, kidney disease, and ultimately increased mortality among other things. Though it is thought that today's children are affected by chronic conditions such as hypertension more frequently than in previous generations, this has not been thoroughly analyzed.

**Hypothesis**

To analyze the trend of hypertension in pediatric population

**Methods**

An NIS database was queried from 2005-2012. Exclusion criteria included patients greater than >18 years old and patients with secondary causes of hypertension, as this study was looking at essential hypertension only. Analysis was performed via chi square or t test with SAS 9.4, all values were significant when $p<0.05$.

**Results**

As per our analysis, the incidence of hypertension in the pediatric populations had a decline in 2006, but since then it has been on the rise while hypertension in the adolescent age group showed a consistent upward trend. Furthermore, our data also revealed that the incidence of hypertension was highest in the Caucasian race in comparison to the other races, with a p-value of $< 0.001$. Lastly, the likelihood of mortality in hospitalized pediatric populations with a diagnosis of hypertension was 2.03 while in adolescents it was 0.84 with a p value of $<0.001$.

**Conclusion**

It is thought that the increase in incidence of hypertension in these patient populations could potentially be due to the high sodium, high fat, and low fiber diets of most American citizens. It is well documented that obesity is an epidemic in the youth of America and we believe an analysis of the correlation between hypertension and obesity in these patient populations is warranted, as it is possible that dietary modification in these patients could result in a lower incidence of hypertension, and thus lower mortality and morbidity rates.

**Serum Calcium Homeostasis and Volume Dynamics in Alzheimer's Disease and Diabetes Mellitus-2**

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**Conclusion**

**Background**

The objective of this study is to investigate the associations between Alzheimer's disease (AD) and diabetes mellitus-2 (DM-2) by analyzing linear correlations among random glucose level, HbA1c, and serum electrolytes. We quantified the changes in serum electrolytes through the analysis of changes in serum calcium.

**Hypothesis**

Because the hemostasis of serum calcium is tightly regulated, we hypothesize that acute changes in serum calcium concentration can be explained solely by expansion and contraction of extracellular fluid volume.

**Methods**

Electronic data from three groups was analyzed. Group1 consisted of patients with AD only. Group2 consisted of patients with DM-2 only. Group3 consisted of patients with AD and DM-2. The relative change in ECF volume was estimated from serum calcium concentrations. Other serum electrolytes exhibit changes in concentrations that are attributed to changes in ECF volume and active loss or gain in amount. The relative change in concentration and amount for serum electrolytes were estimated using the concentration formula.

**Results**

The correlation analysis of the estimated change in ECF with respect to corrected serum calcium showed a consistent and strong correlation factor of 0.99 for all groups. Sodium and chloride have strong correlation factors, while potassium has to a weak correlation. As serum calcium concentration increases, serum electrolytes relative amounts decrease to compensate for hyperosmolarity caused by hypovolemia. The hypercalcemia associated with hypovolemia, caused by decreased ECF, induced secretion of sodium, potassium, and chloride to compensate for the apparent hyperosmolarity. In patients without AD corrected calcium seem to have wider range of change as compared to patients with AD. The proposed model to estimate ECF volume change through serum calcium has highlighted the relative amount changes in serum electrolytes. Serum calcium homeostasis appears to be altered in patients with AD, affecting the compensatory mechanisms of serum electrolytes that may be protective against AD.

**Improving Pediatric Resident Education and Experience in Outpatient Continuity Clinic**

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**Background**

The ACGME self-study requirement allows residency programs to identify strengths and weaknesses via a longitudinal evaluation creating improvement aims. One improvement aim designed by the pediatric residency program was to broaden resident education in outpatient clinical practice by increasing exposure to various clinic attendings as each physician has their own way of practicing medicine. This was achieved by implementing a yearly rotating continuity clinic schedule for the residents in 2017. In addition, more private practice attendings during weeks of nursery service rotated through the resident clinic to broaden educational exposure. A pediatric psychiatrist was also hired to precept the resident clinic to aid in mental and behavioral health education. Satisfaction was assessed after one year via a survey which showed 47.06% residents felt their continuity clinic experience had "definitely" improved and 52.94% residents felt their continuity clinic experience had "somewhat" improved. In addition, 64.71% of PGY3 residents stated this would continue to provide benefit to resident education.

**Hypothesis**

Reevaluate resident satisfaction of the ACGME self-study focus aim to improve resident education in continuity clinic by increasing exposure to various attendings.

**Methods**

An anonymous online survey was completed amongst the pediatric residents in December 2019 to assess resident satisfaction of yearly rotating continuity clinic schedule.

**Results**

Seventy-three percent of residents completed the survey. Sixty-three percent were "definitely" satisfied, 26% were "somewhat" satisfied and 11% were "not at all" satisfied with the rotating clinic schedule. New concerns arose through reevaluation of the ACGME self-study aim including continuity percentage, time to room a patient, and scheduling issues.

**Conclusion**

In conclusion, pediatric residents continue to be satisfied with rotating continuity clinic schedule and exposure to new attendings with different teaching styles. Moving forward, there is opportunity to broaden the self-study improvement aim as new concerns arose by residents regarding continuity clinic. Resident satisfaction will be assessed yearly through focus groups and surveys.

**Influence of Body Mass Index on the duration of Ventilator use and its association with Acute Respiratory Distress Syndrome**

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Internal Medicine

**Background**

In the United States, 39.8% of adults greater than 20 years of age are obese. The association of obesity with chronic disease is studied but it's impact on acute conditions is not well understood. Our aim was to study the impact of body mass index (BMI) on the duration of ventilator use and development of acute respiratory distress syndrome (ARDS) among patients admitted in ICU with sepsis.

**Hypothesis**

Positive relationship between BMI and the risk of developing ARDS

**Methods**

A retrospective cohort study was conducted on patients from MIMIC 3 database. We included only patients who met the criteria of sepsis and were admitted to ICU. Height and weight of the patient measured at the time of admission were used to estimate BMI and classified in five classes based on WHO criteria. We Evaluated length of ventilator use among obese septic patients. Diagnosis and severity of ARDS was determined from PO2 and FiO2 ratio. Kruskal-Wallis test with Dunn's post hoc analysis was used for continuous non-normally distributed data. Poisson regression analysis was also used where appropriate. The regression model was adjusted for age, sex and sofa scores.

**Results**

Total of 4224 patients were included in the study with 57% males and 43% female patients. Among the septic ICU patients, 162 (4%) were underweight, 1272 (30%) were normal BMI, 1295 (31%) were overweight, 1116 (26%) were obese and 379 (9%) were severely obese. The obese and severely obese patients had significantly longer duration of ventilator use as compared to normal BMI patients (OR= 1.2 (1.03-1.40),p=0.02 and OR=1.5 (1.24-1.87),p=<0.001).

**Conclusion**

Obese and severely obese patients admitted in ICU with sepsis had increased duration of ventilator use. Obese and severely obese patients were at increased risk of developing mild and moderate level ARDS as compared to patients with normal BMI."

**Reducing Unnecessary Emergency Department Visits in the Holzer Health Systems**

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**Background**

According to a 2013 study by Truven Health Analytics 71 percent of Emergency department visits could have been treated safely in an urgent care clinic or primary care setting. The average cost of an Er visit was 1233 dollars which is more than 10 times the cost of a primary care visit. Reducing unnecessary visits to the emergency department has financial costs not just to the individuals seeking care but also to the institution associated with the visit. In the fiscal year 2017 and 2018 the Holzer hospital system had the dubious distinction of having the highest ER visit per capita in the State of Ohio.

**Hypothesis**

By hot-spotting or focusing on patients who frequent the ED the most, the number of unnecessary ED visits can be reduced within our health care system.

**Methods**

In order to remedy this situation the Holzer health system decided on a strategy of hotspotting or focusing on patients who frequent the ER the most in order to reduce the overall per capita ER visit. We utilized care managers to identify and call those patients who had an increased frequency of ED visits. Also we shortened the time of follow up with these patients and their PCP as outpatients.

**Results**

The preliminary statistics have shown a moderate reduction in overall per capita ER visit over the 2018 to 2019 fiscal year. This translates to a financial savings that can be used for other health care resources throughout the hospital system. (Numbers are pending.)

**Conclusion**

By increasing contact between patients who have a high frequency of ED visits with both their Care Managers and PCPs unnecessary visits can be reduced. This can result in a savings to both the patient and our institution.

**A Mindfulness/Wellness Intervention to Decrease Burnout and Increase Empathy in Pediatric Residents**

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**Background**

Physician burnout has reached epidemic levels in the United States and has been linked to lower quality of care and higher medical error rates. Up to 60% of training and practicing physicians report symptoms of burnout, defined as emotional exhaustion, depersonalization, and low sense of accomplishment. Protected wellness time is becoming more widely accepted as an important element of resident education.

**Hypothesis**

Improvement of residents' feelings of empathy and burnout with implementation of wellness time into the weekly lecture block.

**Methods**

For the first cycle, pediatric residents were given two validated questionnaires regarding feelings of burnout and empathy prior to the intervention, which involved a 15-20 minute weekly session during protected lecture time to discuss positive patient interactions or words of praise for fellow residents. After an eight-week period, the same questionnaires were given as post-test for comparison (post-test 1). The second intervention included weekly 20 minute sessions of guided meditation performed by an experienced attending. Residents were also encouraged to introduce the habit of daily meditation. A third set of questionnaires were given to measure the impact of the second intervention (post-test 2). Analysis used paired t-tests and Spearman's rho.

**Results**

Previous results had shown significant improvement in empathy pre-test and post-test 1 ($p<0.03$), as well as significant negative correlations between empathy and burnout, specifically emotional exhaustion ($p<0.05$; $r=-0.53$). Regarding the second intervention, we observed negative correlation between empathy and burn out, specifically personal accomplishment ($p<0.03$, $r=-0.53$).

**Conclusion**

Significant improvement in empathy was observed comparing pre-test and post-test following the first intervention. Consistent significant negative correlations between empathy and burnout were observed with pre-test and both post-tests following the interventions. Further research is needed to determine more ways to decrease burn out and improve sense of personal accomplishment and physician wellness.

**Assessment of Value for Patients Who Underwent Appendectomies At An Academic Medical Center**

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**Background**

Near 300,000/year appendectomies are performed in USA and policies are linking reimbursement to quality in order to optimize cost. Healthcare systems and stakeholders seek to determine optimal value to establish a fee-for-value payment model.

**Hypothesis**

We aim to determine factors that drive value (quality/cost) in patients undergoing an appendectomy, to develop a predictive model for outcomes and to establish a dynamic platform for a 'learning health system' that monitors patient's performance on clinical trials.

**Methods**

Clinical variables (v=75) from patients (>18yo) who underwent appendectomies were retrieved from a Health System warehouse retrospectively (Aug-2010 to July-2016, n=475), and prospectively (Aug-2016 to July-2018, n=147) under IRB approved protocols. Quality was assessed by grading surgical complications using a Classification System where Uncomplicated=1 value unit, Grade 1= 0.95, Grade 2= 0.75, Grade 3= 0.60, Grade 4= 0.50. Grade 5 was not used (death=0). Cost was defined as hospital charges accrued for admission/re-admission up to 30days post-discharge and corrected for inflation at a 5% APR. Bivariate and multivariate analyses were performed using Stata software. Patients with no submitted billing records were excluded from the cost analyses (n=27).

**Results**

622 patients, aged 36.6±15.7 underwent appendectomy. Multiple regression analysis showed perforated (18%) vs non-perforated status and ASA-class, were statistically significant for affecting the value unit in appendectomies by predicting post-operative complications ($p<0.01$). Preoperative comorbidities include DM (5.4%), abdominal surgery (31%), and HTN (20%). 321 patients have no past medical history (52%). ASA-class distribution was as follows: class I= 24%, class II=58%, class III=17%, and class IV=1%. Mean cost for all cases was $34,802; $29,896 (non-perforated) vs $56,238 (perforated, $p<0.05$).

**Conclusion**

Perforated status and ASA-class have a significant impact on decreasing calculated value for adults after appendectomy for acute appendicitis.

**Rural Patient Attitudes Towards Resident Participation in Orthopedic Surgery**

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**Background**

Patient attitudes towards resident and fellow participation in orthopedic surgery have been previously studied in urban populations where a desire to be informed of trainee involvement is near universal. The purpose of this study was to investigate the attitudes of patients toward trainee participation in a rural population.

**Hypothesis**

Rural patients will have the same desire to be informed about trainee involvement in their orthoapedic surgical care when compared to urban patients.

**Methods**

Two-Hundred and Fifteen consecutive patients being seen in trauma and arthroplasty clinics by a multi-surgeon practice at a single, rural 303-bed institution in Huntington, West Virginia were surveyed with a questionnaire (response rate 62.1%). The questionnaire was adapted from a previous study by Nahhas et. al. with permission.

**Results**

94% of patients felt that residents and fellows should perform surgery as part of their education. 21.4% would not want a second year participating in their surgery, and only 9.3% of would not want a fifth year participating. Nearly all patients (99.1%) desired disclosure of resident involvement.

**Conclusion**

While rural patients desire the same disclosure as their urban counterparts, they are far more amenable to trainee participation in their surgeries. Therefore, discussions about resident surgical involvement in rural areas should be initiated with every patient and approached by surgeons with minimal apprehension.

**Factors Affecting Value for Outpatients Vs Inpatients Who Underwent Cholecystectomies at A Tertiary Medical Center.**

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**Background**

Cholecystectomy is the most common surgical procedure US. Healthcare Schemes are combined to address value through the implementation of pay for performance policies.

**Hypothesis**

We aim to define factors affecting value (quality/cost) in patients undergoing cholecystectomy and to develop a predictive model for outcomes.

**Methods**

Patients (>18yo) treated as inpatients or outpatients for symptomatic cholecystitis were analyzed retrospectively (Aug-2010 to July-2016, n=1742), and prospectively (Aug-2016 to Dec-2018, n=910) under IRB-approved protocols. Quality was assessed by grading surgical complications using a Classification System where Uncomplicated=1 value unit, Grade 1=0.95, Grade 2=0.75, Grade 3=0.60, Grade 4=0.50. Grade 5 was not used (death=1). Cost was defined as hospital charges accrued for admission/re-admission up to 30days post-discharge and corrected for inflation at a 5% APR. Statistical analyses were carried out as inpatient (IP) or outpatient (OP) status. Bivariate and multivariate analyses were performed using Stata software.

**Results**

Patients (n=2146) aged 43.9±16.6 underwent laparoscopic (n=2053) or open (n=93) cholecystectomy. Multivariate analysis for IP (n=716) showed open procedure (10%), ASA class (class I= 6%, class II= 52%, class III= 37%, and class IV= 4%) and COPD (5%) as statistically significant variables affecting the value of the procedure ($p<0.01$). For OP (n=1430), Multiple regression analysis showed open procedure (2%), ASA class (class I= 8%, class II= 54%, class III= 35%, and class IV= 2%), active smoking (27%) and previous history of MI (4%) had statistically significant impact on value ($p<0.05$). The unit value for uncomplicated outpatient laparoscopic cholecystectomy with no readmission was $17,239 (value unit=1).

**Conclusion**

Open cholecystectomy, ASA class, and COPD have a significant effect on decreasing calculated value for adult inpatients after cholecystectomy. While, open procedure, ASA class, active smoking, and previous history of MI show a significant impact on decreasing value for adult outpatients after cholecystectomy.

**Biomarker Identification for Polycystic Ovary Syndrome Diagnosis**

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**Background**

Polycystic ovary syndrome (PCOS) is one of the most common endocrine disorders in reproductive aged women and is characterized by hyperandrogenism, ovulatory dysfunction, and polycystic ovaries. Women with PCOS are at risk for developing other conditions associated with metabolic syndrome including type 2 diabetes and obesity. Therefore, it is important to recognize this syndrome early in young women, as early intervention may prevent long-term sequelae. Currently, there is no universally accepted criteria for diagnosis which often leads to slower diagnosis and treatment. Indeed, a more specific biomarker is needed for proper diagnosis. Interestingly, bile acids and hepatokines (FGF-19/FGF-21) have been shown to be associated with insulin sensitivity and BMI and could be connected to PCOS.

**Hypothesis**

We hypothesized that bile acids and hepatokines FGF-19 and FGF-21, in the absence of obesity and presence of PCOS, will display a differential pattern of expression.

**Methods**

This study recruited 27 women of reproductive age, both obese and normal-weighted, with and without PCOS, to delineate potential biomarkers, specifically monitoring bile acid accumulation and species in addition to FGF19 and FGF21, hepatokines associated with metabolic health. FGF-19 and FGF-21 were analyzed via ELISA while bile acids were analyzed via mass spectrometry using plasma from fasted subjects.

**Results**

FGF-21 is positively associated with PCOS while FGF-19 showed no correlation. Bile acids including TCA, TCDCA, GCDCA, and GLCA displayed significant changes between groups, indicating their connection with obesity and PCOS.

**Conclusion**

While this was a pilot study, several bile acids were altered in PCOS in the lean and obese background. This result shows there are more facets to PCOS including the variation in bile acid pool and hepatokine concentration. Future studies include understanding the contribution of these bile acids to the PCOS phenotype as a basic lab project.

**A Novel Technique to Detect Femoral Shaft Perforation During Direct Anterior Total Hip Arthroplasty.**

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Despite its popularity, the direct anterior approach for hip arthroplasty is not without complications. Intraoperative femoral shaft perforation utilizing this approach ranges from 0.8-7%. A missed perforation can invariably lead to fracture and need for further surgery if not detected intra-operatively. We describe a reproducible and cost-effective technique using a plastic Yankauer suction handle to help identify proximal femoral perforations during direct anterior total hip arthroplasty. Careful attention to the visual, tactile, and auditory feedback provided by the suction handle can help ensure the cortical continuity of the proximal femur. Familiarity with relevant surgical anatomy, improving surgical technique, and scrutinizing implant positioning helps to minimize the risk of complications during the direct anterior approach.

**Written Action Plans in West Virginia: Improving the Process and Communication between Schools, Parents, and Physicians**

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**Background**

Asthma and food allergies constitute a significant public health burden in school-aged children. Current recommendations encourage every child with asthma or food allergies to have a written action plan for emergent treatment. The state of West Virginia (WV) currently requires each county's board of education to have a policy in place that allows for medication administration at schools, but there is no standardized form or process for these plans.

**Hypothesis**

After reviewing different action plan processes currently in place in both urban and rural settings in WV counties we will be able to determine which process is more effective and how to best improve upon the process in a larger, public health context.

**Methods**

A questionnaire was distributed to 359 school employees in 51 schools in both rural and urban counties in WV to assess school employees' knowledge of action plans and employee comfort with execution in emergent circumstances.

**Results**

The majority (84.3%) of survey responders stated that they were aware emergency action plans were in place, and 80.5% were familiarized with those action plans. They felt as that those action plans were easily accessible in the case of emergency. Overall, 99.4% of survey responders answered affirmatively that action plans were useful to have in place. However, a significant subset of rural responders did not feel well-trained to administer emergency medications (p-value <0.001).

**Conclusion**

WV school employees find action plans to be useful in helping to identify and manage children with asthma and/or food allergies. Although many responders in urban settings report being comfortable with administering emergency medications, there is a subset of rural respondents who report discomfort with medication administration. Future studies may allow for possible interventions within the school system, whereby emergency medication education and training can be implemented.

**Transitioning from Intern to Senior**

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**Background**

Transitioning to the role of a senior can be difficult due to limited understanding of associated expectations and responsibilities.

**Hypothesis**

The goal of this project was to determine the need for intern education prior to becoming seniors, and to implement a relevant intervention.

**Methods**

A senior resident survey in 2017 revealed that all felt unprepared going into their second year, and felt that a meeting with a senior to discuss expectations would have been beneficial before starting a senior role.

**Results**

A meeting with interns was held in June 2017 where a senior resident discussed responsibilities and attending expectations for post-intern years. All interns felt more prepared after the session. This intervention was repeated the following year; however, the session was at a time that not all interns could attend. In their survey, residents indicated the session was helpful, but did not prepare them for the role of a resident working in a new area of the hospital. In 2019 the meeting was organized to discuss the role of a senior in different clinical areas. A survey of these residents midway through their second year indicated that most felt somewhat prepared to step into the role of a senior, but felt unprepared to be the solo resident in the PICU.

**Conclusion**

Our results suggest interns benefit from our educational session, but would like better preparation for the PICU. Our future plans include arranging a protected time slot for the session, during which we will discuss information regarding the senior role in various clinical areas, focusing on the PICU. We hope to arrange a 5-day block in the last 3 months of the academic year for each intern to rotate in, and familiarize themselves with the PICU. Finally, we plan to arrange a PICU attending-led lecture on ventilators and managing emergency scenarios without an attending.

**A Quality Improvement Project to Improve Resident Preparation for Rural Practice**

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**Background**

In a series of focus groups the process of ensuring that residency graduates felt prepared for rural health practice was identified as a program aim.

**Hypothesis**

Outcome AIM: 100% of pediatric resident graduates will express they feel prepared for rural practice.
Process AIMs:
Residents will attend 3 deliveries during their NBN rotation
Will participate in 5 neonatal resuscitation mock codes yearly
85% of high risk deliveries will be attended
100% of residents spend 4 days on rural van

**Methods**

We developed outcome and process AIM statements and a Key Driver diagram. Seven graduates practicing in rural areas were questioned. Four said more presence at deliveries and mock neonatal resuscitation scenarios would be helpful. Four former residents were invited to present grand rounds. They further emphasized need for increased confidence with neonatal resuscitation.

Seven PDSA cycles carried out to achieve AIM of attendance at deliveries during NBN rotation. Five mock code labs held. Eight PDSA cycles completed regarding AIM of attendance at NICU deliveries. Schedules adjusted to ensure rural health van experience.

**Results**

Outcome measures
Graduates who participated in the interventions were questioned. All expressed they felt well prepared and simulation labs were helpful. None identified attending deliveries as an area needing improvement.

Process measures
Resident attendance at low risk deliveries increased from zero to one per month.
Five high fidelity infant simulation labs were held.
Resident attendance at high risk deliveries improved from 29% to 88%.
All residents spent 4 days on rural health van.

**Conclusion**

Identification of key drivers with implementation of a series of PDSA cycles met the outcome AIM. The process measures of increased attendance at high risk deliveries, a series of mock codes, and clinical experiences on rural van were met. While attendance at low risk deliveries was increased the AIM was not met.

**A Family of Sporadic Creutzfeldt-Jakob Disease (sCJD).**

Dipali Nemade, Jason Adams, Samrina Hanif, Justin Nolte, Dharampreet Singh.
Neurology, Joan C Edwards School Of Medicine, Marshall University

**Background**

sCJD is a rare prion disease with prevalence of 1 per 1,000,000 population per year. We present a case of sCJD whose family members & one friend died from sCJD.

**Case Presentation**

A 60-year-old right-handed male was evaluated in clinic for 6-8 weeks of behavioral issues. He lost a close friend & brother in past 6 months & father few years ago. All of them had rapidly progressive bizarre behavioral & memory issues. His friend had biopsy proven CJD. Interestingly, all of them were avid deer hunters. He had very prominent avolition with abulia with MoCA :16/30. Initial MRI brain was unremarkable. Patient was admitted a week later for worsening behavioral issues, staring episodes without loss of consciousness & left arm dystonic posturing. On exam, patient was not oriented, could not follow commands & speech was perseverative & easily distracted. He had hypertonia in left arm>leg. Labs- Serum T. Pallidum Ab: +ve but RPR <1:1. Video EEG showed GPDs with numerous bursts of rhythmic sharp waves and PLD in F4, F8 region. Solumedrol was added for possible auto-immune encephalitis but had to be discontinued due to agitation. Quetiapine 50mg QHS & IVIG x 5 days was then added. In the 1st week, worsening electrographic seizures led to intubation & escalation in antiepileptic therapy & higher Midazolam doses. He later developed spontaneous & startle myoclonus. EEG showed 0.5-1 Hz biphasics & triphasics. MRI brain 2 weeks later showed cortical ribboning in right hemisphere & hockey stick sign. PRNP gene, Mayo Paraneoplastic & autoimmune epilepsy panel were negative. After discussion with wife 2 weeks later, patient was made comfort care & died on the same day. Lab report later showed positive RT-QuIC & Protein 14-3-3, CSF tau protein > 4000pg/ml. Histopathology confirmed the diagnosis of sCJD.

**Discussion**

sCJD is a D/D even in the presence of family history, especially when there is a shared exposure. A 60-year-old right-handed male was evaluated in clinic for 6-8 weeks of behavioral issues. He lost a close friend & brother in past 6 months & father few years ago. All of them had rapidly progressive bizarre behavioral & memory issues. His friend had biopsy proven CJD. Interestingly, all of them were avid deer hunters. He had very prominent avolition with abulia with MoCA :16/30. Initial MRI brain was unremarkable. Patient was admitted a week later for worsening behavioral issues, staring episodes without loss of consciousness & left arm dystonic posturing. On exam, patient was not oriented, could not follow commands & speech was perseverative & easily distracted. He had hypertonia in left arm>leg. vEEG showed GPDs with numerous bursts of rhythmic sharp waves and PLD in F4, F8 region. Solumedrol was added for possible auto-immune encephalitis but had to be discontinued due to agitation. Quetiapine 50mg QHS & IVIG x 5 days was then added. In the 1st week, worsening electrographic seizures led to intubation & escalation in AED & higher Midazolam doses. He later developed spontaneous startle myoclonus. EEG showed 0.5-1 Hz biphasics & triphasics. MRI brain 2 weeks later showed cortical ribboning in right hemisphere & hockey stick sign. PRNP gene, Mayo Paraneoplastic & autoimmune epilepsy panel were negative. After discussion with wife, patient was made comfort care & died on the same day 2 weeks later. Lab later showed positive RT-QuIC & Protein 14-3-3, CSF tau protein > 4000pg/ml. Histopathology confirmed the diagnosis of sCJD.sCJD is a differential diagnosis even with suspicious family history, especially when there is a shared exposure.

**Isolated Cutaneous Relapse from Follicular Lymphoma- A Rare Entity**

Hassaan Raza Jafri MD, Ahmad Abu-Hashyeh MD, Isna Batool Khan MD, Vincent Graffeo MD, Jennifer Hawkins DO, Mohamed Alsharedi MD

Department of Hematology/Oncology, Marshall University Joan. C Edwards School of Medicine

**Background**

We present a case of previously treated follicular lymphoma who presented with skin lesion. Further work-up led to the diagnosis of relapsed follicular lymphoma with no progression of disease elsewhere.

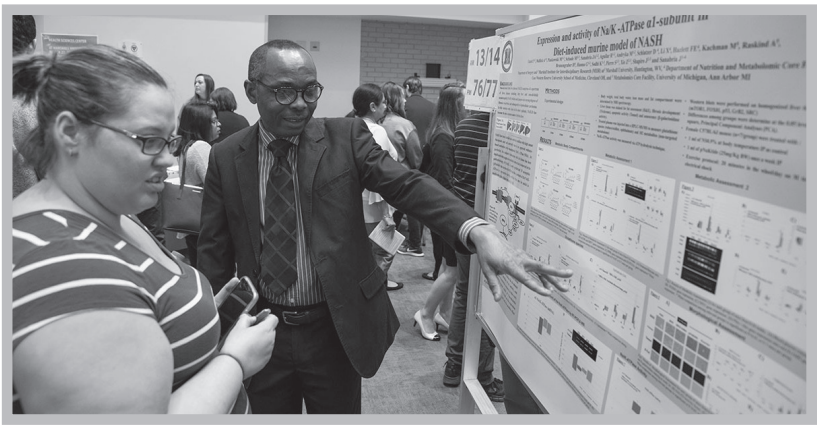
**Case Presentation**

64-year-old male reported right inguinal area swelling for about 15 years. A CT scan of the abdomen and pelvis was obtained in April 2015, which demonstrated pelvic and abdominal lymphadenopathy. Excisional biopsy revealed Follicular Lymphoma WHO low grade (Grade I-II). Patient was placed on observation.
One year later the patient had obstructive uropathy secondary to lymphadenopathy. Patient was given 4 weekly doses of Rituximab with subsequent CT-scans showing favorable response. Two years later, he had excision of lesion on the right side of the face, which showed Follicular Lymphoma with no evidence of large cell transformation. PET/CT revealed improvement of the lymph node involvement in the patient's abdomen and pelvis with abnormal uptake in skin. Given the new relapse involving extra nodal sites, the patient was offered chemo-immunotherapy. He refused chemotherapy and was treated again with 4 cycles of rituximab in January 2019. PET/CT 8 weeks after therapy suggested an adequate response to therapy. Three months later, he developed swelling on the left side of his face. PET CT scan demonstrated skin thickening in facial area, neck, scalp and upper thorax with stable disease elsewhere. Patient was not deemed an appropriate candidate for radiation therapy. He is intended to start chemo-immunotherapy.

**Discussion**

Normally, NHL relapses where it manifested before, most commonly lymph nodes. Skin relapse with NHL especially follicular lymphoma is very rare. We aim to alert physicians/ hematologists about a rare presentation of relapse from follicular lymphoma. Cutaneous lesions in patient with history of lymphoma should be thoroughly investigated as they may be only site of disease relapse. Sometimes these lesions indicate transformation to large B cell Lymphoma.


Emergency Department
SMARTCenter
Specialists in Movement and Rehabilitation Therapies
Currently Enrolling Clinical Trials


Expression and activity of Na/K -ATPase α1-subunit in
Diet-induced murine model of NASH

**POSTER SESSION 11 - 2:30PM - 3:15PM**

# 32ND ANNUAL RESEARCH DAY POSTER SESSION

**The Central Regulation of Lrp1b in the Development of Obesity**

Katherine Wang, Jacaline Parkman, Lawrence Grover, Jung Han Kim
Department of Biology, College of Science; Department of Biomedical Sciences, Joan C. Edwards School of Medicine, Marshall University, Huntington, WV.

**Background**

Obesity is a serious health problem associated with increased morbidity and mortality. The pathogenesis of obesity is complex, involving multiple interactions among behavioral, environmental, and genetic factors. Here, we consider the role of the low density lipoprotein-related protein 1B gene (Lrp1b) in driving gene and diet interactions promoting obesity. Lrp1b is highly expressed in the human and rodent brain, yet little is known about its central nervous system functions. A potential link between LRP1B and obesity has been suggested in humans.

**Hypothesis**

The present study aims to assess 1) whether the expression levels of Lrp1b in specific brain regions are regulated by diet-induced obesity in mice, and 2) whether this diet effect is enhanced in a polygenic mouse model of obesity and type 2 diabetes, TALLYHO/JngJ (TH).

**Methods**

At 4 weeks of age, male TH and C57BL/6J (B6) mice were weaned onto chow or high fat diets (HFD) and maintained. At 20 weeks of age, mice were euthanized and the hypothalamus, neocortex, hippocampus, and cerebellum were dissected. Gene and protein expression levels of Lrp1b were measured using qPCR and western blot analysis, respectively. Data were analyzed using GraphPad Prism software in a one-way ANOVA.

**Results**

In both TH and B6 mice, the Lrp1b gene was expressed most highly in the neocortex. Neocortical Lrp1b expression was increased twofold by HFD, with no strain differences.

**Conclusion**

In summary, the Lrp1b gene is highly expressed in the brain's neocortex and up-regulated by obesity-inducing HFD in mice. The data gathered from this study will contribute to further research investigating the interaction of gene and diet in the development of obesity.

**Impaired Astrocyte Maturation and Synaptic Coupling Following In-vitro Ethanol Exposure**

Bethany Koontz, Jesse Stevens, Mary-Louise Risher
Department of Biomedical Sciences, Joan C. Edwards School of Medicine, Marshall University, WV, Hershel Woody Williams VA Medical Center, Huntington WV, Department of Psychiatry and Behavioral Sciences, Duke University Medical Center, Durham, NC.

**Background**

Binge drinking is highly prevalent from adolescence through the mid-20's. Early onset binge drinking is correlated with increased likelihood of developing alcohol use disorder and changes neuronal structure and function. However, the impact on non-neuronal glial cells has yet to be determined. Astrocytes are glial cells that couple with synapses providing localized support necessary to regulate neurotransmitter and ion homeostasis and maintain synaptic stability. When astrocyte-synaptic decoupling occurs, lack of proximity can compromise these functions and disrupt astrocyte-targeted synaptic regulation. Here we investigate the consequences of intermittent ethanol (EtOH) exposure on astrocyte development and astrocyte-synaptic coupling in an in-vitro model of binge drinking.

**Hypothesis**

We hypothesize that intermittent EtOH exposure will impair astrocyte maturation and promote astrocyte-synaptic decoupling.

**Methods**

Hippocampal neurons and astrocytes were purified from post-natal day 1 Sprague Dawley rat pups. Astrocytes were nucleofected on DIV-0 with a bacterial plasmid MKate2.5 to label astrocytes and co-cultured with neurons. Co-cultures were dosed to a final concentration of 170-220 mg/dL of EtOH or control media every 48 hours. Beginning on DIV-5, control and EtOH treated co-cultures were isolated and stained with a PSD95 antibody to identify synapses. Fluorescence microscopy was used to quantify astrocyte area and colocalization of PSD95-astrocytes using ImageJ.

**Results**

EtOH exposure disrupts the maturation of astrocytes as indicated by a decrease in astrocyte area and reduces astrocyte-synaptic coupling when compared to controls.

**Conclusion**

Consistent with our in vivo experiments, intermittent EtOH exposure impairs astrocyte maturation and promotes astrocyte-synaptic decoupling in vitro. Decoupling of astrocytes from the synapses may drive dysregulation of astrocyte-dependent synaptic homeostasis. Future research will focus on the specific mechanisms that drive decoupling and inhibit astrocyte maturation. This research provides novel insight into the possible long-term neural consequences of binge drinking behavior, including deficits in cognition and memory.

**Behavioral Effects of Exercise on a Novel "stress-less" Obese Mouse Model**

Ishita Sharma, Anis Messaabi*, Matthew Cincotta, Alexander Cheslock, Abbagael Seidler, Debbie Amos, Jared Mattingly, Lawrence Grover, Nalini Santanam

Department of Biomedical Sciences, Joan C Edwards School of Medicine, Marshall University, *Sorbonne University, Paris, France

**Background**

There has been a plethora of studies that highlight the benefits of exercise on cardiovascular and psychological health. It has been demonstrated that the inclusion of different forms of aerobic and non-aerobic physical exercise alleviates depression and anxiety and increases muscle strength and balance in men and women of different age and physiological groups. Exercise is also known to be very effective in treating obesity, which is a widespread epidemic. However, obese vs. normal-weight individuals might have different responses to the same level of exercise intensity. In this study, we investigated the impact of sedentary vs. exercise lifestyle on muscle strength and anxiety in normal vs. genetically modified obese mice.

**Hypothesis**

It was hypothesized that modulation of endogenous oxidant stress (over-expression of catalase) along with increased physical activity could produce positive results in the behavior of the mice.

**Methods**

Behavior changes were determined in three types of mouse models that were either sedentary or exercised for 8 weeks: (i) the "control" C57bl6 mice (C57) that had no genetic modifications; (ii) catalase transgenic mice that had increased antioxidant catalase expression in all their tissues; and (iii) the newly generated genetically obese "Bob-Cat" mice (Cat-Ob/+) that lacked leptin but had high catalase.

**Results**

The data gathered suggest that exercise reduced anxiety in obese Cat-Ob/+ mice while it increased anxiety in other two genotypes. Exercise also improved muscle strength and increased balance and muscle coordination in all mice genotypes. Finally, the body weight and composition measurements indicated that the control C57 mice showed an increase in body weight and lean muscle mass, while Cat-Ob/+ mice showed a decline in body weight and an increase in fat mass in response to exercise.

**Conclusion**

These findings indicated that excess Catalase along with exercise can modulate anxiety behavior.

**Evaluating Sex Differences in Astrocyte-Regulated Synapse Formation**

Ean Bills, Anna Mazur, Chris Risher
Biomedical Sciences, Joan C. Edwards School of Medicine, Marshall University

**Background**

The regulated development of synapses in the brain is vital to proper functioning of the central nervous system (CNS). Astrocytes are glial cells known to secrete factors, such as thrombospondin (TSP), that promote synaptogenesis. The synaptogenic mechanism of TSP depends on brain-derived neurotrophic factor (BDNF), which is strongly regulated by the sex hormone estrogen. Astrocytes possess estrogen receptors that rapidly respond to fluctuating quantities of estrogen by triggering changes in the rates of synthesis and release of glial signaling factors, suggesting a potential mechanism for control of synaptogenic pathways.

**Hypothesis**

We hypothesize that estrogen produced from female-derived neurons inhibits the activity of astrocyte-secreted TSP during a critical developmental period, thereby regulating astrocyte-mediated development of synapses in a sex-dependent manner.

**Methods**

Cortical neurons were isolated and cultured separately from both male and female rat pups at postnatal day 1. Neurons received treatments of astrocyte-conditioned media (ACM), TSP2, or letrozole, which prevents production of estrogen, at days 7 and 10 in vitro. Three days after treatment, neurons were fixed and stained for presynaptic protein Bassoon and postsynaptic Homer1 using immunocytochemistry (ICC). Neurons were imaged using a Leica upright fluorescent microscope and analyzed for co-localized synaptic puncta using a custom ImageJ plugin.

**Results**

Neurons from male-only litters had a significantly higher prevalence of TSP2-induced synaptogenesis, while female neurons showed no increase in synapses after exposure to TSP2. When combined with letrozole, TSP2 treatment was able to increase excitatory synapse number in female-derived cultures. No differences in synapse number were seen with ACM treatment of male or female neurons, indicating that this level of regulation is specific to TSP and not other astrocyte-secreted factors.

**Conclusion**

TSP-induced synaptogenesis is inhibited in females but not males by estrogen-dependent signaling, contributing to sex differences in astrocyte-mediated synaptogenesis.

**Examination of Resveratrol Protection of Mitophagy and Mitochondrial Changes Mediated by Cisplatin in Human Proximal Tubular Cells**

Mason E. Dial*, Kathleen Brown*, Chere Davis#, Rachel McGuffey* and Monica Valentovic*
*Biomedical Sciences Toxicology Research Cluster Marshall University School of Medicine; #Glenville State College, Glenville, WV

**Background**

Cisplatin is a cancer chemotherapy drug that is associated with nephrotoxicity. Resveratrol (RES) is an antioxidant found in chocolate, grapes and peanuts. RES has been reported to possess anti-cancer activity.

**Hypothesis**

This study tested the hypothesis that RES would protect human noncancerous proximal tubular epithelial (HK-2) cells from cisplatin cytotoxicity by preserving mitochondrial function.

**Methods**

HK-2 cells were plated and incubated for 48h. Cells were pretreated with 0 (DMSO), 5, 7.5 uM for 1h. Cells were then co-incubated for 24h with 0 (water), 15 or 30 uM cisplatin. Upon completion of the 24h period, cell viability was assessed using MTT assay. Mitochondrial function was measured with a MitoStress test using a Seahorse analyzer. All experiments were conducted as three independent experiments. Differences between groups were evaluated using One Way and Two-way ANOVA followed by Tukey post hoc test at a 95% confidence interval.

**Results**

RES cell viability showed similar values when compared to vehicle control indicating RES was not cytotoxic. Cisplatin was cytotoxic to HK-2 cells at 15 and 30 uM within 24h. RES attenuated cisplatin cytotoxicity. Western blots compared mitochondrial protein complex expression between cisplatin and RES treated groups. Cisplatin induction of apoptosis was measured using Caspase 3 cleavage. Cisplatin mediated induction of mitophagy evaluated protein expression for LC3B I, LC3B II and the ratio of LC3BI/LC3BII.

**Conclusion**

Cisplatin was cytotoxic within 24h to HK-2 Cells. RES attenuated cisplatin cytotoxicity. RES maintained mitochondrial oxygen consumption rate (OCR) at levels similar or greater than vehicle control in the presence of cisplatin. (Supported by Marshall Medical School Dean's Summer Research Fund and the NIH Grant P20GM103434 to the West Virginia IDeA Network for Biomedical Research Excellence).

**In Vitro Antitumor Activity of Natural Extracts on Head and Neck Cancer Cells**

Nana A. Bosomtwe, A.R.M. Ruhul Amin
Department of Pharmaceutical Sciences & Research, Marshall School of Pharmacy

**Background**

Head and neck squamous cell carcinoma (HNSCC) is the sixth most common type of cancer worldwide (1). Despite advances in the treatment of HNSCC in recent years, the overall survival rates and clinical outcomes have not improved significantly (2). Many natural dietary compounds have been identified to be effective in the prevention and treatment of cancer. The aim of this study is to examine the antitumor effects of the natural extract, ACM, on HNSCC cell lines in vitro.

**Hypothesis**

The aim of this study is to examine the antitumor effects of the natural extract, ACM, on HNSCC cell lines in vitro.

**Methods**

Three HNSCC cell lines were used for the study. Sulforhodamine B (SRB) cytotoxicity assays were used to determine the effects of ACM on cell growth. The sensitivity of the cell lines were determined by measuring IC50 using CalcuSyn software. As the induction of apoptosis is crucial for effective cancer cell elimination and tumor regression, we also measured apoptosis by Annexin V-phycoerythrin staining and flow cytometry.

**Results**

ACM dose- and time-dependently inhibited growth of all three cell lines and induced dose-dependent apoptosis in two of the three cell lines. The IC50 values were 2.12, 0.979, and 0.763 ng/mL against MDA686TU, 1483, and FaDu cell lines, respectively. More than 40% cells underwent apoptosis at 10ng/mL dose.

**Conclusion**

ACM induced antitumor effects on HNSCC cell lines as evidenced by cell growth inhibition and induction of apoptosis. Future studies will include more HNSCC cell lines and normal human oral keratinocytes to study cell growth inhibition (IC50) and apoptosis as well as to explore the mechanisms by which ACM exerts its antitumor effects. Understanding the mechanisms will help identify future drug therapy for HNSCC and other types of cancer.

**Thymidine Phosphorylase Plays a Mechanistic Role in Diabetes-associated Thrombotic Diathesis**

Adam Belcher, Hong Yue, Wei Li
Department of Biomedical Sciences, Joan C. Edwards School of Medicine

**Background**

Cardiovascular disease (CVD) is currently the leading cause of death worldwide and it disproportionately affects people with type-II diabetes mellitus (T2DM). Fatal cardiovascular events occur 3-4 times more often in patients with T2DM than patients without diabetes. While primary anti-thrombotic drugs reduce CVD mortality, they have less efficacy in diabetic patients due to a hypercoagulable state. The current antithrombotics can also cause hemorrhage and stomach ulcers. Therefore, finding a novel mechanism-based therapy that reduces the risk of thrombosis in diabetic patients without decreasing hemostasis is imperative. Thymidine phosphorylase (TYMP), a key enzyme in the pyrimidine salvage pathway, has been found to be increased in diabetic patient serum and adipocytes from obese individuals. Our previous and ongoing studies have shown that TYMP deficiency in mice decreases thrombosis in vivo, as well as platelet adhesion and aggregation in vitro.

**Hypothesis**

Therefore, we hypothesize that inhibition of TYMP attenuates the risk of thrombosis in diabetic patients.

**Methods**

To this end, we fed Tymp-/- and wild type C57BL/6J (WT) mice a high fat diet with 60% calories from fat for 16 weeks to induce obesity and insulin resistance. Biweekly fasting glucose and weekly weight measurements were taken. A pre- and post-diet glucose tolerance test was performed. After 16 weeks, mice were used for an in vivo thrombosis study and sacrificed. In vitro cell culture was used to determine potential TYMP binding proteins.

**Results**

We found that Tymp-/- mice had lower body weight, better glucose tolerance, and decreased thrombosis. TYMP deficiency also decreased obesity-associated inflammation when compared to WT mice. We also found that TYMP can bind to the SH3 domain of Lyn, a Src family kinase involved in platelet function, which provides insight into potential mechanisms of action.

**Conclusion**

In conclusion, our study demonstrates that TYMP is a promising target for preventing thrombosis in patients with T2DM.

**Assessing Physiological and Behavioral Changes in Rodents Following In Utero Opioid Exposure**

Sarah Stevens, Shekher Mohan
Department of Pharmaceutical Science and Research, Marshall University, School of Pharmacy, Huntington, WV.,
Department of Pharmaceutical Sciences, Manchester University, College of Pharmacy, Fort Wayne, IN

**Background**

As opioid use among pregnant woman increases, the number of infants born with neonatal abstinence syndrome (NAS) continues to rise. Although the short-term withdrawal symptoms are well characterized, the neuropathology behind opioid-mediated NAS and the long-term effects on behavior and memory are unclear. Current preclinical models of NAS are limited by short gestational periods, large litter sizes and primary organogenesis occurring postnatal. Using a novel mouse model, we aimed to study the short and long-term effects of in utero morphine exposure by assessing withdrawal behavior, memory and investigating cellular mediators underlying NAS.

**Hypothesis**

Mice exposed to morphine in utero will experience increased physiological and behavioral changes indicative of opioid withdrawal. We also expect morphine exposed mice to experience learning and memory deficits.

**Methods**

Dams were treated daily with saline or morphine 10 and 30 mg/kg S.C. beginning on G18 until day of birth, resulting in a exposure of 19-21 days. Physiological (body weight, body temperature) and withdrawal behaviors (jumps, wet dog shakes and ultrasonic vocalizations) for each pup were recorded daily from P0-P7. Differences in memory were measured using Y-maze and novel object recognition tests starting at one month of age.

**Results**

Morphine treated mice were found to exhibit increased physiological changes and withdrawal behavior associated with opioid withdrawal. Additionally, decreased Y-maze performance was found in morphine exposed mice compared to saline treated mice.

**Conclusion**

These findings suggests that our study demonstrates a novel spontaneous postnatal withdrawal model. Our results show long-term deficits in learning and memory throughout adulthood in mice prenatally exposed to morphine. Further studies are in progress to determine underlying cellular changes responsible for these differences. These results coupled with the lengthened gestational period, small litter size and increased prenatal organogenesis make this mouse model of in utero opioid exposure an improved translational model of NAS.

**A Role for Omega-3 Fatty Acids in the Treatment of Diffuse Large B-cell Lymphoma**

Tanner Bakhshi, Brad Muncy, Tanner Way, Philippe T. Georgel
Department of Biomedical Research, Joan C. Edwards School of Medicine, Huntington, WV; Department of Biological Sciences, Marshall Univ., Huntington, WV; Department of Biomedical Research, Joan C. Edwards School of Medicine, Huntington, WV; Department of Biomedical Research, Joan C. Edwards School of Medicine, Huntington, WV and Department of Biological Sciences, Marshall Univ., Huntington, WV

**Background**

Diffuse large B-cell lymphoma (DLBCL) is the most common type of lymphoma. 50-70% of DLBCL patients are diagnosed at an advanced stage, and standard chemotherapy (R-CHOP) is not curative for 30-50% of them. Sequencing experiments have shown that the most common mutations in DLBCL are those of epigenetic "writers," including the lysine acetyltransferases (KATs) CREBBP and P300. These mutations result in decreased histone acetylation (e.g., H3K27Ac), switching of relevant genes' enhancers from poised to repressed, and decreased acetylation of important non-histone proteins like BCL6 and p53. A recent clinical trial involving another B-cell-derived cancer, chronic lymphocytic leukemia (CLL), showed that long-term term treatment with w-3 fatty acids (w-3 FAs) led to increases in histone H4 acetylation compared to baseline levels (n=1).

**Hypothesis**

The purpose of our study is to determine whether w-3 FAs may be used to restore acetylation of both histones and non-histone proteins in DLBCL, as well as enhancer activity and gene expression.

**Methods & Results**

Our preliminary results show that exposure of two DLBCL cell lines with CREBBP and/or EP300 mutations (Toledo and SU-DHL-5) to the w-3 FA docosahexaenoic acid (DHA) for 72 hours causes a dose-dependent decrease in cell viability. The data also show that changes in gene expression (qPCR) and histone post-translational modifications (PTMs) occur in response to treatment with DHA, and that these changes vary by cell type and DHA dosage.

**Conclusion**

Furthermore, our results suggest that the response of DLBCL cells to w-3 FAs may depend upon more factors than originally anticipated. This may involve a differential response between normal B-lymphocytes and DLBCL cells at different stages and/or with different KAT mutational statuses. We are in the process of expanding our analysis to include normal and DLBCL cell lines with wild-type CREBBP and EP300.

**Are sensory systems tuned to body weight and size?**

Harris CM, Dinges G, Bueschges A, Zill SN
Biomedical Sciences, Joan C. Edwards School of Medicine, Marshall University, Huntington WV and Biocenter, University of Cologne, Cologne, Germany

**Background**

The nervous system controls posture and walking using sensory signals of multiple modalities. However, few studies have examined how the control mechanisms are adjusted for changes in body size and mass that can occur in normal growth, aging or clinical conditions such as obesity. We have studied this problem in insects, due to the numerical simplification of neural control, common biomechanics of leg use and availability of genetic tools. In standing and walking, the mass of the body is detected and signaled by sense organs (campaniform sensilla) in the legs, similar in function to vertebrate Golgi tendon organs.

**Hypothesis**

Morphological characteristics of force receptors may be correlated with the size and body weight in both development of individuals and different species.

**Methods**

The site of mechanotransduction (cuticular caps) of campaniform sensilla are imaged by confocal microscopy. The number and cap diameters of receptors are determined and measured in projection images.

**Results**

Homologous groups of receptors have been identified in the legs of each species (flies lack Group 2 on the anterior trochanter). The number of receptors is generally related to the size of the insect but similar numbers are found in blow flies and Drosophila, despite a 30 fold difference in their mass. In contrast, preliminary data indicate that the range (gradient) of cap sizes may more closely correlate with the weight of the animal. For example, the range of cap sizes is larger in blow flies than in Drosophila but similar to that found in juvenile cockroaches of approximately equivalent weight.

**Conclusion**

These studies support the idea that properties of sensory receptors that detect forces in the legs may be tuned to the body weight. These findings are useful in understanding force detection in biological systems and have potential translation applications in microprocessor controlled prosthetic and robotic limbs

**Exploring and Targeting Epigenetic Mechanisms in Endometriosis**

1Sarah Brunty, 2Kassey Wagner, 3Brenda Mitchell, and 1Nalini Santanam
1Department of Biomedical Sciences, 2West Virginia Wesleyan College, Buckhannon, WV, 3Department of Obstetrics & Gynecology, Joan C. Edwards School of Medicine, Marshall University, Huntington, WV.

**Background**

Endometriosis is a disease that affects 1 in 10 women during childbearing years. It is characterized by the lining of the uterus, the endometrium, growing outside the uterus. This growth forms lesions, which can cause chronic pain. It is thought that peritoneal fluid (PF) has an effect on the progression and severity of the disease. It has been shown that the composition of the PF from women with endometriosis varies from that of women without.

**Hypothesis**

Our hypothesis is that the PF is contributing to the epigenetic role in endometriosis by increasing the expression of an epigenetic marker, EZH2, and causing increased growth.

**Methods**

We used a primary endometrial cell line, EOOF5, from a woman without endometriosis as well as tissue from a woman without endometriosis. Cells and tissues were treated with either PF from a woman with or without endometriosis (control and endo PF). Treatments were also performed using the addition of a drug specifically targeting EZH2, GSK126, either alone or after treatment with PF.

**Results**

While not significant, EZH2 showed an increase in expression when treated with endo PF in the EOOF5 cells. Protein analysis showed a significant increase in EZH2 when treated with endo PF ($p<0.05$) as well as a significant decrease in expression for PF+GSK126 treated cells ($p<0.05$). For tissues, the same trend of increased expression for endo PF treated was seen for mRNA analysis. For protein analysis, tissues treated with control or endo PF and 9 uM GSK126 showed significant decrease in expression for EZH2.

**Conclusion**

Results show that EZH2 is increased when treated with endometriotic PF and that GSK126 decreases this expression, both in the cells and the tissues. Future studies will examine other genes that may be playing a role in this pathway, as well as transitioning to a mouse model.

**The Role of The Na/K-Atpase-A1-Caveolin-1/Smac/Survivin Pathway In Nash Related Hcc Genesis**

Udoh U1-3, Mallick A1-3, Sanabria JD1-3 Smith G1-3, Beltran N1-3, Schade M1-3, Sanabria JA1-3, Rajan PK1-3, Banerjee M2, Sodhi K1-3, Pierre S2-3, Xie Z2-3, Shapiro J2-3 and Sanabria J1-3.
Department of Surgery1, Marshall Institute for Interdisciplinary Research (MIIR)2, Marshall University Joan Edwards School of Medicine3, Huntington WV

**Background**

Hepatocellular Carcinoma (HCC) and its related mortality is increasing to the 3rd cause of cancer related mortality worldwide, mainly from the metabolic cellular disturbances promoted by the epidemic of obesity and a paucity of markers for its early detection. Our group has shown that the α1-Na/K-ATPase (NKA) interacts with the anchoring protein caveolin-1 (cav-1) to provide a pathway for organogenesis during cell development. In addition, it may promote suppression of tumor development through SMAC/Survivin involvement as its inhibition prevented cell replication of tumor cell lines.

**Hypothesis**

We propose uncoupled metabolism acts in tandem with an unbalanced NKA α1-caveolin-1/SMAC/Survivin pathway enhancing HCC genesis.

**Methods**

Expression of Cav-1/SMAC/Survivin proteins was performed by both confocal-microscopy on immuno-stained livers, and ELISA on treated plasma from a HCC/NASH rodent model and human subjects. Mice were exposed to pNaKtide, an inhibitor of Src-phosphorylation at the NKA α1-caveolin-1 complex. Significant differences among groups were established at $p<0.05$ using ANOVA/t-test.

**Results**

The expression of Cav-1 was significantly higher in liver tissue from patients with NASH±HCC when compared to normal livers or livers with metastases ($p<0.05$). Survivin expression was significantly higher in patients with NASH/HCC+ vs NASH/HCC-, normal livers, and liver with metastases ($p<0.05$). In contrast, SMAC protein expression was significantly lower in liver tissue with NASH or HCC vs controls. Similar results were obtained in the murine model. Plasma levels of described proteins have a direct correlation with proteins expression on liver tissue ($p<0.05$). In animals, pNaKtide showed a significantly lower tumor burden ($p<0.05$).

**Conclusion**

Cav -1, SMAC and Survivin proteins expression differed significantly in patients with HCC+ vs HCC- and NASH, and when compared to normal livers or livers with metastases. Inhibition of this pathway by pNaktide could lead to HCC prevention/regression. Protein markers may serve as biomarkers for early tumor detection.

**Effects of nicotine + morphine on reward-related behavior and nicotinic acetylcholine receptor regulation in mouse midbrain.**

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**Background**

In the United States about 480,000 deaths/year are caused by cigarette smoking and about 50,000 due to opioid abuse. Co-use of more than one drug is common, therefore, it is vital to study the effects of drug combinations to understand how co-use alters the brain. Especially given that in America, > 90% of opioid dependents are heavy smokers. The objective for this study is to determine how combined nicotine + morphine alters reward-related behavior and nicotinic acetylcholine receptor (nAChR) expression in the midbrain.

**Hypothesis**

Our hypothesis is that co-use of nicotine + morphine leads to enhanced GABA neuron disinhibition of VTA dopamine neurons.

**Methods**

Female and male (3-5 months old) C57BL/6J background strain mice with or without α4-mCherryα6-GFP nAChRs were used in conditioned place (CPP) preference assays to examine reward-related behavior with nicotine + morphine. We used confocal microscopy to analyze the density of α4-containing (α4*), α6*, and α4α6* nAChRs in ventral tegmental area (VTA), substantia nigra pars compacta (SNc), and substantia nigra pars reticulata (SNr).

**Results**

In our CPP assays we found that 20 mg/kg morphine is more rewarding to females than males, suggesting a sex-dependent dose effect with morphine. In our microscopy assays, nicotine + morphine treatment downregulated α4* nAChRs on SNr GABA cells.

**Conclusion**

Our CPP data supports that sex is an important variable in the effects of drugs on reward-related behavior. Our receptor regulation data suggests that downregulation of α4* nAChRs on SNr GABA cells is important to the combined effects of nicotine + morphine.

**Mechanism of inhibition of villus cell Na/KATPase by PGE2 in the chronically inflamed intestine**

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**Background**

In the mammalian intestine, Na-K-ATPase in the basolateral membrane of absorptive villus cells provides the favorable transcellular Na gradient for the absorption of nutrients via Na-nutrient co-transporters on the brush border membrane. Malabsorption of essential nutrients (e.g. amino acids, glucose) by villus cells during chronic intestinal inflammation is due, at least in part, to the inhibition of Na-K-ATPase. Further, specific immune inflammatory mediators (e.g. PGE2) appear to mediate the downregulation of Na-nutrient co-transporters. However, how PGE2 may specifically regulate Na-K-ATPase in villus cells during chronic intestinal inflammation to cause malabsorption of nutrients is not known.

**Hypothesis**

PGE2 mediates the inhibition of Na-K-ATPase during chronic enteritis.

**Methods**

IEC-18 cells grown to 4 days post-confluence was used. Na-K-ATPase activity was determined as 86Rb+ uptake and inorganic phosphate release. RT-qPCR and Western blot were performed to quantitate mRNA and protein levels of Na-K-ATPase, respectively.

**Results**

PGE2 (0.1μm) significantly reduced 86Rb+ uptake in IEC-18 cells. PGE2 also reduced Pi release in IEC-18 plasma membrane. PGE2 is known to mediate its action via cAMP dependent protein kinase A (PKA). In this study, cAMP levels were found to be significantly increased by PGE2. 8-Bromo-cAMP (analogue of cAMP) had an effect similar to PGE2, while Rp-cAMP reversed the PGE2 mediated reduction of Na-K-ATPase. PGE2 also caused a significant decrease in mRNA and protein (plasma membrane preparations) expression of Na-K-ATPase α1 and β1 subunits, which reversed to normal when treated with Rp-cAMP.

**Conclusion**

PGE2 mediated reduction of Na-K-ATPase is via cAMP activated PKA pathway in intestinal epithelial cells. The mechanism of inhibition is secondary to a transcriptional reduction in Na-K-ATPase α1 and β1 subunits. Thus, in the chronically inflamed intestine, PGE2 inhibits Na-K-ATPase via PKA pathway.

**Engaging Community Health Students in Active Learning in a Partnership Research Study**

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**Background**

Prescription drug abuse is the fast-growing drug concern in the United States today. Research has shown that the primary developmental risk period for the onset of prescription drug abuse is during adolescence (McHugh, Neilson, & Weiss, 2015). Individual states across the United States are working on ways to combat drug abuse/misuse.

**Hypothesis**

A structured program on prescription drug abuse will result in an increase in knowledge in middle and high school students.

**Methods**

A partnership research project between a state agency and a school of nursing was developed to help combat drug abuse in adolescents. The research project consisted of a PowerPoint presentation and activity game developed by the state agency with input from the school of nursing faculty. Nursing students from two senior-level community health nursing classes actively participated in the research project over a period of six months by implementing the intervention in eight different local school systems. Additionally, students were engaged in the research process collecting pre and posttest surveys and served in a transformational leadership role in the local community schools.

**Results**

All Individual schools in which the partnership research project was implemented by the nursing students experienced a significant increase in knowledge related to prescription drugs ($p<0.05$). Overall there was an increase in adolescent knowledge after the intervention. The average difference between test scores was 22%. Utilizing a paired test, it was determined that the difference was significant with a p-value of 0.006 (95% CI: 7.8%-37.1%).

**Conclusion**

Collaborating with local government agencies in a partnership can assist nursing in the resources needed to prevent prescription drug abuse by early intervention in the school system. Nursing students can maximize collegial networks through partnerships with state agencies. Students can also engage in transformational leadership by becoming active participants in the research process and community health advocates creating positive change in the community.

**A Randomized Open Label Study of Tapering Proton Pump Inhibitors in GERD**

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**Background**

Proton pump inhibitors (PPI's) are effective in treating gastroesophageal reflux disease (GERD). They are unfortunately often inappropriately prescribed and long- term use has potential adverse effects. A definitive method for cessation of PPI's does not currently exist.

**Hypothesis**

The objective of this study was to determine if there is a significant difference in successfully discontinuing PPI use at 12 months between groups of patients discontinuing abruptly or tapering first.

**Methods**

We conducted a randomized trial with 38 patients diagnosed with GERD. We collected 6 weekly, and then monthly surveys of symptoms based on the Dyspepsia Symptom Severity Index. Chart review at 12 months was used to determine whether the patient was able to discontinue PPI.

**Results**

A Kaplan-Meier Survival Analysis at 12 months did not show a statistically significant difference between the taper group and abrupt group for discontinuation of PPI medication. A total of 10/17 (59%) participants in the taper group were able to discontinue PPI therapy compared to 8/16 (50%) participants in the abrupt group. Five participants (3 in the taper and 2 in the abrupt group) did not complete the study. Cox regression analysis showed no association of H2blocker use, alcohol use, smoking or caffeine use with failure.

**Conclusion**

Further study is needed with larger numbers of participants and more diverse populations. Until there is clearly one best method to discontinue PPIs, clinicians should discuss these two methods with patients and come to a decision based on individual preference.

**Assessment of Commercially Available Computerized Neurocognitive Testing in the Adolescent Concussed Athlete: A Retrospective Comparative Analysis**

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**Background**

Clinicians frequently use computer-based neurocognitive assessments to aid in the diagnosis and management of Sport Related Concussion (SRC). With practitioners using varied Neuro-Cognitive Assessment Tools (NCAT), questions arise concerning among NCAT and how these differences may affect patient care. The purpose of the current study is to offer a comparative analysis of two widely accepted, commercially available computer-based neurocognitive testing modalities in the adolescent concussed athlete.

**Hypothesis**

There will be a difference between the C3 Logix® vs ImPACT® scoring in the IRPT and RTP.

**Methods**

In order to identify patients that were diagnosed with SRC, the records of patients reporting to a Sports Medicine practice were reviewed from a period of 18 months. All patients were assessed with either the ImPACT® or C3 Logix NCAT®. The date of the injury (DOI) as well as the patient's symptom level (IEVAL), time to initiation of the return to play protocol (IRTP), and time to the return to play (RTP) were recorded.

**Results**

Two hundred and twenty-two records (222) were identified. There was no difference in the symptom score (P = 0.22) at the IEVAL between C3 Logix® (31.5±27.0) and ImPACT® (23.2±21.9), in the IRTP (P = 0.22) between the C3 Logix® (6.2±4.3 days) and ImPACT® (5.1±4.3 days) or RTP (P = 0.46) between C3 Logix (12.1±4.9 days) and ImPACT (15.6±19.8 days). Weak to moderate correlations were found between symptom scores, IRTP, and RTP.

**Conclusion**

Clinicians made similar recommendations, independent of the NCAT used, as when to initiate the return to play protocol and when the patient could ultimately return to play.

**Attention Deficit Hyperactivity Disorder (ADHD), Disordered Eating (ED) and Food Insecurity (FI): A Controlled Study of Prevalence and Risk Factors.**

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**Background**

ADHD is a neurodevelopmental disorder characterized by consistent inability to focus and symptoms of hyperactivity or impulsivity. Common co-existing conditions are anxiety, disruptive behavior disorder, learning disabilities, obesity, and body mass index (BMI) abnormalities associated with stimulant medication therapy. The prevalence and risk factors for ED and FI in children with ADHD have not been studied.

**Hypothesis**

To determine the prevalence and risk factors for ED and FI in children with ADHD compared to a control population.

**Methods**

During the time period 9/19 through 11/19, 46 parents of children aged 5 -13 years diagnosed with ADHD and treated with stimulant medication by one behavioral pediatrician following current American Academy of Pediatrics guidelines, completed a written questionnaire concerning ED and FI. Surveys were also obtained from 20 similarly aged children without ADHD. The 5 question SCOFF screening tool designed for detecting eating disorders for adolescents 13-17 years was modified for younger children to include 9 questions. ED was diagnosed if 4 or more of the questions received a positive response. FI was considered present if either of the 2 "Hunger Vital Signs" received an "often true" or "sometimes true" response. Other variables identified included age, sex, BMI, and insurance type. Statistical analysis was performed by the two-sample t test with equal variances and Pearson's chi-squared test where applicable.

**Results**

The statistical comparison between the ADHD group and the control revealed a significant ($p<0.05$) difference in positive SCOFF scores (40% vs 13%: $p=0.028$) and lower (underweight) BMI score (9% vs 0% : $p=0.043$) for the ADHD patients. Age, sex, insurance status and FI (12% vs 13%) showed no significant difference. The comparison between ADHD/SCOFF positive (+) and ADHD/SCOFF negative (-) patients revealed no significant differences in any of the variables.

**Conclusion**

Children with ADHD have a higher prevalence of ED and lower BMI compared to a control population.

**Sexual Health Inventory for Men (SHIM) Questionnaire as a Screening Method for Erectile Dysfunction in the General Urology Clinic**

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**Background**

SHIM is a validated questionnaire that is widely used in urology clinics to evaluate and assess treatment efficacy for erectile dysfunction (ED).

**Hypothesis**

In this study we evaluated the benefit of using SHIM questionnaire as a screening tool for ED in the general urology clinic.

**Methods**

All new male urology patients who are 40 years of age or older visiting the general urology clinic for received SHIM questionnaire. Patients who wanted treatment for ED, received a full ED evaluation and treatment.

**Results**

379 patients received SHIM questionnaire. 48 patients (12.7%) refused to fill the questionnaire. We excluded all patients presenting for sexual health issues (67 patients, 17.7%). We included the remaining 264 patients (69.6%). Chief complaint was not predictive of the patient's SHIM score or desire to have ED treatment. Older patients were more likely to want ED treatment and had lower SHIM scores. However, above the age of 70 years there is a decline in the number of patients wanting treatment. DM was associated with the desire for ED treatment. 81 patients (82.7%) were offered oral PDE5Is, 9 patients (9.2%) were offered intracavernosal injection, 1 patient (1.0%) was offered vacuum device, and 7 patients (7.1%) were offered penile prosthesis.

**Conclusion**

SHIM questionnaire is a useful tool in the general urology clinic. It can serve as an efficient tool to screen for and quantify ED in patients presenting for other urologic issues. Maximum benefit is seen in patients between the age of 51-70 years, and in diabetic patients.

**Identifying Prevalence of Pneumococcal Vaccinations Among Rheumatoid Arthritis Patients of the Rural Appalachian Population in an Acdemic Rheumatology Clinic**

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**Background**

Patients with rheumatoid arthritis are often treated with Disease-modifying antirheumatic drugs alone or in combination with biologic drugs, predisposing them to pneumococcal disease that has high mortality. Pneumococcal vaccinations are a critical component of RA management. Pneumococcal vaccination rates remain suboptimal among RA patients due to several reasons including lack of awareness between patients and providers.

**Hypothesis**

The aim of our study is to determine pneumococcal vaccination rates based on the 2015 American College of Rheumatology (ACR) and Centers for Diasese Control and Prevention (CDC) guidelines among RA patients and to identify care gaps if present

**Methods**

We performed a retrospective chart review of the adult RA patients seen at the outpatient rheumatology clinic from January 1, 2019 to June 30, 2019. Demographics of the patients such as age, gender, active RA medications and pneumococcal immunization history were included in our study. The data obtained was analyzed to identify if each patient had received the recommended pneumococcal vaccination series.

**Results**

A total of 107 RA patients were identified. Data related to patient demographics are outlined in table 1. 10 of the 107 patients were identified to be compliant with the current recommendations for the age appropriate pneumococcal vaccine series. Among those 10 patients, 2 were between ages 19-64 years and 8 were > 65 years of age.

**Conclusion**

Our retrospective study showed only 10% of our rheumatoid arthritis patients are in compliance with current ACR and CDC pneumococcal vaccine recommendations. Limitations of our study include vaccinations received outside our clinic that were not documented, incomplete patient records from referring physicians in regards to immunization status, and undocumented patient refusal of vaccines. Future steps to increase adherence rates include educating health care providers and patients on the importance of adhering to current immunization standards, ensuring adequate supply of vaccines in the clinic and integrating outside medical information into our EHR.

**Parent-Reported Bupropion Safety and Effectiveness in Pediatric Complex Attention Deficit Hyperactivity Disorder (ADHD): A Controlled Study**

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**Background**

Although not approved by the FDA for treatment of ADHD, current systematic reviews of bupropion use in pediatrics has demonstrated an efficacy and safety profile equivalent to methylphenidate. Bupropion may also be useful in the management of complex ADHD with comorbid conditions. Indications and appropriate dosages have not been established.

**Hypothesis**

Bupropion is an effective treatment modality for complex ADHD in pediatric patients.

**Methods**

A telephone survey and chart review were performed on 42 patients at the University Pediatric ADHD center, aged 5-20 years, who received bupropion 100mg to 150mg prescribed once or twice daily duration the time period November 2018-November 2019. All patients had been diagnosed and treated with stimulant medication by a behavior pediatrician following the American Academy of Pediatric ADHD guidelines. Data collected included age, sex, BMI, insurance status, relevant concurrent medications, dosage of bupropion, and the average number of medication alterations within the 12 months prior to enrollment. The same data was collected from a chart review of 40 age/sex-matched control patients seen during the same time interval. Twenty parents of the treatment group (65%) completed a telephone survey to rate bupropion effectiveness and safety. P values were calculated using two-sample T tests with equal variances.

**Results**

Seventeen parents (85%) reported a good to excellent response to bupropion therapy, (5%) fair response, and 2 (10%) no reaction. The comparison between treatment and control groups showed a statistical significance in the number of current diagnoses, medications and medication adjustments during the preceding 12 months. The most common coexisting conditions included anxiety, depression, oppositional defiant disorder, sleep disturbances, tic disorders and disruptive mood dysregulation disorder. Concurrent non-stimulant medications included guanfacine, fluoxetine, aripiprazole, escitalopram, and sertraline.

**Conclusion**

Results indicate that bupropion may be a safe and effective adjunctive therapeutic option for complex ADHD in pediatric patients that have comorbid diagnoses and multiple medications.

**Does Subtyping Attention Deficit Hyperactivity Disorder (ADHD) Using Biologically Based Temperament Patterns Correlate with Co-Existing Conditions of Oppositional Defiant Disorder (ODD) or Generalized Anxiety Disorder (GAD)?**

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**Background**

Current research indicates that the DSM V classification of ADHD subtypes correlates with inherited patterns of child temperament identifiable by peripheral physiologic characteristics (cardiac measures) and central nervous functioning (magnetic resonance imaging). The nine individual temperament traits are: Activity Level, Distractibility, Intensity, Regularity, Persistence, Sensory Threshold, Adaptability, Approach/Withdrawal and Mood.

**Hypothesis**

Specific subtypes of ADHD, as determined by parent-reported temperament profiles, have an increased prevalence of comorbid conditions of ODD or GAD.

**Methods**

A chart review was performed of all parent-reported temperament profiles completed prior to referral for ADHD evaluation for the time period of January 2015 to January 2018. All nine temperament characteristics were described and rated by parents as: 0-absent to mild, 1-moderate and 2-severe. All patients were categorized to ADHD-Combined Type if the Activity Level temperament score was 1 or 2. Patients were categorized as ADHD-Inattentive Type if the score was 0. All patients were diagnosed and treated for ADHD by one behavioral pediatrician following current American Academy of Pediatric guidelines. Additional diagnoses of ODD or GAD were made according to positive DSM V criteria and parent standardized questionnaires over the time period of the study. Statistical comparisons of ADHD subtypes were made using a Pearson's Chi Square analysis.

**Results**

A total of 224 parent-completed temperament questionnaires were reviewed and divided into 123 (55%) ADHD-Combined Type and 102 (46%) ADHD-Inattentive Type. ADHD-Combined Type classification compared to ADHD-Inattentive Type revealed a significantly higher prevalence of ODD and all temperament characteristics other than approach/withdrawal.

**Conclusion**

Determining ADHD subtype on the basis of parent-reported, biologically-based temperament patterns, rather than DSM V criteria, may result in an equal distribution of combined and inattentive subtypes. ADHD-Combined Type pediatric patients appear to be at higher risk for development of ODD and temperament concerns.

**Correlating genotype with phenotype in childhood cases of autism spectrum disorder in WV**

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**Background**

Autism spectrum disorder (ASD) is an umbrella term for neurodevelopmental disorders characterized by persistent deficits in social communication, and the presence of restrictive/repetitive behaviors. There has not been a single cause identified that leads to ASD, however it is believed that environmental and/or genetic factors may be of significance. Genetic chromosomal microarray studies are now being recommended as a first-tier diagnostic tool for patients with autism. This testing can uncover copy number variations (CNVs) associated with microdeletion/duplication syndromes that have been linked to developmental disorders, including ASD. In this study, we focused on cases in the Appalachian region, which is a medically underserved area that is also under-represented in many datasets.

**Hypothesis**

Individuals with a CNV will have a more severe phenotype of ASD.

**Methods**

A retrospective chart review was performed on patients with an initial diagnosis of ASD from 2008-2019 seen in the WVU healthcare system. Variables including gender, severity, parental age, and geographic distribution were collected and compared between patients with a CNV and those without.

**Results**

Our data showed a significantly increased ratio of females to males with a positive CNV as compared to those with a negative CNV. Also, there was a more severe phenotype in those with a positive CNV in the Social Communication category, but not the Restrictive and Repetitive Behavior category. No significant difference was found between the groups for maternal or paternal age. When comparing the individuals who had a CNV, 32.4% of total CNVs were pathogenic, which is higher than the national average of 27.5% of CNVs being "causative."

**Conclusion**

The incidence of pathogenic CNVs found in individuals with ASD in the Appalachian region seems to be higher when compared to previous studies. Finding these CNVs can lead to higher diagnostic yield and genetic counseling, as well as testing for associated comorbidities before symptoms occur.

**Assessment of Emergency Preparedness and Healthcare Experience on Colorado 14ers**

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**Background**

A 14er is simply a mountain peak that rises to an elevation that is 14,000 feet or greater above sea level. The state of Colorado has 58 hike-able peaks above 14, 000 feet. Many emergencies and deaths occur on 14ers when people are ill prepared for handling emergency situations. This can include anything from failing to bring the right equipment to not knowing enough about the region in which they are hiking. Even the most prepared hikers need to exercise good judgement when it comes to hiking 14ers. This study aims to describe what most hikers carry with them while hiking 14ers, as well as the levels of healthcare experience that most hikers have.

**Hypothesis**

We believe that the more experienced hikers, those who have hiked the most 14ers, and those with higher levels of healthcare experience will be most prepared in terms of emergency equipment brought.

**Methods**

A 10 question anonymous survey assessing emergency preparedness and healthcare experience was made available to hikers of Colorado's 14ers through social media groups. The data was analyzed using Stata 16.0 (College Station Texas).

**Results**

There were 726 total respondents for this survey, 346 of which were men and 380 women. The majority of respondents (74.8%, n=543) were residents of Colorado. The average number of 14ers hiked was 19 with a median of 11. Nearly 12.8% of respondents (n=93) identified themself as a healthcare professional (MD, RN, NP, PA), while an additional 13.1% (n=95) identified as working in an ancillary healthcare service (PT, PharmD, OT, etc).

**Conclusion**

Those who hiked more 14ers, were more likely to be able to run 5 miles, have wilderness certification, and carry NSAIDs, 550 cord, bandages, splints, beacon, emergency blanket, matches or fire starter, a knife, a map or compass, sun protection, and a headlamp or flashlight.

**In-hospital mortality of transcatheter versus surgical aortic valve replacement: A Nationwide Analysis**

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**Background**

Transcatheter aortic valve replacement (TAVR) is an alternative to surgical aortic valve replacement (SAVR) for patients with severe aortic stenosis Commercial use or TAVR has expanded widely, nonetheless, is still considered a developing procedure and is not used widely in the country. Methods, techniques, training and valves are continuously evolving.

**Hypothesis**

Compare whether TAVR has better outcomes as compared to TAVR

**Methods**

Nationwide inpatient sample (NIS) data from 2005 to 2012 was queried. Patients who had aortic stenosis and underwent consequent either TAVR or SAVR were selected. Cases who received both techniques were excluded. We further stratified the groups according to the propensity match score and used TAVR as a reference. All statistical analyses were performed using SAS version 9.4

**Results**

Among 48,022 patients admitted for aortic valve replacement between 2005 and 2012, 96.67% (n=46,424) underwent SAVR and 3.33% (n=1,598) underwent TAVR.
Mortality prior to propensity match was higher in TAVR (4.51% vs3.21%, p= 0.004). ). The all-cause mortality remained higher in TAVR (4.62% vs 3.57%, p= 0.15), after adjusting for age, sex, race, insurance payer, diabetes, hypertension, hyperlipidemia, smoking status, heart failure, coronary artery disease (CAD) and prior myocardial infarction. Length of stay was shorter in TAVR (8.38 days vs 11.52 days)

**Conclusion**

Data analysis results demonstrated that the patients with higher mortality has occurred when performing TAVR as compared as SAVR, however recently reports support improving techniques, faster recovery, shorter length of stay. Furthermore, usually TAVR candidates usually have more comorbidities and lower performance status, hence the expected mortality is higher. Further studies are suggested to further stratify mortality across the years.

**Management of Cardiogenic Shock Due To Thyrotoxicosis: A Systematic Literature Review**

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**Background**

A grave complication of thyrotoxicosis, or thyroid storm, is the development of heart failure and cardiomyopathy. Recognizing this condition is imperative in preventing further left ventricular dysfunction and cardiogenic shock. This manuscript aims to review the literature on cardiogenic shock associated with thyrotoxicosis and present management recommendations on this rare condition.

**Hypothesis**

This manuscript aims to review the literature on cardiogenic shock associated with thyrotoxicosis and present management recommendations on this rare condition

**Methods**

A literature search was performed in December of 2018, using the PubMed medical search engine. A systematic search was carried out using the keywords Thyroid Storm AND Cardiogenic Shock and Thyrotoxicosis AND Shock.

**Results**

Statistical analysis showed survival rate difference was not statistically significant between the groups. Mean days to de-cannulation from ECMO was calculated for live patients and found to be 6.5 days.

**Conclusion**

Patients presenting with thyroid storm-induced shock may not be suitable candidates for traditional management with β-adrenergic blockers (β-blockers). Use of β-blockers could exasperate their condition. Through extensive literature review on this rare condition, the most effective management was found to be therapeutic plasma exchange in order to decrease thyroid hormone levels, which have direct toxic effect on the heart. Furthermore, the use of ECMO and Impella are advised to reduce pressure on the heart and ensure the patient's organs are well oxygenated and perfused while the left ventricle is recovering.

**Which of the recommended tests based on the 2018 definition of periprosthetic joint infection has the best performance?**

William Fravel, Alisina Shahi, Javad Parvizi, Ali Oliashirazi
Marshall Orthopaedics

**Background**

Diagnosis of periprosthetic joint infection (PJI) remains a challenge. There is no single best diagnostic test; hence a clinician who encounters a suspected PJI case has to use a combination of tests, all of which can be invasive and expensive. The question that arises is which of these tests has a better performance for diagnosing PJI. Diagnostic odds ratio (DOR) has been described as the best indicator for test performance, which takes into account both the sensitivity and specificity while remaining independent of prevalence.

**Hypothesis**

The purpose of this study was to compare the performance of the diagnostic tests for PJI per the 2018 definition of PJI; serum erythrocyte sedimentation rate(ESR), C-reactive protein(CRP), D-dimer, synovial fluid(SF) white blood cell(WBC) count, SF polymorphonuclear (PMN%), and leukocyte esterase(LE) were compared using DOR.

**Methods**

We conducted a retrospective study on a prospectively collected database of total knee and hip arthroplasties that were performed at our institution between 2015-2018. The diagnosis of PJI was made per the 2018 definition of PJI. We investigated serum ESR, CRP, and D-dimer, SFWBC count, SFPMN%, and SFLE strip test results in 274 primary and revision total hip and knee arthroplasties. DOR was calculated for each test.

**Results**

Overall we had 76 primaries, 109 aseptic revisions, and 89 revisions due to PJI. Serum D-dimer had the highest DOR for diagnosing PJI: 42.06(95%confidence interval[CI]:24.8-65.7). The rest of the DORs in the descending order were SFLE 29.6(95%CI:19.2-58.8), SFWBC:28.3(95%CI:20.2-41.2), CRP:24.4(95%CI:18.5-34.7), SFPMN%: 24.6(95%CI:17.2-36.9), and ESR:13.7(95%CI:10.8-19.6).

**Conclusion**

These results demonstrated that serum D-dimer is an accurate and effective marker for diagnosing PJI and should be given consideration to in conjunction with other markers.

**Serum D-Dimer: A New Test for Timing of Reimplantation in Patients Who Undergo a Two Stage Exchange for Periprosthetic Joint Infection**

Syed Ali Adil, Alisina Shahi, Javad Parvizi, Ali Oliashirazi
Marshall Orthopaedics

**Background**

Determining the optimal reimplantation time in patients who undergo resection arthroplasty, is arguably the most challenging decision and understudied topic in the treatment course for patients with periprosthetic joint infection (PJI). In this study we sought to investigate the utility of serum D-dimer in determining the timing of reimplantation.

**Hypothesis**

In this study we sought to investigate the utility of serum D-dimer in determining the timing of reimplantation.

**Methods**

We conducted a prospective study and measured the preoperative serum D-dimer (ng/mL), ESR (mm/hr), and CRP (mg/dL) levels in PJI patients who were undergoing a two-stage exchange. PJI was defined using the Musculoskeletal Infection Society (MSIS) criteria. Patients with active ulcer, history of recent trauma (within two weeks), hypercoagulation disorders, cancer, and systemic inflammatory diseases were excluded. Recommended thresholds by the modified MSIS diagnostic criteria for serum ESR (30 mm/hr), CRP (10 mg/dL), and D-dimer (850 ng/mL) were used.

**Results**

Our cohort consists of 36 patients that underwent reimplantation in the course of a two-stage exchange. Serum D-dimer had a better performance compared to serum ESR and CRP; the false positive rate was 14% (5/36) for D-dimer, 33% (12/36) for CRP, and 41% (15/36) for ESR in the reimplantation patients. Originally eight patients had positive D-dimer levels at the time of reimplantation, however, two of those had positive intraoperative cultures (one with Staphylococcus epidermidis and the other one with Propionibacterium acnes) both of whom developed subsequent infection and required further surgery. The third patient also failed due to persistent drainage but the cultures were negative. Interestingly, the serum ESR and CRP were both normal in these three patients.

**Conclusion**

Our study shows that the serum D-dimer could be a promising marker for determining the optimal timing of reimplantation and infection eradication when compared to ESR and CRP.

**Direct Anterior Total Hip, Significantly Lower Rates of Deep Venous Thrombosis and Pulmonary Embolism**

Baylor Blickenstaff, Vishavpreet Singh, Alisina Shahi, Ali Oliashirazi
Marshall Orthopaedics

**Background**

Pulmonary embolism (PE) and deep vein thrombosis (DVT), together referred to as venous thromboembolism (VTE), are serious and potentially preventable complications after total hip arthroplasty (THA). VTEs are the number one cause of mortality in patients undergoing THA. Several conditions have been reported to be associated with an increased risk for VTE development after THA, including.

**Hypothesis**

The aim of this study was to investigate if the surgical approach could affect the incidence of VTEs after THAs.

**Methods**

We conducted a retrospective multi-center study and reviewed primary and revision THAs that were performed between 2010-2018. We reviewed 6,743 primary and revision THAs. Symptomatic VTEs diagnosed within 90 days postoperatively were captured. Risk factors including: Type of surgery (primary vs. revision), surgical approach (anterior vs. posterior), history of VTE, presence of hypercoagulation disorders, gender, age, and BMI were taken into account. A multivariate regression model was used to analyze the data.

**Results**

The overall rate of DVT was 3.8% within 90 days of the surgery. Patients who underwent THA with direct anterior approach had a significantly lower incidence of VTE (2.6% vs. 4.4%; p= 0.0002). The risk factors for DVT in descending order were: hypercoagulation state (Odds ratio [OR]: 5.2, 95% confidence interval [CI]: 3.1-8.5), history of prior VTE (OR: 4.4, 95%CI: 2.8-6.7), age>70 (OR: 3.3, 95%CI: 2.5-7.1), female gender (OR: 3.1, 95%CI: 1.8-5.5), BMI>35 kg/m2 (OR: 2.4, 95%CI: 1.2-4.7), revision THA (OR: 2.1, 95%CI: 1.3-3.9), and posterior approach (OR:1.3,95%CI:1.1-1.4).

**Conclusion**

Numerous studies have endorsed the advantages of direct anterior THA over other techniques. Based on the results of this study it appears like that direct anterior approach is associated with significantly lower incidence of VTE events postoperatively. Considering the fatal consequences of these events we recommend to choose direct anterior approach for THA when applicable.

**Total Knee Arthroplasty Can Save Lungs**

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**Background**

Total knee arthroplasty (TKA) is a life-changing event. Many patients stop smoking prior to their elective surgery as part of preoperative optimization. However, it is unknown how many of these patients relapse to smoking after their surgery. The aim of this study was to investigate the incidence of smoking relapse and its association with periprosthetic joint infection (PJI) in a large non-select cohort of patients.

**Methods**

We retrospectively identified patients who underwent primary TKA between 2000 and 2016. Patients were stratified into four groups: current smokers (A), former smokers (B), ceased smoking for the procedure (C), and nonsmokers (D). Patients were followed for at least two years and the relapsed cases were identified. The association between smoking status and PJI was investigated using multivariate regression analysis.

**Results**

16,322 patients were identified who underwent 19,986 total knee arthroplasties during the study period. Of these patients, 1,352(8.2%) were current smokers, 4,522(27.7%) were former smokers, 3,575(21.9%) ceased smoking for their procedure, and 6,873(42.1%) were nonsmokers. Current smokers were significantly more likely than nonsmokers to undergo reoperation for infection (odds ratio[OR],2.12[95%confidence interval(CI),1.42-3.25];p=0.04), and former smokers were at no increased risk (OR,1.12[95%CI,0.63-1.45];p=0.71). Of group C patients only 1,258(35.1%) had relapse within two years after surgery. The rate of infection was significantly higher in patients who returned to smoking compared to those who didn't (5.0% vs. 0.4%; OR:2.1[95% CI, 1.53 to 2.44]).

**Conclusion**

Majority of patients who stopped smoking did not have a relapse within two years after surgery. It appears that TKA not only can improve patients' functionality but also is a turning point that prevents future smoking in majority of the patients. Smoking is a major risk factor for PJI and patients who return to smoking are at higher risk.

**Improving Admission Medication Reconciliation Completion Among Pediatric Residents**

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Department of Pediatrics

**Background**

Admission medication reconciliation (AMR) completion has been identified as an issue among pediatric residents. AMRs were routinely incomplete during the responsible resident's twelve-hour shift. Pediatric nurses compiled a daily list of incomplete AMRs to finalize during morning rounds, interrupting patient care. Previous studies have demonstrated an increased risk of adverse events if AMRs are not completed accurately. Literature review revealed limited studies investigating AMR completion rate in a timely manner.

**Hypothesis**

The purpose of this research is to improve the pediatric AMR completion rate in a timely manner which was defined as 6 hours or less. The aim was to reach 85% AMR completion rate within 6 hours of admission within a year.

**Methods**

A quality improvement study using the Plan-Do-Study-Act (PDSA) model. Baseline data was extracted and compared to data following completion of each PDSA cycle from December 2018 to present. The PDSA cycles included an announcement at monthly resident forum, intern education, lecture by attending physician, individual reminders to residents, electronic health record interactive reminder to complete AMR. The study was ongoing in PDSA cycle 4 as of January 2020.

**Results**

Baseline data showed an average of 13.5 hours from admission to completion of AMR and 51% within 6 hours. After PDSA cycles 1-3, the mean decreased to 8.6 hours. As of November 2019, completion within 6 hours increased to 72% demonstrating statistical significance (p value <0.0001). From PDSA 2 to 3, the mean increased from 6.5 to 8.6 hours and percent of completion within 6 hours decreased from 78% to 72%. This was not significant (p value 0.1523). Further data pending completion of current and future PDSA cycles.

**Conclusion**

Completion of AMRs by pediatric residents has improved using the PDSA model. Further research is needed to determine the effect on adverse event occurrences following the implementation of the PDSA cycles.

**Head CT in syncope and near-syncope workup in the Emergency Department: A Rural vs Urban Comparison**

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Marshall Internal Medicine, Holzer Family Medicine, Marshall Cardiology

**Background**

The prevalence of syncope as a presenting symptom to the emergency department (ED) ranged from 0.8% to 3% in multiple studies. CT scans of the head are one of the most common tests in work-up of syncope or near-syncope. However, expensive and low-yield diagnostic tests for syncope should not be routinely ordered.

**Hypothesis**

Patients presenting to rural ED with syncope of near-syncope will show a difference in the yield of health CT scans than that of an academic teaching hospital. The yield of head CT scan and associated factors will be examined along with discharge or hospital admission data.

**Methods**

We retrospectively reviewed the EMR of all patients who presented with complaints of syncope or near-syncope to the ED at Holzer, Logan Regional Medical Center and Pleasant Valley Hospital between January 1, 2018, and December 31, 2018. These results will be compared to those obtained from Cabell Huntington Hospital (CHH).

**Results**

A total of 780 patients were retrospectively studied at CHH with mean age of 45.5 (standard error of mean 0.7) of which 303(38.3%) of them were male. CT head was performed in 265 (34%) patients, whereas 238 (30.5%) patients were admitted. Patients with CT head were more likely to get admitted compared with those without CT head (39.6% vs 25.8%, $P<0.001$). Rural analysis is currently being completed.

**Conclusion**

Our preliminary results indicate that our urban results suggest that the yield of head CT scans in patients presenting to the ED with syncope or near-syncope was low. Patients with head CT were more likely to get admitted. Avoidance of unnecessary head CT is of great importance in quality improvement and cost-effective patient care in ED. Furthermore, rural data will be analyzed and head to head comparison will be performed to note differences in the utility of CT head in rural setting vs urban.

**Make Kids Stroke-Smart: A Community Based Interventional study.**

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**Background**

Stroke is the fifth leading cause of death. Each year more than 795,000 people have a stroke in the United States. Timely recognition of symptoms is critical in management. Family members are crucial in recognizing stroke symptoms since less than 5% of patients can call 911 themselves due to the inability to speak or dial the phone. This is particularly significant since a growing number of children are being raised by grandparents and older parents.

**Hypothesis**

This study was undertaken to assess & improve the knowledge about stroke amongst children.

**Methods**

A community-based interventional study was conducted among 305 kids ranging from 2nd to 8th grade. A pre-test questionnaire was administered & later health education regarding stroke was imparted using audiovisual aids. There were 6-12 kids in each group. A post-test was done to assess the impact of stroke education. Components of education included were: 1) What is a stroke? 2) FAST mnemonic. 3) Time-sensitive treatment. 4) Risk factors for stroke 5) How can kids help? 6) Whom to call and where to go? The data was compiled & analyzed using frequency, percentage & chi-square test using statistical software IBM SPSS version 24.

**Results**

There were 9 kids in 2nd grade, 87 in 3rd grade, 89 in 4th grade, 92 in 5th grade, 21 in 6th grade and 7 in 8th grade. There was a significant lack of knowledge in the pretest groups. The post-test showed statistically significant improvement in all the tested components irrespective of age & grade ($p<0.001$).

**Conclusion**

Targeting the younger generation for stroke education is one way to improve community knowledge of stroke symptoms. This will increase the chances of stroke patients receiving acute stroke therapy. Children can also be used as a conduit to transmit educational information to parents & other family members thus further raising stroke awareness.

**The relationship between diet, gut microbiota, and chronic disease**

Maya N. Menking-Colby, Japri N. Miller, MS, Holly A. Farkosh, Kade J. Bradley, Franklin D. Shuler, MD, PhD
Department of Orthopedics, JCESOM

**Background**

USDA food guidelines were established to help promote healthy diets. The food wheel (1980's), food pyramid (1990s), and current MyPlate guidelines provide visual dietary references but do not address the optimal diet for disease prevention and treatment. There is a growing amount of research dedicated to understanding how the human gut microbiota influences disease and health outcomes.

**Methods**

This project explores and refines the dietary recommendations using an evidence-based medicine, systematic literature review for the prevention and treatment of disease states associated with alterations in the gut microbiota.

**Results**

The human gut microbiota is everchanging and can be influenced by food consumption, age, method of birth, activity level, geographic location, antibiotic use, and a host of other factors. Certain disease states occur when the balance of the gut microbiota is shifted, a phenomenon termed dysbiosis. Dysbiosis of the gut microbiota has been linked to disease states such as diabetes, autoimmune diseases, cardiovascular disease, and obesity. Additional disease states are being identified including gut-brain interactions affected by diet. Dysbiosis is improved with a diet (such as resistant starches, leafy greens, cruciferous vegetables, fruits, and plant-based fats) that maintains bacterial balance and promotes an anti-inflammatory state.

**Conclusion**

This research attempts to identify the effect of dysbiosis on the aforementioned disease states and offer dietary recommendations that could be implemented to treat these diseases or reduce their risk of development. The generation of an updated MyPlate guideline is used to address dietary changes aimed at minimizing the impact of these chronic disease states."

**Filling in the Gaps: Family Medicine Resident QI Project to Increase Knowledge of Skin Cancer Screening Techniques**

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Family Medicine, Holzer Health System

**Background**

Total Body Skin Exam (TBSE) as a means of skin cancer screening is not routinely part of the general physical examination performed by primary care providers (PCPs). Typically, only exposed areas relevant to the physical exam are evaluated. While over half of PCPs feel that skin cancer screening is 'extremely' important, skin cancer screening is not common in the primary care setting in the United States, likely due to time constraints as well as the lack of emphasis and training in medical school and residency.

**Hypothesis**

This continuing project will identify medical students', family medicine residents', and supporting providers' self-identified knowledge and skill TBSE deficiencies and address those deficiencies by providing an informative and engaging skin lecture series.

**Methods**

Holzer Family Medicine residents, medical students, and providers will be administered a pre-test each new year to self-identify confidence and skill levels in performing TBSE, diagnosis, treatment and further management of commonly encountered skin lesions. A lecture series has been developed to focus on the identification and management of common benign and malignant skin lesions. The same survey will be administered at the end of this project as a post-test to determine if confidence and skill level increased as a result of the lecture series.

**Results & Conclusion**

Our data from the first cohort of participants indicates self-perceived improvement in confidence and experience with whole body skin examinations after our resident driven lecture series and skin cancer screening community event.

**Severe Ketoacidosis From Ketogenic Diet and Surreptitious Acetic Acid Ingestion**

Abdul Rana, Kanaan Mansoor, Mahmoud Abouzid, Iheanyichukwu Ogu, Ghassan Bandak
Internal Medicine

**Background**

Obesity is an epidemic with high burden of disease. Ketogenic diet and herbal supplements have recently gained popularity amongst patients struggling with weight loss. There is limited data available for most of these supplements contrary to the claims laid by the mainstream media. Due to lack of awareness, this patient population is at high risk of adverse effects.

**Case Presentation**

43-year-old female patient presented to the emergency room with weakness, lightheadedness and intermittent nausea of one-week duration unrelated to oral intake. She reported occasional alcohol consumption in small amounts and had been on a strict keto diet. In addition, she reported increased dietary acetic acid intake both as direct ingestion and supplementation to almost any food she ate in an effort to expedite weight loss. On arrival she was hypotensive and tachycardiac. Physical exam was unremarkable except for labored breathing. Labs revealed a serum bicarbonate level of 10mEq/L, venous pH of 7.15, anion gap of 27, and lactic acid of 4.19mmol/L. Qualitative acetone testing was positive at 3+, Serum Creatinine was 2.37mg/dl, serum glucose was 108mg/dl and had an osmolal gap of 19. She was initially treated for diabetic ketoacidosis and fomepizole was given empirically which was stopped later and she continued treatment with crystalloids, sodium bicarbonate and dextrose. Ketosis and acidosis resolved and renal function normalized.

**Discussion**

Severe ketosis in setting of ketogenic diets is a serious complication which is infrequently reported in literature. The use of dietary acetic acid is usually well tolerated, however in this case the large quantities and presence of acute renal injury may have worsened the acidosis. With the recent surge of over the counter weight loss supplements and fat diets, physicians need to engage in dietary discussions with patients when attempting to lose weight.

**Unusual clinical presentation of periodic paralysis, case report and literature review**

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**Background**

We are presenting a case of hypokalemic paralysis that presented to the ER with flaccid paralysis in three out of four limbs.

**Case Presentation**

A 40-year-old patient presented to the ED complaining of severe bilateral legs and left arm weakness started two days before presenting to the ED after he did physical exercises. He denied having fevers, vomiting, diarrhea, chest pain, or losing control urine or stool. Saddle area sensation was contact. No vision or hearing changes. Examination showed flaccid paralysis in the bilateral lower limbs and right arm, however, left arm muscle power was completely normal, other physical exam components were wihting normal limits. Labs showed potassium at 1.9 mmol/L, creatine phosphokinase 398 IU/L, magnesium 1.8 mg/dl, urine drug screen showed positive for opiates. EKG showed sinus bradycardia at 51 bpm, QTc 534 ms and first-degree heart block (PR interval 224 ms). Head CT without contrast showed posterior scalp soft tissue swelling and mild sinus disease, no evidence of acute intracranial pathology. Patient was given IV & PO KCL. After 48 hours, K normalized. He regained full muscle power again. Repeat EKG showed QTc interval is back to baseline 394.

**Discussion**

To our knowledge, this is the first time that a patient with hypokalemic paralysis present with paralysis in 3 out of four limbs. The clinical presentation of this patient is different than other types of periodic paralysis. Compared to the closest type (Hypokalemic Periodic Paralysis) which has autosomal dominant genetic background, no family members had the same symptoms before. Compared to the type (Thyrotoxic periodic paralysis), thyroid function tests were within normal limits. Compared to (Anderson Syndrome), an autosomal dominant disease that has classic dysmorphic features, our patient did not carry the dysmorphic features and none of his family members had genetic or dysmorphic diseases.

**Unique Ictal Signature: Delta Brush as an Ictal Morphology in a Patient with Hypoxic Ischemic Encephalopathy**

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**Background**

We present a unique case of delta brush ictal phenomena in a 2 year old patient with multifocal seizures following hypoxic ischemic encephalopathy. "Extreme delta brush" morphology has been reported as an inter-ictal finding in anti-NMDA receptor encephalopathy, but not as an exact ictal signature. Also, a delta brush (high amplitude slow wave with superimposed fast activity) can be normal in preterm infants and usually occurs in central, temporal or occipital regions. However, the identification of delta brush as an ictal phenomenon and thereafter use for prognostic value can help manage patients in the acute and long-term settings.

**Case Presentation**

Our patient is a 2 year old male with previously undiagnosed long chain 3-hydroxyacylCoA dehydrogenase deficiency (LCHAD). He presented with hypoxic-ischemic encephalopathy from hypoglycemia. EEG recording showed a subclinical seizure of left occipital delta brush morphology. Further EEG recording demonstrated clinical seizures with electrographic spike and wave epileptic discharges that were multifocal in origin associated with eye deviation, nystagmus, or arm or leg tonic clonic activity. 6 days following the initial hypoxic insult, he had seizures from the left occipital region again but consisting of a typical spike and wave morphology and were associated with right foot twitching. Magnetic resonance imaging showed abnormal T2 signal in cortical occipital sulci.

**Discussion**

We report a unique case of delta brush morphology seen as an ictal phenomenon. To our knowledge, this has not been reported in the literature. It is important for others to be aware of this ictal signature to better identify patients for subclinical seizure activity. The reports about extreme delta brush in anti-NMDA receptor patients showed a longer hospital stay and worse prognosis compared to those without the extreme delta brush pattern. Our patient had a 3 month hospital course with recurrent seizures, thus suggesting refractory seizures and poor prognosis.

Continuing Education Model for Nurses Regarding Substance Use Disorder

Natalie Perry, Ilana Chertok
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**Background**

Nurses have reported a lack of knowledge regarding substance use disorder. Previous encounters with the patient population affected by substance use disorder and a lack of knowledge can lead to a lack of perceived competency among nurses. Limited research on continuing education interventions have suggested an improvement in nurses' knowledge and sense of competency in caring for patients with substance use disorder.

**Methods**

The purpose of this study was to evaluate a continuing education intervention on nurses' knowledge and perceived competency regarding the care of hospitalized patients with substance use disorder. A pre-test/post-test design was utilized to assess changes in knowledge and perceived competency immediately before and after the intervention for 31 hospital nurses using evidence-based tools and measures.

**Results**

Directly following the intervention, knowledge and perceived competency scores were significantly improved among the nurse participants, while there was no statistical significance noted between the demographic characteristics and the pre-test/post-test results.

**Conclusion**

The educational intervention was found to significantly improve knowledge and perceived competency scores among nurses as evidenced by the pre-test/post-test scores. Thus, nurses working with patients diagnosed with substance use disorder could benefit from continuing education on substance use disorder."

**Clinical Empathy in Medical Trainees: Do You Have "IT"? Protocol to Assess rs53576 Oxytocin Receptor Gene Polymorphism.**

Franklin D. Shuler MD, PhD and Jo Ann Raines, MA
Office of GME JCESOM

**Background**

Empathy is critical to all aspects of physician training and practice impacting satisfaction, burnout and patient care outcomes. Recent data indicates that some medical trainees might have a beneficial "silent" genetic mutation favoring the expression of empathy improving empathetic communication. So is empathy ""taught"" or do you just have ""it""? Identification of this mutation is critical to cultivate empathy and communication enhancing the development of a positive physician-patient relationship.

The empathy gene (OXTR = oxytocin receptor gene) can have a silent single nucleotide polymorphism (SNP) where a G to A allele change (rs53576) results in individuals who have enhanced socio-cognitive skills and are not only more empathetic with higher behavioral and dispositional empathy but feel less lonely, have less major depressive episodes, employ more sensitive parenting techniques, have more sociality, and have lower rates of autism. For the medical trainee, empathy can influence specialty selection, peer and patient interaction, satisfaction, burnout, and advancement. Potential leaders in medicine were noted to have empathy and sociability (top influencers) while bottom influencers were associated with loneliness; all three of these traits are associated with the rs53576 OXTR polymorphism implying correlation but establishment of genetic causation is at the heart of this project (GG allele = increased empathy and sociability; AA = more lonely). For the JCESOM and GME office, genetic empathy assessment can provide a novel way to help address physician shortages and optimize selection and training pathways to improve the overall patient and physician satisfaction within the healthcare system.

**Methods**

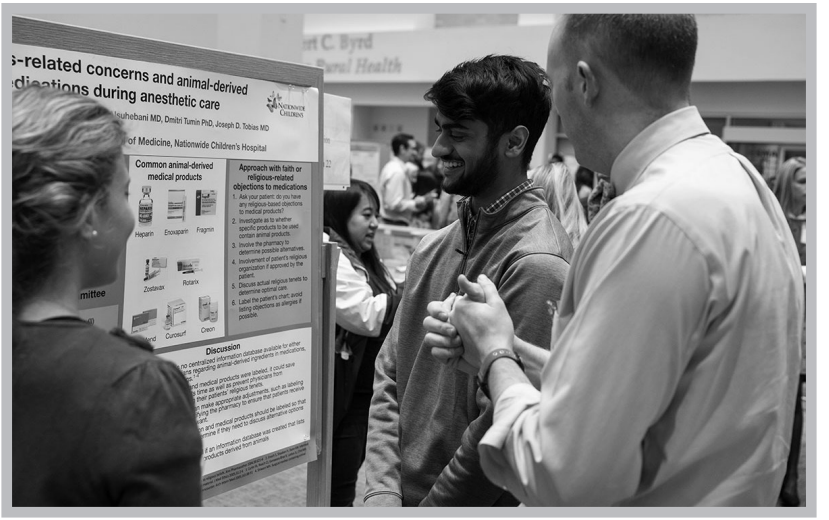
We propose a two-part IRB approved testing protocol to create a baseline assessment of oxytocin receptor gene rs53576 polymorphisms in medical trainees at an academic medical center. Part I uses a well-established, validated instrument to assess empathy developed specifically to address health profession education and patient care. The Jefferson Scale of Empathy (JSE) will be used for empathy assessment in our medical trainees (including all residents and fellows and MS IV [n=317]). Data will be analyzed by Jefferson University Asano-Gonnella Center for Research in Medical Education and Health Care and compared to the recent 2019 publication of normalized medical student and general population data. Part II uses our expertise at our genomics core to detect the SNPs rs53576 polymorphisms associated with the OXTR gene using saliva samples – AA, AG and GG at the third intronic area in Chromosome 3. Genetic testing is critical for empathy assessment because self-reported empathy in medical trainees does not correlate with patient perceived physician empathy and empathy decreases during medical training.

**Results**

Initial statistical analysis confirmed that our medical trainee cohort is sufficient to detect substantive association between self-reported JSE empathy assessment and the presence of rs53576 OXTR polymorphisms. JSE scores have been used to highlight associations between medical student self-reported empathy and specialty interest.

**Conclusion**

Subset analysis will see if empathy is associated with residency specialty and career selection. Additional analysis will account for the recent discovery of a sexually dimorphic effect of this polymorphism on empathy and assess if patient perceived physician empathy is associated with rs53576."


s-related concerns and animal-derived
dications during anesthetic care
Nationwide Children's
Common animal-derived medical products
Heparin
Enoxaparin
Fragmin
Zostavax
Rotarix
Curosurf
Creon
Approach with faith or religious-related objections to medications
1. Ask your patient: do you have any religious-based objections to medical products?
2. Investigate as to whether specific products to be used contain animal products.
3. Involve the pharmacy to determine possible alternatives.
4. Involvement of patient's religious organization if approved by the patient.
5. Discuss actual religious tenets to determine optimal care.
6. Label the patient's chart; avoid listing objections as allergies if possible.
Discussion


A Reminder of Adverse Effects



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