

# HEALTH SCIENCES CENTER 31<sup>TH</sup> ANNUAL RESEARCH DAY AT MARSHALL UNIVERSITY MARCH 22, 2019

Oral and Poster Presentations

Marshall University Medical Center • Huntington, West Virginia

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**This event is supported annually by educational grants from the following Endowments:**

Dr. Albert C. Esposito Memorial  
Thelma V. Owen Memorial  
Richard J. Stevens Memorial

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**No Faculty Disclosure or conflicts of interest are indicated for this CME activity.**

**Disclosure of Conflicts of Interest**

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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 31st 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.

### PLANNING COMMITTEE - NO CONFLICTS INDICATED

**Uma Sundaram, MD**, Conference Chair, Vice-Dean, Research and Graduate Education

**Todd Gress, MD**, Co-Chair, Assistant Dean, Clinical and Translational Research

**David N. Bailey, MBA**, Assistant Dean, CME

**Richard Egleton, PhD**, Co-Director, Biomedical Sciences Graduate Programs

**Brian Patton, Director**, Digital Media Services

**Elsa I. Mangiarua, PhD**, Professor, Biomedical Sciences

**Paris N. Johnson**, Program Support Coordinator, CME Registration

### STAFF COORDINATORS - NO CONFLICTS INDICATED

Anita Mathis .....BMS Coordination & Registration

Matthew W. Crutchfield.....Graphic Services

Brian Patton.....Web Publications, Online Abstract  
Submission Form Design and Content  
Retrieval, Judging tabulations summary

Betina K. Dingess .....Registration  
Administrative Assistant to Dr. Sundaram

RESEARCH DAY



## PAST INVITED LECTURERS

### **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 Anschutz 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*

### **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*

## PAST INVITED LECTURERS

### **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*

### **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*

## PAST INVITED LECTURERS

### **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 epidemiology in the new millennium*

### **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 21<sup>st</sup> 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*

### **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*



## PAST INVITED LECTURERS

### **1992 – Simon Karparkin, MD**

Professor of Medicine

New York University School of Medicine

*1. Role of thrombin, 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. Epidemiology, pathogenesis, therapy*

*2. New approaches to development of treatment plans*

### **1990 – Dewitt S. Goodman, MD**

Director, Institute of Human Nutrition

Director, Arteriosclerosis Research Center

Tilden-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, Professor 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*

## 2018 RESEARCH DAY CONFERENCE PRESENTATION WINNERS

### POSTER CASE

#### Student

Rickets Treatment Improves more than Bone Health in Toddler with Autism Spectrum Disorder

Leah Stalnaker | Pediatrics

#### Resident

Native Aortic Root Thrombosis in Hypoplastic Left Heart Syndrome

Rabia Noor | Pediatrics

### POSTER BASIC SCIENCE

#### Student

Targeting heat shock protein 90 to alter evolution of aggressive cancer phenotype

Nickolas Bacon | Biomedical Sciences

#### Post-Doctoral

Inhibiting Na/K-ATPase Oxidant Amplification Loop Regulates Aging in C57B16 Old Mice

Rebecca Klug | Surgery

### POSTER CLINICAL SCIENCE

#### Student

The Effects of Gabapentin on the Withdrawal Symptoms of Neonates Prenatally Exposed to Opioids

Will Lester | Pediatrics

#### Post-Doctoral

Psychosocial and Physiologic Characteristics of Patients with Non-epileptic Events:

A Retrospective Study of Rural Patients

Dipali Nemade | Internal Medicine

### ORAL BASIC SCIENCE

#### Runner-Up

Characterization of Renal Cytotoxicity and Oxidative Stress Induced by the Radiocontrast Agent Diatrizoate (DA) in Human Proximal Tubular Cell Line

Dakota Ward | Biomedical Sciences

#### Winner

In vivo brain engineering for neurological disorders

Arrin Brooks | Biomedical Sciences

### ORAL CLINICAL SCIENCE

#### Runner-Up

Dose-Escalated Salvage Stereotactic Body Radiation Therapy (SBRT) for Locally Recurrent Previously-Irradiated Head and Neck Squamous Cell Carcinoma Trends

Toward Improved Local Control and Overall Survival

Raj Singh | Radiation Oncology

#### Winner

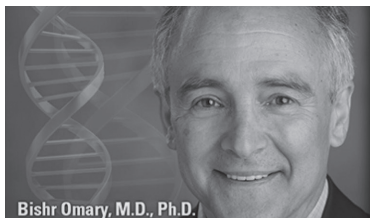
Reducing Opioids with Enhanced Recovery After Cesarean Delivery

Kevin White | Obstetrics and Gynecology

# RICHARD J. STEVENS, MD MEMORIAL LECTURE

RESEARCH DAY | INVITED LECTURER

**MARCH 22, 2019 at 11:30 AM • HARLESS AUDITORIUM**



**Bishr Omary, M.D., Ph.D.**  
**Executive Vice Dean for Research and  
Chief Scientific Officer, Chair Department  
of Molecular and Integrative Biology at  
the University of Michigan and the next  
president of the AGA.**

No Conflicts indicated by Disclosure.

## *The Intermediate Filament Cytoskeleton in Health and Disease*

Dr. Bishr Omary, Ph.D., M.D., is Chief Scientific Officer and Executive Vice Dean for Research at University of Michigan Health System and will be the next president of the AGA.

Dr. Omary served as Member of Scientific Advisory Board of Cell Biosciences, Inc. His research interests include studying disease-related, cell biological and molecular aspects of cytoskeletal and other proteins in digestive organs.

Dr. Omary is applying his research to the understanding of inflammatory bowel diseases and Barrett's esophagus. Other clinical interests include cryptogenic cirrhosis, colonic cancer and polyps. Recently, Dr. Omary's Lab identified keratin mutations as a major predisposition to the development of liver cirrhosis. He has collaborated with Cell Biosciences in these studies on an early-phase, single-cell analysis instrument.

Dr. Omary received his Ph.D. in Cell Biology and Immunology from UCSD and completed a Ph.D. to M.D. program at the University of Miami. After a medical residency at the University of California, Irvine, Dr. Omary served a fellowship at UCSD and joined the Stanford faculty in 1989 with a lab at the Veteran's Administration Hospital. At Stanford, he served as chief of Gastroenterology and Hepatology and director of the Digestive Disease Center. In 2008, he joined the University of Michigan. He served as chair of the Department of Molecular and Integrative Physiology, is the H Marvin Pollard Professor of Gastroenterology in the Department of Internal Medicine, and was an investigator at the Veterans Affairs Ann Arbor Healthcare System from 2008 - 2017.

As chair, he led the department to become the highest ranked NIH funded physiology department in the U.S., helped grow its educational and training platforms, and was instrumental in recruiting half of the department's current faculty.

## List of Presenters' Abstracts

No relevant Conflicts of Interest as supported by Disclosure  
See Agenda Pages 14-15

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## List of Presenters' Abstracts

No relevant Conflicts of Interest as supported by Disclosure  
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# RESEARCH DAY AGENDA

MARCH 22, 2019

Specific learning objectives will be presented with each oral presentation.

Questions and answers encouraged throughout all sessions.

No apparent speaker conflicts indicated as supported by disclosure.

7:00AM	Registration	Participant AM & PM registration and evaluation required
8:15AM	Welcome	Jerome A. Gilbert, PhD, President, Marshall University
8:20AM	Opening Remarks	Uma Sundaram, MD, Vice Dean and Research Day Chair

## ORAL SESSION 1 • ABSTRACTS • PAGE 23

Time	Name/Department/Format	Abstract Title
8:30AM	Dakota B Ward/Biomedical Sciences	"Cytotoxicity, Mitochondrial Function, and Endoplasmic Reticulum (ER) Stress Associated with the Radiocontrast Agent Diatrizoate (DA) in a Human Proximal Tubule Cell Line"
8:42AM	Arrin Brooks/Biomedical Sciences	Fine-tuning the degradation rate of novel fibrin brain implants
8:54AM	Taylor Boggess/Biomedical Sciences	Investigating the role of astrocytes in the development of synaptic connectivity in neonatal abstinence syndrome
9:06AM	Hari Vishal Lakhani/Surgery	NaKtide attenuates Atherosclerosis by Blocking Adipocyte Na/K-ATPase/ROS Amplification in ApoE <sup>-/-</sup> Mice fed a Western Diet
9:18AM	Minqi Huang/Marshall Institute for Interdisciplinary Research	Regulation of Adipogenesis by $\beta_1$ Na <sup>+</sup> /K <sup>+</sup> -ATPase via Its Conserved Caveolin Binding Motif
9:30AM	Mary Piaskowski/Surgery	THE EFFECTS OF SW299033 ON NASH ASSOCIATED FIBROSIS IN THE RODENT.

## 9:45AM BREAK POSTER SESSION 1 - BASIC SCIENCE AND CASE STUDY - ATRIUM ABSTRACTS PAGE 49

## ORAL SESSION 2 • ABSTRACTS • PAGE 31

10:30AM	Travis Salisbury/Biomedical Sciences	The regulation and function of L-Type Amino Acid Transporter 1 in response to adipokines in human breast cancer cells
10:42AM	Hari Vishal Lakhani/Surgery	The Role of the Adipocyte Na/K-ATPase Oxidant Amplification Loop in Uremic Cardiomyopathy
10:54AM	Molly Butts/Clinical and Translational Science	The Unique Regulation Of Ethanol on Sodium-Dependent Glutamine Cotransport In Intestinal Epithelial Cells
11:06AM	Adam Belcher/Biomedical Sciences	Thymidine Phosphorylase Enhances Diabetes-associated High-risk of Thrombosis
11:18AM	Ifeoluwatomi Fuwape/Internal Medicine	CHOLINE-BINDING PROTEIN A ASSOCIATED WITH RESISTANT SEROTYPES OF INVASIVE STREPTOCOCCUS PNEUMONIAE.
11:30AM	KEYNOTE	Bishr Omary, MD, PhD Vice Dean for Research and Chief Scientific Officer, University of Michigan The intermediate filament cytoskeleton in health and disease

## 12:40PM - BOX LUNCH

## RESEARCH DAY AGENDA

### ORAL SESSION 3 • ABSTRACTS • PAGE 37

1:15PM	Madison Crank/Cardiology	Comparison of The Acute Effects of Mainstream Cigarette Smoke to Oral Nicotine Spray on Electrocardiogram Intervals: Preliminary Results.
1:27PM	Ahlim Alsanani/Cardiology	Correlations Among Echocardiographic Parameters in Patients with Chronic Renal Failure.
1:39PM	Dominique Elmore/Pediatrics	Is Fever a Marker for Further Investigation in Children with RSV Bronchiolitis?
1:51PM	Brittani Lowe/Psychiatry and Behavioral Medicine	Mental Health in Appalachian vs. Non-Appalachian College Students
2:03PM	Cecilia Nease/Pediatrics	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

### 2:30PM BREAK POSTER SESSION 2 • CLINICAL SCIENCE AND MEDICAL EDUCATION - ATRIUM ABSTRACTS PAGE 113

### ORAL SESSION 4 • ABSTRACTS 43

3:15PM	Meghan Pauley/Pediatrics	Physician Compliance with Obesity Guidelines and Related Complications
3:27PM	Ardalan Sayan/Orthopaedics	Risk factors for stiffness after primary and revision total knee arthroplasty: a multicenter study
3:39PM	Jennifer Dotson/Hematology/Oncology	Somatic Mutations and Their Correlation with Tumor Mutation Burden, Survival and Programmed-Death Cell Ligand-1 (PD-L1) Status in Non-Small Cell Lung Cancer
3:51PM	William A Hayes/MUSOM	The use of intra-articular pressure as a diagnostic tool for traumatic knee arthroscopy

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

### 5:00PM - ADJOURNMENT

## RESEARCH DAY AGENDA

### 9:45AM-10:30AM • POSTER PRESENTATIONS SESSION 1 - BASIC SCIENCE AND CASE STUDY

- | No. | Name/Department/ <b>Abstract</b>   |
|-----|--|
| 1.  | Lexie Blalock/Biomedical Sciences<br><b><i>"A Systematic Approach to Identifying the Immunogenic Proteins of the Unculturable Intestinal Commensal, Segmented Filamentous Bacteria."</i></b> |
| 2.  | Gregory Hill/Biomedical Sciences<br><b><i>A Systematic Review of Analgesic Pharmacology In Perioperative Pain Control for Opioid-Tolerant Cesarean Section Patients</i></b>                  |
| 3.  | Lakshmi Sundaram/CTS<br><b><i>Altered localization of Na/K-ATPase alpha-1 subunit is responsible for reduced Na/K-ATPase activity in intestinal epithelial cells in obesity.</i></b>         |
| 4.  | Franklin Shuler/Orthopedic Surgery<br><b><i>Blue light sterilization of Orthopaedically relevant pathogenic bacteria using IlluminOss</i></b>  |
| 5.  | Mathew Schade/Surgery<br><b><i>CARDIOTONIC STEROID RECEPTOR REGULATES NASH ASSOCIATED FIBROSIS IN THE DIET-INDUCED MURINE MODEL</i></b>  |
| 6.  | Skylar Cooper/Biomedical Research<br><b><i>Characterizing the effect tobacco flavors have on nicotine addiction</i></b>  |
| 7.  | Mohammed Ranavaya/Marshall Orthopedics<br><b><i>Comparison of Unicortical and Bicortical Proximal Screws and Short Plate vs Long Plate in a Distal Femur Fracture Model</i></b>              |
| 8.  | Tanner Bakhshi/Biomedical Research<br><b><i>Compensating for histone acetyltransferase mutations in diffuse large B-cell lymphoma with omega-3 fatty acids</i></b>                           |
| 9.  | Christian Harris/Biomedical Sciences\Anatomy, Marshall University<br><b><i>Contribution of force dynamics (dF/dt) to activation of muscle synergies in insect legs</i></b>                   |
| 10. | Jiang Liu/Biomedical Sciences<br><b><i>Dissecting the Na/K-ATPase Signaling complex in Renal Proximal Tubule: A Cysteine-Cysteine Crosslinking Approach</i></b>                              |
| 11. | Alicia Avelar/Biomedical Sciences<br><b><i>Effects of co-injection of nicotine and morphine on nicotinic acetylcholine receptor regulation in mouse midbrain.</i></b>                        |
| 12. | Taha Ahmad/Biomedical Sciences<br><b><i>Effects of Cytochrome P450 2B6 (CYP2B6) Single Nucleotide Polymorphisms on CYP2B6 Activity: Implications for Methadone Metabolism</i></b>            |
| 13. | Benjamin Frear/Biomedical Sciences<br><b><i>Evaluation of Mitochondrial Energy Metabolism and Translation in Clear Cell Renal Cell Carcinoma</i></b>   |
| 14. | Utie Udoh/surgery<br><b><i>Expression and activity of NaK ATPase _-subunit in Diet-induced murine model of Non-alcoholic steatohepatitis (NASH)</i></b>                                      |



## RESEARCH DAY AGENDA

15. Timothy Adkins/Biomedical Sciences  
***Inhibition of Mitochondrial Protein Synthesis to Stimulate the Effect of 4-Hydroxy Tamoxifen in ER(+) Cell Lines***
16. Sara Alastal/Clinical & Translational Sciences  
***Is Na/K-ATPase Signaling Involved in Regulation of Blood Pressure by HO-1?***
17. Franklin Shuler/Orthopedic Surgery  
***Real-time blue light environmental decontamination: intra-operative surgical instrument sterilization***
18. Matthew Cincotta/Department of Biomedical Sciences  
***Redox regulation of behavior changes in diet-induced “stress-less” obese mouse model***
19. Sarah Cole/Biomedical Sciences Toxicology Research Cluster  
***Resveratrol Protection of Doxorubicin Renal Cytotoxicity, Initial Examination of Protein Modifications***
20. Sarah Brunty/Biomedical Science  
***Role of endometriotic peritoneal components on ovarian cell transformation***
21. Shreya Tapan Mukherji  
***Marshall Institute of Interdisciplinary Research  
Role of Na/K-ATPase (NKA) non-enzymatic function in proximal tubule sodium handling***
22. Franklin Shuler/Orthopedic Surgery  
***SABR: Sonic Acoustic Biofilm Removal***
23. Adam Martin/Marshall Institute of Interdisciplinary Research  
***Skeletal Muscle-Specific Na/K-ATPase Alpha One Knock Out Protects against High Fat Diet-Induced Metabolic Complications***
24. Rebecca Pratt/Biomedical Research  
***The Adipocyte Na/K-ATPase Oxidant Amplification Loop is the Central Regulator of Western Diet-Induced Obesity and Associated Comorbidities***
25. Amritta Mallick/Surgery  
***The Effect of pNaKtide & Exercise on Gut-Microbiota Dynamics in a Diet-Induced NASH Murine Model.***
26. Christopher Walker/Biomedical Research  
***The Effects of Adolescent Binge Drinking on Astrocyte Maturation and Synaptic Colocalization***
27. Dipali Nemade/Department of Neurology  
***A case of Embryonal Tumor with Abundant Neuropil and True Rosettes: a distinct genetic locus with an excellent outcome.***
28. Andre Lamyathong/Psychiatry  
***A case report of augmenting treatment of MDD with Methylphenidate patch***
29. Julia Preusch/Psychiatry  
***A Case Series: Review of Aggression and Psychostimulants***
30. Kayla Rodriguez/Family and Community  
***Abnormal Hyperpigmentation after Long Term Minocycline Use***

## RESEARCH DAY AGENDA

31. Samantha Smith/Family and Community  
***Adult Pulmonary Langerhans Cell Histiocytosis with Osseous Involvement, a Diagnostic Conundrum***
32. Mallory Morris/Psychiatry  
***Altered Mental Status and Catatonic features in a patient with profound thiamine deficiency secondary to bariatric surgery***
33. Niccia diTrapano/Obstetrics and Gynecology  
***An Unforeseen Consequence of Dental Braces: Chronic Allergic Dermatitis of the Vulva.***
34. Justin Addicks/Internal Medicine  
***An unusual case of carotid-cavernous fistula in a 78-year-old male with complex imaging diagnosis***
35. Kelechukwu Okoro/Cardiology  
***Anomalous Origin of Left Circumflex Artery from Right Sinus of Valsalva***
36. Karl Shaver/Internal Medicine  
***Bilateral Extracranial Carotid Artery Aneurysms: A Rare Complication of Marfan Syndrome***
37. Jordan Dever/Family and Community  
***Chronic Inflammatory Demyelinating Neuropathy in a Patient Complicated by Diabetes Mellitus***
38. Clare Bajamundi/Psychiatry  
***Delirium Misdiagnosed as Lewy Body Dementia- Case Presentation and Review of Literature***
39. Callie Seaman/Family and Community  
***Diabetic Muscle Infarction: a rare end-organ vascular complication of diabetes***
40. Carly Clark/Otolaryngology  
***Extramedullary hematopoiesis in the sinonasal cavity, a case report and review of the literature***
41. Katherine Addicott/Obstetrics and Gynecology  
***Herpes Simplex Encephalitis During Pregnancy***
42. Adam Schindzielorz/Psychiatry  
***Hypersensitivity to Serotonin Syndrome in Cerebral Palsy***
43. Jennifer Dotson/Marshall University  
***Inferior STEMI and Systemic Emboli Presenting as a Recurrent Ewing Sarcoma in the Lung Invading the Left Atrium with Tumor Thrombi***
44. Dipali Nemade/Department of Neurology  
***Intravenous tPA in treatment of acute stroke related to aortic dissection***
45. Ahmed Amro/Cardiology  
***Kounis Syndrome: A simple MRI with contrast turned into a life threatening condition***
46. Rania AlAsmar/Internal Medicine  
***Life-threatening hemothorax following small-bore thoracocentesis for pleural effusion in patient on clopidogrel.***
47. Taylor Maddox/Family and Community  
***Neonatal withdrawal following in utero exposure to kratom.***

## RESEARCH DAY AGENDA

48. Kamal Patel/Department of Psychiatry and Behavioral Medicine  
***Off Label-Low Dose Naltrexone for Post-Traumatic Stress Disorder***
49. John Young/Department of Orthopaedic Surgery  
***Opioid Restriction Laws for Acute Pain in West Virginia, Ohio, Kentucky, Pennsylvania, Maryland, and Virginia.***
50. Yonas Raru/Internal medicine  
***PULMONARY VEIN THROMBOSIS SECONDARY TO TUBERCULOSIS IN A NON-HIV INFECTED PATIENT***
51. Zachary Curtis/Cardiology  
***Purulent Pericarditis from MRSA Complicated by Cardiac Tamponade in IV Drug Users***
52. Marji McCoy/Psychiatry  
***Pyridoxine Failure in Treatment of Tardive Dyskinesia Complicated by New Onset Depression***
53. Yonas Raru/Internal Medicine  
***RASBURICASE INDUCED SEVERE HEMOLYSIS AND METHEMOGLOBINEMIA IN A CAUCASIAN PATIENT COMPLICATED BY ACUTE RENAL FAILURE AND ARDS***
54. Hannah Datz/Anesthesiology and Pain Medicine  
***Religious-related concerns and animal-derived medications during anesthetic care***
55. Jett MacPherson/School of Medicine  
***Small Bowel Obstruction Secondary to Ascariasis Infection: An Alarming Finding in the Remote Territory of Eastern Honduras***
56. Sydney Smith-Graham/Family and Community  
***Succenturiate Placental Lobe Abruption***
57. Mohamed Suliman/Internal medicine  
***Sympathetic storm***
58. Melissa Nehls/OB/GYN  
***Thrombotic Event Following Nexplanon Placement***
59. Tamara Murphy/Psychiatry  
***Two Ankylosing Spondylitis Patients Treated with Adalimumab Associated with Parieto-Occipital Cerebral Abscesses and Neuropsychiatric Sequelae***
60. Anne DeFruscio/Psychiatry  
***Use of Atypical Antipsychotics in Postpartum OCD***
61. Erika Maynar/Psychiatry  
***Use of Pyridoxine (Vitamin B6) in Treatment of Neuroleptic-Induced Tardive Dyskinesia: A Case Report***
62. Monider 'Monty' Singh/Internal Medicine  
***Virchow's Node: A Case Report of An Extremely Rare Presentation of Metastasis of Adenocarcinoma with Mucinous Features from the Colon***
63. Franklin Shuler/Department of Orthopedic Surgery  
***Wound healing augmented with blue light***

## RESEARCH DAY AGENDA

2:30PM-3:15PM • POSTER PRESENTATIONS SESSION 2 - CLINICAL SCIENCE AND MEDICAL EDUCATION  
ATRIUM, ABSTRACTS PAGE 113

- | No. | Name/Department/ <b>Abstract</b>  |
|-----|---|
| 64. | Rabia Noor/Pediatrics<br><b><i>A Quality Improvement Project To Decrease Burnout and Increase Empathy in Pediatric Residents</i></b>                                    |
| 65. | Kathryn Huggins/Marshall Pediatrics<br><b><i>A Quality Improvement Project to Improve Blood Pressure Measurement and Documentation in Pediatric Resident Clinic</i></b> |
| 66. | Maggie Blackwood/Pediatrics<br><b><i>A Quality Improvement Project to Increase Pediatric Resident Attendance at Low-Risk Deliveries</i></b>                             |
| 67. | Franklin Shuler/Orthopedic Surgery<br><b><i>Abnormal PSA results from Senior Day at Cabell Huntington Hospital</i></b>  |
| 68. | Henry Heisey/Psychiatry<br><b><i>Aggressive Behaviors among Adults with Intellectual or Developmental Disability</i></b>  |
| 69. | Ahmed Amro/Cardiovascular Department<br><b><i>Albumin level as a risk marker and predictor of Peripartum cardiomyopathy</i></b>   |
| 70. | Landon Thompson/Department of Internal Medicine<br><b><i>An Intervention to Improve the Evaluation of Clerkship Students</i></b>  |
| 71. | Rachel Wargacki/Orthopaedic Surgery<br><b><i>Analysis of Carbon Fiber Reinforced Polyetheretherketone Orthopaedic Implants</i></b>                                      |
| 72. | Jerrold Justice/OBGYN<br><b><i>Average Time-to-Conception After Hysterosalpingography Using Oil-Soluble Contrast Media</i></b>  |
| 73. | Vishavpreet Singh/Department of Orthopaedics<br><b><i>Can Aspirin Reduce the Incidence of Persistent Wound Drainage after Total Hip and Knee Arthroplasty?</i></b>      |
| 74. | Giancarlo Acosta/Cardiology<br><b><i>Clinical Determinants of Myocardial Injury among Hypertensive Crisis Patients</i></b>  |
| 75. | Noah Searls/Pharmacy Practice, Administration, and Research<br><b><i>Combative Treatment for Carfentanil Epidemic - Editorial</i></b>                                   |
| 76. | Franklin Shuler/Department of Orthopedic Surgery<br><b><i>Development of an occupational exposure platform: The NSTICK app</i></b>                                      |
| 77. | Andrew Martin/Ob/Gyn<br><b><i>Does multi-generational substance abuse have a deleterious effect on outcomes of pregnant women enrolled in our MARC program</i></b>      |
| 78. | Yuto Nakafuku/Joan C. Edwards School of Medicine<br><b><i>Driving in the Rural Community Dwelling for the Oldest Old</i></b>  |

## RESEARCH DAY AGENDA

79. Ahmed Amro/Cardiology  
***Elevated Diastolic blood pressure (DBP) predicts short-term risk for Acute Coronary Syndrome (ACS) in patients without prior Cardiovascular Disease.***
80. Alex Brenner/Surgery  
***Exploring Surgical Value in Appendectomies***
81. Andrea Hart/Family and Community  
***Family Physicians and Weight Loss Nutrition Counseling in the Huntington, WV Area***
82. Rodrigo Aguilar/Internal Medicine  
***Gender role on inpatient mortality of patients with Takotsubo Cardiomyopathy across CKD Stage 3 to ESRD: A Nationwide Analysis***
83. Morgan Bridwell/Department of Pharmacy Practice, Research and Administration  
***Hospitalized Patients Experiences & Reasons for Taking Prescription Opioids***
84. Kathryn Huggins/Marshall Pediatrics  
***Improving Pediatric Resident Comfort Level with ACGME Required Procedures***
85. Andrew Weaver/Surgery  
***INCIDENCE, PREVALENCE AND MORTALITY OF HEPATOBILIARY & PANCREATIC MALIGNANCIES AT THE GLOBAL, REGIONAL AND COUNTRY LEVEL: 1990 TO 2016. GBD 2018 Study***
86. Emma Nellhaus/Division of Addiction Sciences, Family and Community  
***Inclusion of Positive Self-Reporting by Mothers of Substance-Exposed Neonates Increases the Predictability of NAS Severity Over Toxicology Alone***
87. Cindy Dailey/GME  
***Information Within Residency Monthly Evaluation Forms at Two Institutions***
88. Brian, Sheshadri, Heng, Hoque/Department of Pharmacy Practice, Administration and Research  
***Justification for the Classification of Kratom Herbal Supplement as a Schedule I Drug***
89. Brittani Lowe/Department of Psychiatry and Behavioral Medicine  
***Looking at Suicide and Self-Harm Behaviors in a College Psychiatric Clinic***
90. Heather Katz/Hematology/Oncology  
***Management of Bone Health in Breast Cancer Patients on Aromatase Inhibitors: A Single Institution Review***
91. Dakota May/Orthopedic Surgery, Marshall University Joan C. Edwards School of Medicine  
***Monitoring and Regulation of Operating Room Traffic via the MonitOR System: Revisited One Year Later***
92. Henry Heisey/Psychiatry  
***Multimorbidity among Adults with Intellectual or Developmental Disability***
93. Alicia Heyward/Pediatrics  
***Necrotizing Enterocolitis and Its Association with Neonatal Abstinence Syndrome***
94. Samuel Dungan/Department of Orthopaedic Surgery, Joan C. Edwards School of Medicine  
***Osteomyelitis rates in Huntington and Cabell Co., WV.***

## RESEARCH DAY AGENDA

95. Emelia Winston/Marshall Obstetrics and Gynecology  
***Overtreatment of urinalysis in obstetric triage patients***
96. Mats Lemberger/Family and Community  
***Real-World Treatment of Hepatitis C Virus (HCV): Evaluating Drug Therapy Effectiveness by Tracking Viral Load Progression in WV Medicaid Patients.***
97. Lacey Andrews/Family and Community  
***Relationship Between Patient Malnutrition and Opioid Use Disorder in Rural West Virginia***
98. Rebecca Wingfield/Department of Pediatrics  
***Severity and Type of Parental Stress in Pediatric Patients with Attention Deficit Hyperactivity Disorder (ADHD) Alone vs. ADHD with Coexisting Autism Spectrum Disorder (ASD): A Controlled Study***
99. Timothy Jennings/Pharmacy  
***Sterility of Evzio® Brand Naloxone After Expiration***
100. Rodrigo Aguilar/Internal Medicine  
***THE IMPACT OF GENDER ON IN HOSPITAL MORTALITY OF HYPERTENSIVE PATIENTS ACROSS CKD STAGE 3 TO ESRD: A NATION WIDE ANALYSIS.***
101. Lawrence Wyner/Urology  
***Tweaking the Suprapubic Cystostomy Procedure: New Tricks for an Old Dog***
102. Emily Sloane/Obstetrics and Gynecology  
***Using Patient Satisfaction Questionnaire as an Assessment and Feedback Tool for Medical Students in Third Year Clerkship***



ORAL SESSION I • 8:30 AM – 9:45 AM

# 31ST ANNUAL RESEARCH DAY ORAL SESSION

# **Cytotoxicity, Mitochondrial Function, and Endoplasmic Reticulum (ER) Stress Associated with the Radiocontrast Agent Diatrizoate (DA) in a Human Proximal Tubule Cell Line**

Dakota B. Ward, Kathleen Brown, Monica A. Valentovic

. Department of Biomedical Sciences, Toxicology Research Cluster, Joan C. Edward School of Medicine Marshall University, Huntington, WV USA

## **Background**

Contrast-Induced Acute Kidney Injury (CI-AKI) is the third most common cause of hospital associated kidney damage. Contrast agents are necessary for many diagnostic procedures such as arteriography, venography, and whole body CAT scans. The mechanisms of contrast-induced renal impairment are not entirely known but oxidative stress, diminished renal hemodynamics, and direct cytotoxicity have been hypothesized.

## **Hypothesis**

The hypothesis for this study is that diatrizoate (DA) induces direct cytotoxicity to human proximal tubule epithelial (HK-2) cells via oxidative stress, diminished mitochondrial function, and induced endoplasmic reticulum (ER) stress.

## **Methods**

HK-2 cells were plated for 48 h to equilibrate followed by a 24 h exposure to DA (0-30 mg l/mL). All studies were run with a minimum of 3 independent experiments. Viability was measured at the end of the 24 h period using Cell Countess Trypan Blue exclusion and MTT conversion to formazan. Oxidative stress and ER stress were monitored using Western blot analysis for protein expression. Mitochondrial function was monitored using an Agilent Seahorse analyzer. Agilent Seahorse Cell Mito Stress Tests and Cell Glycolysis Stress Tests were performed on HK-2 cells exposed for 24 h to DA.

## **Results**

Diminished cell function was evident within 24 h beginning with 2 mg l/mL DA as measured by the MTT assay. Western blot analysis indicated a rise in protein carbonylation as a biomarker of oxidative stress following DA exposure relative to vehicle ( $p < 0.05$ ). Basal Oxygen Consumption (OCR) and maximal OCR were diminished by 15 mg l/mL DA relative to control ( $p < 0.05$ ).

## **Conclusion**

DA impaired HK-2 cells by inducing a rise in oxidative stress and diminishing mitochondrial function.



# **Fine-tuning the degradation rate of novel fibrin brain implants**

Arrin Brooks

College of Science, Department of Biomedical Research, Marshall University

## **Background**

Neurological diseases arise from different etiologies but ultimately result in loss of neuronal cells and concomitant functional deficits. The paucity of treatment options has motivated research utilizing stem cells (SCs) to regenerate tissue lost in these diseases.

## **Hypothesis**

We hypothesize that given appropriate scaffolding, endogenous brain SCs can be recruited from native niches to areas of disease and repurposed to regenerate lost tissue. Our innovative method employs fibrin cylinder brain implants that redirect endogenous SCs. These implants must be optimized to withstand degradation long enough to establish a new cellular migratory stream, but eventually degrade leaving behind a replenishable path composed entirely of neural SCs.

## **Methods**

Implant degradation rate can be fine-tuned by incorporating aprotinin, a protease inhibitor. Because aprotinin rapidly diffuses out of fibrin, the crosslinking agent disuccinimidyl suberate (DSS) was also added to matrix solution. First, in vitro studies using increasing aprotinin concentrations incorporated into fibrin were cultured with neural SCs and the rate of matrix degradation measured over 2 weeks. Additionally, fibrin cylinders containing increasing aprotinin concentrations were implanted into rat brains and the amount of remaining matrix was observed at 4 weeks post-implant via light-sheet microscopy of cleared brain samples.

## **Results**

Aprotinin slows fibrin degradation in vitro and in vivo in a dose-dependent manner. Fibrin alone degrades to completion by day 4 in vitro, while incorporating higher aprotinin concentrations (30 $\mu$ M and up) no degradation was observed after 2 weeks. Similar aprotinin dose-dependent degradation resistance was demonstrated in vivo.

## **Conclusion**

Our novel brain implants can recruit brain SCs to other brain regions and degrade in a controlled manner. We were able to fine-tune the degradation rate of our hydrogel matrix by simple addition of aprotinin and DSS. This procedure shows therapeutic promise for many neurological conditions that result in neurodegeneration, as it can replace lost neural cells to regenerate brain tissue.

# Investigating the role of astrocytes in the development of synaptic connectivity in neonatal abstinence syndrome

Taylor Boggess, Chris Risher

Biomedical Sciences, Joan C. Edwards School of Medicine, Marshall University

## Background

Neonatal abstinence syndrome (NAS) has become a major health concern in the United States and Central Appalachia in particular as a result of the widespread opioid epidemic. Recently, Marshall University physicians have noted a specific clinical presentation of NAS in infants prenatally exposed to opioids and gabapentin, a drug commonly given for the treatment of pain and seizure. Interestingly, gabapentin is also known to inhibit the development the synaptic pathways in the brain by interfering with signaling proteins (i.e. thrombospondins) derived from non-neuronal brain cells called astrocytes.

## Hypothesis

We hypothesize that the progression of NAS is dependent on impaired astrocyte synaptogenic signaling in the developing brain.

## Methods

In this study, a mouse model of NAS was developed using mice transgenic for the thrombospondin/gabapentin receptor,  $\alpha 2\delta$ -1. Pregnant dams were given daily access to buprenorphine (5 mg/kg) and gabapentin (30 mg/kg) in a condensed milk mixture from gestational day 7 until approximately 11 days following the birth of their litter. The pups were then sacrificed at postnatal day 21 (P21). 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 fluorescent markers of the presynaptic protein VGluT1 and postsynaptic PSD95. Stained sections were then imaged on a Leica SP5 confocal microscope and analyzed for co-localized synaptic puncta number using a custom ImageJ plugin.

## Results

At P21, heterozygous  $\alpha 2\delta$ -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.

## Conclusion

Brain areas associated with addiction underwent significant synaptic reorganization following prenatal drug exposure. Future experiments will determine whether the extent of reorganization is shifted in an  $\alpha 2\delta$ -1-dependent manner, suggestive of astrocyte involvement in the pathology of NAS.

## **NaKtide attenuates Atherosclerosis by Blocking Adipocyte Na/K- ATPase/ROS Amplification in ApoE -/- Mice fed a Western Diet**

Hari Vishal Lakhani, Muhammad A. Chaudhry, Tilak Khanal, Joseph I. Shapiro, Komal Sodhi

Departments of Internal Medicine, Surgery and Biomedical Sciences, Joan C. Edwards School of Medicine, Marshall University, Huntington, WV.

### **Background**

Atherosclerosis is associated with well-known risk factors such as obesity and is known to occur in a state of oxidative stress. We and others have also observed that the adipocyte itself is an important source of oxidant stress in models with obesity/metabolic syndrome. We have previously reported that the  $\alpha 1$  subunit of the Na/K-ATPase acts as an amplifier for ROS. We have also shown that blockade of this amplification with peptide, NaKtide, ameliorates oxidative stress and obesity in mice subjected to WD.

### **Hypothesis**

We hypothesize that adipocytes create systemic oxidant stress through the Na/K-ATPase feed-forward oxidant amplification loop in atherosclerosis and serve as a therapeutic target for this condition.

### **Methods**

Male ApoE<sup>-/-</sup> (KO) mice were fed either normal chow or a WD, with or without NaKtide. NaKtide was transfected with lentivirus coupled to the adiponectin promoter for expression in adipose tissue. Mice were randomly divided into 6 groups: (1) Control, (2) Control+GFP, (3) Control+NaKtide (4) ApoE KO+WD, (5) ApoE KO+WD+GFP, (6) (6) ApoE KO+WD+NaKtide. Following 12 weeks of study, the animals were sacrificed, subsequently tissues and plasma samples were collected for metabolic function, lipid profile and biochemical analysis. Aortas were dissected and quantification of aortic lesions was done.

### **Results**

Our results show that NaKtide improved glucose tolerance in ApoE<sup>-/-</sup> mice fed a western diet. Mice fed a WD had increased plaque size which was significantly decreased by NaKtide treatment. Further our results showed that NaKtide improved the level of plasma inflammatory cytokines, TNF- $\alpha$ , IL-6 and MCP-1, in mice fed a western diet. NaKtide decreased inflammation and macrophage infiltration in adipose tissue as compared to control and more so with WD.

### **Conclusion**

This study suggests that the adipocyte Na/K-ATPase/ROS signaling cascade is a possible mechanism for the development of atherosclerosis associated with the metabolic syndrome phenotype and NaKtide presents a potential novel treatment for these pathologies.

# Regulation of Adipogenesis by $\alpha 1$ Na<sup>+</sup>/K<sup>+</sup>-ATPase via Its Conserved Caveolin Binding Motif

Minqi Huang, Liquan Cai, Sandrine Pierre, Zijian Xie  
Marshall Institute for Interdisciplinary Research

## Background

In addition to its role as an ion pump, Na/K-ATPase (NKA)  $\alpha 1$  isoform forms a signal receptor complex with the non-receptor tyrosine kinase Src and the scaffolding protein caveolin-1. Stimulation of this receptor leads to an activation of Src/ERK cascade and an increase in generation of reactive oxygen species (ROS). Pharmacological inhibition of the NKA-mediated signal transduction has been shown to inhibit adipogenesis and high fat diet-induced obesity. However, there is no genetic evidence supporting a role of  $\alpha 1$  NKA in the regulation of adipogenesis.

## Hypothesis

$\alpha 1$  Na<sup>+</sup>/K<sup>+</sup>-ATPase regulates adipogenesis via its conserved caveolin binding motif

## Methods

We employed CRISPR/Cas9 system to mutate a conserved caveolin-binding motif (F97A and F100A) in the gene coding for  $\alpha 1$  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. Following up we measured mitochondrial function and metabolic profiling in CBM adipocytes.

## Results

We found that the CBM mutant human iPSC are capable of differentiation into adipocytes. However, Oil Red O staining indicated a significant reduction in lipid accumulation during adipocyte maturation in the mutant cells. This observation was confirmed by electron microscopy imaging and by changes in the expression of adipocyte marker genes. Mechanistically, the loss of CBM in ATP1A1 resulted in alteration in mitochondrial structure and function. This was further validated by metabolic profiling.

## Conclusion

Taken together, these results indicate an important role of NKA-mediated signal transduction in adipogenesis through a regulation of mitochondrial structure and function. Thus, we suggest that NKA-mediated signal transduction may serve as a new target for developing therapeutic avenues in the management of obesity and metabolic syndromes.

# THE EFFECTS OF SW299033 ON NASH ASSOCIATED FIBROSIS IN THE RODENT.

Schade M MSc, Sanabria JA BSc, Aguilar R MD, Andryka M MD, Mallick A PhD, Piaskowski M, and Sanabria J MD MSc.

Department of Surgery and Marshall Institute for Interdisciplinary Research (MIIR) at Marshall University Joan Edwards School of Medicine, Huntington WV, Department of Nutrition and Metabolomic Core Facility, Case Western Reserve University School of Medicine, Cleveland OH

## Background

Non Alcoholic Liver Disease (NAFLD) and its complications, NASH, ESLD and HCC have become the second most common cause for liver transplantation in the West. We have developed SW299033, a selective inhibitor of 15-hydroxyprostaglandin dehydrogenase (15-PGDH), a prostaglandin-degrading enzyme that potentiates tissue regeneration in multiple organs.

## Hypothesis

The purpose of the present studies was to test the efficacy SW299033 developed by our group in reversing the liver disturbances produced by NASH

## Methods

C57Bl/6J mice (female: n=7, per each time point) were exposed to normal chow (NMC group, Control -) or high fat diet + fructose (HFD, Western diet). Mice on HFD was not treated or treated with SW033299 or exercise. Body composition was determined by MRI spectroscopy. Quantitative protein expression of genes involved in cell metabolism or cell senescence were determined by Western Blots. Metabolic profiles were measured on treated plasma by LC/MS-MS. Principal component analyses (PCA) were conducted to detect metabolite differences among groups

## Results

The total body weight corrected by aging increased significantly in the HFD due to an increase in the fat compartment with similar lean mass and total body water (HFD vs normal chow, p<0.05). The number of cells in senescence and the apoptotic index were significantly decreased in both the SW and Exe groups when compared to the HFD (p<0.05) and no difference was noted when intervention groups were compared to the NMC. In addition, the deposition of collagen was significantly lower in SW/Exe groups when compared to the HFD group, where animals showed bridging liver fibrosis by W24. Glutathione sp., mitochondrial  $\beta$ -lipid oxidation function and glucose tolerance patterns after censored for aging followed similar trends among groups (p<0.05).

## Conclusion

SW299033 not only prevent but reverse NASH due to high fat diet in the rodent model. Further understanding on the mechanisms should guide us towards a translational approach.





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

**31ST ANNUAL  
RESEARCH DAY  
ORAL SESSION**

# The regulation and function of L-Type Amino Acid Transporter 1 in response to adipokines in human breast cancer cells

Travis B Salisbury

Biomedical Sciences, Marshall University

## Background

Breast cancer is the second most common cancer and the second leading cause of cancer death among women in West Virginia/Central Appalachia. One out of every three cancer deaths are linked to excess body weight and West Virginia has the highest rates of obesity in the country. Obese postmenopausal women have higher rates of breast cancer incidence, are less responsive to cancer therapy and have worse clinical outcomes than non-obese women. The essential amino acid leucine is elevated in obesity, and it promotes cancer by functioning as an mTOR agonist. The uptake of extracellular leucine by breast cancer cells occurs through L-Type Amino Acid Transporter 1 (LAT1).

## Hypothesis

We hypothesized that adipocytes secrete paracrine factors (termed adipokines) that induce LAT1-mTOR signaling in breast cancer cells.

## Methods

Cell culture, western blot, and cell colony forming assays using MCF7 human breast cancer cells were conducted.

## Results

To investigate our hypothesis, we applied adipocyte-secreted factors (ASFs) to human MCF7 breast cancer cells. ASFs significantly ( $P \leq 0.05$ , N4) increased (~60%) the levels of LAT1 protein in MCF7 cells. Increases in LAT1 correlated with increases in mTOR activity, as measured by a 6-fold increase in the phosphorylation of the mTOR target protein p70 S6 Kinase. Next we used the colony formation assay to investigate whether the uptake of extracellular leucine by LAT1 is critical for MCF7 cell proliferation/survival. The LAT1 antagonist BCH has been shown to inhibit (>90%) leucine uptake by MCF7 cells. BCH (20 mM) treatment significantly ( $P \leq 0.05$ ) reduced (by 70%) MCF7 colony formation. Supporting a role for leucine, was finding that its absence from cell culture medium suppressed (by 97%) MCF7 colony formation.

## Conclusion

Collectively, these data indicate that MCF7 cells are remarkably dependent on extracellular leucine, and support our hypothesis to suppress leucine-stimulated mTOR1 to inhibit breast cancer in obesity.



## **The Role of the Adipocyte Na/K-ATPase Oxidant Amplification Loop in Uremic Cardiomyopathy**

Hari Vishal Lakhani, Komal Sodhi, Muhammad A. Chaudhry, Athar Nawab, Xiaoliang Wang, Brian Snoch, Rebecca Pratt, Jiang Liu, Nader G. Abraham, Zijian Xie, Joseph I. Shapiro

Departments of Surgery, Internal Medicine and Biomedical Sciences, Joan C. Edwards School of Medicine, Marshall University, Huntington, WV

### **Background**

Oxidant stress resulting from chronic kidney disease leads to increase morbidity and mortality associated with cardiovascular disease. We have previously demonstrated that systemic administration of pNaKtide, a specific antagonist of Na/K-ATPase signaling, could ameliorate the experimental uremic cardiomyopathy.

### **Hypothesis**

As adipocyte contribution to systemic disease has become an important topic, we aimed to determine how adipocyte specific targeting of NaKtide, the component of pNaKtide that inhibits Src kinase but lacks the cell-permeant sequence derived from TAT, would affect the development of uremic cardiomyopathy. We also examined the effect of western diet (WD) on the development of uremic cardiomyopathy, using partial nephrectomy (PNx) mice model, with or without NaKtide targeted specifically to adipocytes.

### **Methods**

C57Bl6 mice (10 weeks old; male) were randomly divided into 7 groups: (1) Sham, (2) Sham+WD, (3) Sham+WD+NaKtide (4) PNx, (5) PNx+NaKtide, (6) PNx+WD, and (7) PNx+WD+NaKtide. Metabolic function was assessed via blood pressure readings, glucose tolerance tests, and echocardiography.

### **Results**

C57Bl6 mice developed cardiomyopathy characterized by diastolic dysfunction and left ventricular hypertrophy 4 weeks after PNx. Concomitant administration of WD worsened these changes as well as exposed systolic dysfunction ( $p < 0.01$ ). Transfection with a lentivirus delivering NaKtide expression coupled to an adiponectin promoter normalized cardiac abnormalities in mice subjected to PNx and PNx + WD. We also observed that these mice had normal hematocrit values as well as normal levels of circulating IL-6, TNF $\alpha$ , MCP-1 and marker of macrophage infiltration, F4/80, which differed from the PNx and PNx + WD mice (both  $p < 0.01$ ). Control transfection with either an empty vector or NaKtide coupled to the MyoD promoter for expression in skeletal muscle did not affect uremic cardiomyopathy.

### **Conclusion**

Our study demonstrates that adipocytes contribute to the oxidant stress associated with uremic cardiomyopathy. These data suggest that the adipocyte Na/K-ATPase signaling may be a viable clinical target for the prevention or treatment of uremic cardiomyopathy.

# The Unique Regulation Of Ethanol on Sodium-Dependent Glutamine Cotransport In Intestinal Epithelial Cells

Molly Rae Butts, Soudamani Singh, Uma Sundaram

Clinical and Translational Science, Joan C. Edwards School of Medicine

## Background

Background: Malnutrition is common in alcoholism, possibly due to suboptimal nutrient intake. However, how alcohol may affect the intestinal absorption of nutrients is not known. Glutamine is the primary nutrient source of the mammalian small intestinal enterocyte. Glutamine is absorbed on the brush border membrane (BBM) of intestinal absorptive villus cells via the sodium-dependent glutamine cotransporter B0AT1 (SLC6A19). How ethanol may affect B0AT1 is not fully understood.

## Hypothesis

Hypothesis: Ethanol uniquely regulates B0AT1 in intestinal epithelial cells.

## Methods

Methods: Intestinal epithelial cells (IEC-18) grown to confluency were exposed to 8.68mM (0.04% blood alcohol content equivalent) ethanol at specific time points. Sodium-dependent <sup>3</sup>H-glutamine uptake was conducted to determine B0AT1 activity. Na/K-ATPase activity were measured as a function of inorganic phosphate release. Western blot and immunocytochemistry analysis was performed with the appropriate B0AT1 antibodies.

## Results

Results: Ethanol significantly decreased B0AT1 activity at one hour (control: 1285±36.7 pmol/mg protein\*2min; ethanol: 874±74.9, n=6, p=0.0006). Since the Na/K-ATPase provides the favorable sodium gradient for B0AT1, its activity was measured. Ethanol reduced Na/K-ATPase activity at one hour (control: 22.8±1.83 nmol/mg protein\*min; ethanol: 10.7±1.03, n=6, p=0.0002). Kinetic studies showed a decrease in the maximal rate of uptake at one hour (V<sub>max</sub> in control: 1.48±0.03 nmol/mg protein\*30sec; ethanol: 1.29±0.03; n=4, p=0.01). Western blot and immunocytochemistry studies demonstrated a significant decrease in B0AT1 protein in ethanol-treated cells at one hour.

## Conclusion

Conclusions: Ethanol directly inhibits the absorption of glutamine in intestinal epithelial cells by two distinct mechanisms: inhibition at the BBM by decreasing cotransporter numbers as well as secondary to the altered sodium gradient. Therefore, ethanol alters the assimilation of nutrients, like glutamine, at the level of the intestinal epithelial cell, which may be a vital step in the onset of alcohol-based malnutrition.

# Thymidine Phosphorylase Enhances Diabetes-associated High-risk of Thrombosis

Adam Belcher, Wei Li

Department of Biomedical Sciences, Marshall University School of Medicine

## Background

Type-II diabetes mellitus (T2DM) currently affects more than 30 million people in the US and the leading cause of death among those patients is due to cardiovascular disease (CVD) events, such as myocardial infarction and ischemic stroke. These two life-threatening events are caused by a blood clot, called a thrombus, that forms in either the coronary or cerebral arteries due to platelet activation and aggregation. Antiplatelet therapeutics reduce the risk of thrombosis, but do not work as well in diabetic patients and come at the cost of potentially serious side effects. Therefore, it is imperative to explore novel mechanisms to prevent thrombosis and attenuate the higher risk seen with T2DM. We recently found that thymidine phosphorylase (TYMP) deficient mice had an impaired thrombus formation *in vivo* and reduced platelet activation and aggregation *in vitro*. This could be due to TYMP inhibiting the activity of Lyn, which plays important roles during platelet activation.

## Hypothesis

Plasma levels of TYMP are elevated in patients with T2DM, therefore we hypothesize that inhibition of TYMP could attenuate T2DM-associated high-risk of thrombosis.

## Methods

We fed *Tymp*<sup>-/-</sup> and wild type C57BL/6J (WT) mice with a 60% high fat diet for 16 weeks to induce obesity associated T2DM, which was monitored with glucose and weight measurements. A FeCl<sub>3</sub>-induced carotid artery injury thrombosis model was used to measure differences in thrombosis formation between the mice.

## Results

We found that TYMP deficient mice had lower fasting blood glucose levels, less gain of body weight, and better glucose tolerance when compared to WT animals. TYMP deficient mice also had a lower rate of thrombosis from carotid artery injury.

## Conclusion

These data provided new avenues for assessing the interplay of diabetes and thrombosis for our future studies.

# **CHOLINE-BINDING PROTEIN A ASSOCIATED WITH RESISTANT SEROTYPES OF INVASIVE STREPTOCOCCUS PNEUMONIAE.**

Ifeoluwatomi Fuwape, Ronald J. Stanek, Nancy B. Norton, Maurice A. Mufson.  
Marshall University Joan C. Edwards School of Medicine and Hershel Woody Williams  
VAMC, Huntington, WV.

## **Background**

*Streptococcus pneumoniae*, the cause of invasive pneumococcal disease, contains multiple choline-binding proteins in its cell wall and membrane. One of those choline-binding proteins, choline-binding protein A (CbpA), is a highly-variable, cell-surface protein and virulence factor.

## **Hypothesis**

We investigated the relationship of CbpA to penicillin resistance in *S. pneumoniae*.

## **Methods**

We recovered 199 *S. pneumoniae* isolates from normally sterile sites of patients with invasive pneumococcal disease (IPD) admitted to three affiliated hospitals from 1981 to 2014. For this study, 46 isolates of the total were serotyped by quelling reaction and penicillin susceptibility determined by ETEST.® We extracted genomic DNA from all isolates and amplified the *cbpA* gene with PCR. PCR products were visualized with gel electrophoresis and sequenced. Of the 46 isolates, we successfully amplified and sequenced the *cbpA* gene in 38 isolates. For analysis, we combined the results of this study with the CbpA amino acid sequences obtained from 140 isolates of our original 199 isolates.

## **Results**

We examined the amino acid sequences of 152 isolates that clustered together in a phylogenetic tree. A sequence of 8-10 amino acids inserted in the N-terminal segment of CbpA was identified in nine serotypes that develop intermediate and resistance to penicillin. This insert was identified in 16 of 19 resistant isolates, 6 of 24 intermediate and 14 of 109 susceptible isolates and was absent from all 59 isolates of four serotypes that do not develop resistance.

## **Conclusion**

An altered amino acid sequence of the CbpA protein identified in nearly all penicillin-resistant isolates and in intermediate and susceptible isolates of serotypes known to develop penicillin resistance suggests that a function of the altered cell surface protein has influenced the development of penicillin resistance in *S. pneumoniae*.



ORAL SESSION III • 1:15 PM – 2:30 PM

# 31ST ANNUAL RESEARCH DAY ORAL SESSION

## **Comparison of The Acute Effects of Mainstream Cigarette Smoke to Oral Nicotine Spray on Electrocardiogram Intervals: Preliminary Results.**

Affan Irfan, Madison Crank, Lonnie Lucas, Meagen Carter, George Koromia, Waiel Abusnina.

Department of Cardiology, Joan C. Edwards School of Medicine, Huntington, WV.

### **Background**

Smoking contributes to cardiovascular disease risk with a strong dose response relationship between cigarette smoking and arrhythmic risk. Which individual tobacco smoke constituents and biological pathways mediate this increased risk remains unclear. However, nicotine may drive some of the effects of smoking through sympathetic neural stimulation and systemic catecholamine release.

### **Hypothesis**

We propose that the acute effects of cigarette smoking on Electrocardiogram (ECG) are mediated via nicotine.

### **Methods**

Healthy active smokers (age 18-65 years) were recruited. The participants abstained from all tobacco/nicotine and related products for 8 hours before each visit. 12 lead ECG was recorded before (5 minutes indoor), during (20 minutes outside), and after exposure (5 minutes indoor) to a cigarette (participants preferred brand with nicotine 0.8-1.4 mg) or nicotine spray (4 mg oral spray). The exposures/visit days were at least 24 hours apart. Active enrollment is ongoing. Here we present preliminary results of 15 smokers who completed a 2-day visit.

### **Results**

The RR interval, PR interval, QT interval, JT interval, and Tpeak-Tend significantly decreased during the two exposures and returned to baseline post exposure ( $p < 0.05$ ); whereas corrected QT interval, QRS duration, and P duration remained unchanged. Within the first 5 minutes, nicotine and cigarette smoking both had similar increase in heart rate. However, throughout the rest of the 20-minute exposure period, cigarette smoking resulted in significantly higher heart rate compared to nicotine ( $p < 0.001$ ). The PR interval and JT interval were also shortened to greater extent by smoking exposure compared to nicotine spray ( $p < 0.001$ ). The Tpeak-Tend was similarly affected by the two exposures.

### **Conclusion**

The effects of smoking and nicotine on ECG parameters seem to be related to increases in chronotropy, dromotropy and lusitropy with greater effects from cigarette smoking than nicotine exposure. This suggests nicotine mediates some but not all cigarette smoking-related acute effects on ECG.

# **Correlations Among Echocardiographic Parameters in Patients with Chronic Renal Failure.**

Ahlim Alsanani, Zeid Khitan, Joseph I. Shapiro and Ellen A. Thompson.  
Joan C. Edwards School of Medicine, Marshall University.

## **Background**

Echocardiography has been established as the preferred, noninvasive method for examining cardiac morphology and function. As there are relationships between many of the measured and calculated parameters obtained with routine echocardiography, we sought to examine whether these relationships or correlations might vary depending on the presence of disease.

## **Hypothesis**

Echocardiographic parameters have varying degrees of correlation with each other. We hypothesized that the pattern of correlations might be altered by disease processes.

## **Methods**

To examine this, we reviewed 100 sequential outpatient echocardiograms performed at our institution during 2017. Immediately before the study, blood pressure was performed in the echo lab.

## **Results**

We found that the correlation pattern was not altered appreciably by the presence of hypertension, diabetes or coronary artery disease. However, CKD produced a different pattern. Quantifying this with a distance function, we can see that the distance function for the hypertension pair is  $0.162 \pm 0.004$ , the diabetes pair is  $0.166 \pm 0.004$  and coronary artery disease pair is  $0.165 \pm 0.004$  which are not statistically different from each other. In contrast, the chronic kidney disease pair has a distance of  $0.212 \pm 0.005$  which is very different from the other pairs (all  $p < 0.01$ ).

## **Conclusion**

We found that the presence of CKD was associated with a marked change in the visual correlation pattern as well as a demonstrable difference in autocorrelation coefficients. If these data are confirmed by a larger study, examining the autocorrelation pattern may provide insights into how CKD affects cardiac morphology and function.

## **Is Fever a Marker for Further Investigation in Children with RSV Bronchiolitis?**

Dominique Elmore, Yaslam Balfaqih, Thomas Magrane, Anthony Abadir, Krista Putty, Saloni Bhatt, Marie Frazier, Susan Flesher

Department of Pediatrics, Joan C. Edwards School of Medicine, Huntington, WV

### **Background**

The American Academy of Pediatrics bronchiolitis guidelines advise against unnecessary testing and interventions, as treatment is supportive care (Bronchiolitis 2014). A challenge is knowing when additional testing is warranted. In our experience, most children with RSV are afebrile; febrile children seem to have a more severe course. Research shows that the risk of sepsis or meningitis in children with RSV is very low, but concomitant urinary tract infection occurs and should be investigated (Titus and Wright, Pediatrics, 2003). Secondary bacterial pneumonia is a potential complication of RSV (Thorax 2006, J Thoracic Dis 2018, PLoS Medicine 2015). While sepsis and meningitis are unusual in children with RSV, fever may be a marker for investigation for bacterial infection such as urinary tract infection/pyelonephritis, secondary bacterial pneumonia, or otitis media.

### **Hypothesis**

Fever in children with RSV is a marker for bacterial infections including UTI/pyelonephritis, bacterial pneumonia, and otitis media.

### **Methods**

A retrospective study of 178 children 2 years and younger diagnosed with RSV admitted to our pediatric floor and PICU from July 1, 2015 to June 30, 2017. We investigated fever occurrence, and diagnoses with otitis media, UTI/pyelonephritis, or bacterial pneumonia. Data was analyzed using Pearson Chi Square or Fisher's exact test and the incidence rate ratio was calculated.

### **Results**

Of the 178 children, 73 (41%) had fevers, with 105 (59%) being afebrile. Of those with fever 57/73 (78%) had a secondary bacterial infection. Of those without fever 32/105 (30%) had a secondary bacterial infection. The incidence rate of secondary bacterial infection in febrile children with RSV is 2.6 times higher than in afebrile children. ( $p=0.00$ ) (95% confidence interval).

### **Conclusion**

Seventy eight percent of febrile children with RSV had a secondary bacterial infection of UTI/pyelonephritis, bacterial pneumonia, or otitis media. Fever is a marker that warrants further investigation in children with RSV.



# **Mental Health in Appalachian vs. Non-Appalachian College Students**

Brittani Lowe, Kristina Bryant-Melvin, Suzanne Holroyd

Marshall University, Department of Psychiatry and Behavioral Medicine

## **Background**

Appalachia is a rural area known to have limited availability and access to mental health care. These factors, along with a number of others (poverty, stigma/cultural issues, etc.), may combine and become significant enough to create differences in psychiatric profiles that manifest in college students in this area. Such information would be critical in planning for appropriate treatment and access to care.

## **Hypothesis**

The purpose of this research is to investigate and describe Appalachian college students seeking psychiatric care, and in particular, to determine if Appalachian students differed from students from non-Appalachian regions.

## **Methods**

We conducted a retrospective chart review of 150 patients who sought psychiatric care from an on-campus psychiatric clinic at a southern Appalachian university (Marshall University). Demographic and clinical data were collected, entered into SPSS, and analyzed.

## **Results**

Preliminary results indicate that Appalachian students were significantly more likely to be diagnosed with a depressive disorder (81.1% of Appalachian students vs 57.1% of non-Appalachian students,  $p=0.007$ ). Similarly, Appalachian students were significantly more likely to have any anxiety disorder (65.5% vs 39.3%,  $p=0.010$ ). Appalachian students were also significantly more likely not to have had psychiatric or mental health care prior to college (45.1% vs 14.3 %,  $p= 0.003$ ).

## **Conclusion**

It appears Appalachian students are less likely to have had mental health care prior to college and are more likely to have depressive or anxiety disorders. Results and a review of the literature will be presented.

# **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**

Cecilia Nease, James Lewis, Kristen Hyberg  
Department of Pediatrics, Joan C. Edwards School of Medicine

## **Background**

ADHD and obesity are common and often comorbid conditions in pediatric populations. While research has demonstrated that treatment of ADHD with stimulant medication typically results in a concomitant (and often appropriate) decrease in BMI, the prevalence of weight gain during treatment is a potentially underestimated and poorly understood issue.

## **Hypothesis**

To determine risk factors for weight gain during stimulant treatment in pediatric patients with ADHD.

## **Methods**

Data were obtained from the electronic health records of pediatric patients receiving effective stimulant therapy for the treatment of ADHD from 2009 to 2013. Patients were diagnosed and treated by one behavioral pediatrician following current American Academy of Pediatrics guidelines. Body mass index (BMI) values were recorded from the onset of treatment at 3-6 month intervals over a 2 year follow up period. Chi-squared and odds ratio tests were conducted to test whether likelihood of weight gain varied by initial BMI, medication type, ADHD subtype, demographic variables, comorbidities, and concurrent medications.

## **Results**

Of 265 total patients, 27.1% (n=72) showed an increase in BMI, with a mean percentile increase of 12.04 over 2 years of follow up in this group. Children diagnosed at ages 8-10 years (OR 1.95) and 11-13 years (OR 4.71) showed a higher odds of weight gain. Patients with BMIs in the obese range at diagnosis showed a lower odds of weight gain (OR 0.18). Odds of weight gain did not significantly differ based on gender, insurance status, ADHD subtype, comorbidities, or concurrent medications.

## **Conclusion**

These findings demonstrate that children who begin stimulant treatment for ADHD in late childhood and particularly early adolescence are at an increased risk for weight gain. Given the substantial health burdens associated with excessive childhood weight gain, it is important to early identify these risk factors to provide modification in this child and adolescent population.



ORAL SESSION III • 3:15 PM – 4:03 PM

**31ST ANNUAL  
RESEARCH DAY  
ORAL SESSION**

# Physician Compliance with Obesity Guidelines and Related Complications

Meghan Pauley, Deborah Preston, and Yoram Elitsur

Department of Pediatrics, Gastroenterology, Marshall University Joan C. Edwards School of Medicine, Huntington, WV.

## Background

Pediatric screening guidelines regarding obesity and associated complications have been published by various expert organizations, recommending classifying BMI in addition to obtaining fasting glucose and insulin levels, aminotransferases, and lipid profiles for obese patients. Additionally, abdominal ultrasound (US) and Vitamin D (Vit D) are recommended to screen for fatty liver (NAFLD) and Vit D deficiency.

## Hypothesis

Based on clinical experience in our gastroenterology clinic, we hypothesize a lack of adherence to those guidelines by referring primary care physicians (PCP).

## Methods

In a retrospective study, we assessed the adherence of PCPs to the screening guidelines for obese children. All charts of obese children (BMI  $\geq$  95%tile) referred to the GI clinic for problems other than obesity were retrospectively reviewed. Initial screening data for obesity performed by the referring PCP were retrieved, including: glucose, insulin, liver function tests (LFTs), lipid profile, abdominal US, and Vit D levels. Children who had incomplete or no screening by the referring PCP were further evaluated at our clinic and the data were analyzed.

## Results

A total of 125 charts were reviewed. The diagnosis of obesity was made by the referring PCP in 37 (30%) children. Additional laboratory data included: fasting glucose in 31 (25%) patients, fasting insulin in 3 (2%), HOMA-2 calculations evaluating insulin resistance in 0, HbA1C in 3 (2%), Vit D in 3 (2%), lipid profile in 7 (6%), LFTs in 31 (25%), and abdominal US in 17 (14%) patients. Complimentary data performed by the GI service showed referring PCPs failed to recognize obesity related complications in many children.

## Conclusion

The data demonstrates most PCPs did not follow obesity screening guidelines and often missed early complications of obesity. We recommend a national awareness campaign for screening obese children is warranted in order to reduce morbidity in obese children.

## **Risk factors for stiffness after primary and revision total knee arthroplasty: a multicenter study**

Shahi, Alisina MD, Sayan, Ardalan MD, Singh, Vishavpreet MD, Usama Hassan Saleh MD, Oliashirazi, Ali MD  
Marshall, Department of Orthopedic Surgery

### **Background**

Arthrofibrosis is a debilitating complication of total knee arthroplasty (TKA). It is one of the leading causes of hospital readmission and a predominant factor for TKA failure. Risk factors of arthrofibrosis after primary TKA are well established, however, there is a paucity of literature identifying these risk factors after revision TKA (rTKA).

### **Hypothesis**

Preoperative narcotic use, smoking, anxiety and/or depression, diabetes, obesity, age, race, rheumatoid arthritis, and sex are not significant risk factors for arthrofibrosis

### **Methods**

Upon institutional review board approval we conducted a multicenter retrospective study and reviewed patients who underwent TKA and rTKA between 2008-2017. Possible risk factors analyzed included preoperative narcotic use, smoking, anxiety and/or depression, diabetes, obesity, age, race, rheumatoid arthritis, and sex. Multivariate logistic regression was used to determine odds ratio.

### **Results**

In total, 10,842 TKAs were included in the study of which 3,247 were rTKA. 1.9% of patients (n=206) underwent MUA after surgery. 72% of MUAs occurred within the first 3 months postoperatively. Young patients (<50 years) had significantly higher odds of MUA after rTKA (6.5,  $P < .0001$ ). The remaining significant risk factors in descending order were: obesity (odds ratio [OR]: 5.1, 95% Confidence Interval [CI]: 3.8-6.9), diabetes (OR: 4.7, 95%CI: 3.5-5.8), smoking (OR: 3.9, 95%CI: 2.1-4.6), rTKA (OR: 3.6, 95%CI: 2.8-4.8), and rheumatoid arthritis (OR: 2.4, 95%CI: 1.5-3.3).

### **Conclusion**

In this large multicenter cohort study, 1.9% of patients underwent MUA after TKA and rTKA. Younger patients were 6 times more likely to have a MUA than patients over 50 years old. Determining these risk factors and utilizing the preoperative risk calculator designed based on these risk factor will help the surgeons to identify the patients who are at higher risk and modify them prior to an elective TKA.

# **Somatic Mutations and Their Correlation with Tumor Mutation Burden, Survival and Programmed-Death Cell Ligand-1 (PD-L1) Status in Non-Small Cell Lung Cancer**

Jennifer Dotson, D.O., Suto Akpanudo, M.D., Muhammad Omer Jamil, M.D.  
Hematology/Oncology, Marshall University

## **Background**

In recent years, treatments for non-small cell lung cancer (NSCLC) have expanded to include targeted therapies and immune checkpoint inhibitors in addition to traditional treatments. These newer modalities of treatment require testing with next-generation sequencing (NGS) testing, which offers testing for hundreds of somatic mutations, both with known and unknown significance. Tumor mutation burden (TMB), which is the number of mutations per coding sequence, is also reported on NGS. Patients with targetable mutations or a high TMB have been found to have improved survival and higher responses to immunotherapy, respectively. We wanted to investigate whether the total number of mutations (both with known and unknown significance) had any association with PD-L1 status, TMB and overall survival.

## **Hypothesis**

We hypothesize that higher number of mutations may be associated with higher overall survival, as well as tumor mutation burden and PD-L1 status.

## **Methods**

This was a single institution, retrospective study of 51 patients with stage I-IV NSCLC.

## **Results**

In our study, we found that there was a significant correlation between the number of mutations and TMB in all patients with NSCLC ( $p=0.001$ ), including adenocarcinoma ( $p=0.005$ ). We found that the number of known mutations, mutations of unknown significance and total overall mutations did not have a significant correlation with survival ( $p=0.708$ ,  $p=0.808$ , and  $p=0.639$ , respectively) or PD-L1 status ( $p=0.214$ ). In a subset analysis of patients with metastatic NSCLC, there was also no correlation between the total number of mutations and overall survival ( $p=0.821$ ).

## **Conclusion**

In our study, we determined that there was a positive correlation between TMB and higher number of mutations, though the number of mutations did not correlate with PD-L1 status or overall survival. As TMB is associated with higher immunogenic responses, this data may have future therapeutic implications.

# **The use of intra-articular pressure as a diagnostic tool for traumatic knee arthrotomy**

Hayes, William Anthony M.S., Sayan, Ardalan M.D., Day, James M.D., PhD.  
Marshall Orthopedics

## **Background**

Traumatic knee arthrotomies (TAK) are a common orthopedic injury associated with septic arthritis and other critical co-morbidities. The current gold standard diagnostic method is a saline load test (SLT), which is quite invasive, painful, and does not consider the variations in intra-articular knee dimensions related to size, age, or sex of the patient. The aim of this study is to explore the potential in using variations of intra-articular knee pressure as an efficacious diagnostic tool.

## **Hypothesis**

The use of intra-articular pressure is not more sensitive than SLT for detection on traumatic arthrotomy

## **Methods**

With 60mL syringe and 18-gauge needle, normal saline solution was injected into the knee capsule until the pressure within the knee was great enough to prevent further filling. A 5mm knee arthrotomy was introduced using an 11-blade scalpel. The procedure for measuring pressure at volume was repeated until saline solution had extravasated from the arthrotomy. The pressure at which solution extruded from the arthrotomy was recorded

## **Results**


The volumes of the cadaveric knees ranged from 24mL to 58mL, supporting the fact that intra-articular knee volumes vary greatly within the population and need to be considered when ruling in or out a TAK. Intact knees have a relatively constant intra-articular pressure ( $61.60\text{mmHg} \pm 4.72\text{mmHg}$ ) regardless of their volume, demonstrating the potential to be a more reliable diagnostic variable than volume. Additionally, the 5mm arthrotomy caused the intra-articular pressure to decrease by nearly the same amount in all knees ( $12.00\text{mmHg} \pm 3.46\text{mmHg}$ ), favoring the potential to use intra-articular pressure for diagnostic purposes.

## **Conclusion**

In conclusion, the intra-articular pressure of individuals' knees is rather constant and varies a lot less than knee volume. Additionally, an arthrotomy of a specific size, shape, and location will result in a reproduceable decrease in pressure – especially when accounting for the outliers cadaver 14 produced.







**BASIC SCIENCE AND CASE STUDY POSTER  
SESSION I • 9:45 AM – 10:30 AM**

# **31ST ANNUAL RESEARCH DAY POSTER SESSION**



# **A Systematic Approach to Identifying the Immunogenic Proteins of the Unculturable Intestinal Commensal, Segmented Filamentous Bacteria.**

Lexie C. Blalock, Hongwei D. Yu.

Department of Biomedical Sciences, Joan C. Edwards School of Medicine, Marshall University, Huntington, WV 25701.

## **Background**

The gut microbiota has a profound influence on the comprehensive well-being of its host. As a member of the gut microbial community, Segmented Filamentous Bacteria (SFB) plays a critical role in intestinal immune maturation and homeostasis. Despite its wide range of hosts, including humans, SFB remains unculturable *in vitro*. In consequence, the mechanism by which SFB stimulates the intestinal immune system remains unknown.

## **Hypothesis**

In this study, we applied a multi-omics approach to (i) systematically analyze SFB's niche within the intestinal microenvironment, and (ii) identify candidate proteins that are responsible for the bacterium's unique adhesion to the host epithelium and associated immunomodulation.

## **Methods**

The relative abundance of SFB throughout the murine gastrointestinal (GI) tract, including the isolated or aggregated lymphoid follicles of the ileum, commonly referred to as Peyer's Patches (PeyP), was examined with qPCR and 16s rRNA sequencing. Murine PeyP were probed for total microbial protein content via LC-MS/MS for the identification of *in situ* SFB proteins.

## **Results**

Our qPCR results showed a significantly ( $p < 0.0001$ ) increased abundance of SFB at the sites of the PeyP compared to the luminal fraction of the gut microbiome. Consistent with this observation, our compositional analysis of the PeyP-associated microbiota (PPAM) showed that not only was this microbial community phylogenetically distinct from the rest of the GI tract, but also that SFB represented a substantial relative proportion (6.5 – 74.9%) of the total PPAM population. Conversely, the relative abundance of SFB was either near or below the limit of detection in the microbial community of the intestinal lumen. Moreover, we computationally identified a subset of divergent, adherence-related proteins, including flagellar and pilin proteins, expressed by SFB, which warrant further experimental investigation.

## **Conclusion**

In support of SFB's immunostimulating role, we observed SFB to preferentially colonize the distinct niche of the PeyP, which is likely mediated through a novel adhesion mechanism.

# **A Systematic Review of Analgesic Pharmacology In Perioperative Pain Control for Opioid-Tolerant Cesarean Section Patients**

Harold Burke, Gregory Hill

Marshall University Department of Biomedical Sciences

## **Background**

Cesarean sections are the most common operative procedure in the US and one of the most common indications for neuraxial blockade.

## **Hypothesis**

This systematic review explores the standards of practice for perioperative pain control in cesarean section patients and also highlights recent trends in the treatment of comorbid substance use.

## **Methods**

Searches were conducted using PubMed. Studies describing anesthesia in caesarean sections were selected. A total of 106 studies were found with 51 included for review.

## **Results**

Regional anesthesia is frequently preferred, as it minimizes or eliminates many of the risks incurred with general anesthesia while offering improved outcomes and significantly lowered mortality. Specifically, combined spinal-epidural anesthesia is shown to be the most effective technique for achieving optimal perioperative pain control. However, combinations of multiple anesthetic agents in neuraxial blockade are not more advantageous than monotherapy. For more complicated cases, perioperative evaluation of intra-abdominal pressure and vertebral column length can assist in predicting the efficacy of neuraxial anesthesia. Additionally, patients with increased anxiety scores may benefit from preoperative expectation management, which significantly decreases patients' subjective pain scores as well as their post-operative use of analgesics.

Opioid abusing patients present a unique challenge for perioperative pain control. The wide variability of opioid tolerance and comorbid substance use as well as the inherent unpredictability of pain tolerance and sensitivity often necessitates an individualized approach. Given the increased risk of cesarean section in parous patients with comorbid substance use, thoughtful pain control strategies in this population necessarily have important public health implications. Various protocols like Medication Assisted Treatment (MAT) and Enhanced Recovery can reduce overall use of postoperative narcotics. Likewise, adjuvant peripheral nerve blocks can also be useful in the opioid-tolerant patient.

## **Conclusion**

Amid the opioid epidemic, the obligation of physicians to practice safe and effective pain control methods in this population cannot be understated.

## **Altered localization of Na/K-ATPase alpha-1 subunit is responsible for reduced Na/K-ATPase activity in intestinal epithelial cells in obesity.**

Lakshmi Sundaram, Subha Arthur, Uma Sundaram

Department of Clinical & Translational Sciences, Joan C Edwards School of Medicine,  
Marshall University

### **Background**

Na/K-ATPase is an integral basolateral membrane (BLM) protein in intestinal epithelial cells (IEC), and provides the favorable intracellular Na<sup>+</sup> gradient to promote all Na dependent co-transport processes across the brush border membrane (BBM). In Zucker rat model of obesity, major Na-nutrient absorptive processes were stimulated in IEC. However, Na/K-ATPase activity which was presumed to be activated so as to support these enhanced Na-nutrient co-transport processes was, in fact, significantly reduced. Na/K-ATPase is composed of  $\alpha$  and  $\beta$  subunits, where the  $\alpha$ -1 subunit is essential for the functioning of Na/K-ATPase while the  $\beta$ -1 subunit is important for stabilizing the correct folding of  $\alpha$ -1 polypeptide. It is not known if alteration in the cellular expression of these subunit proteins is responsible for Na/K-ATPase inhibition in obesity.

### **Hypothesis**

We hypothesized that inhibition of Na/K-ATPase in obesity is mediated by altered expression of its subunit proteins.

### **Methods**

Obese Zucker rats (OZR) were used as a model of obesity with LZR as controls.

### **Results**

RTQ-PCR and Western Blot analyses showed a significant increase in the cellular expression of  $\alpha$ -1 and  $\beta$ -1 subunit mRNA and protein in IEC from OZR compared to LZR. Since expression levels of these subunits in the BLM determines the actual function of Na/K-ATPase, we looked at their expression in plasma membrane preparations. There was a significant 2-fold increase in the BLM expression of  $\beta$ -1 protein, thus corroborating with its cellular expression increase. However, the BLM expression of the functional  $\alpha$ -1 protein was significantly reduced (2 fold), thus showing impaired localization. Co-immunoprecipitation experiments showed a decrease in the cellular binding of  $\alpha$ 1 and  $\beta$ 1 subunits in villus cells from OZR.

### **Conclusion**

Na/K-ATPase is inhibited in IEC during obesity likely secondary to altered trafficking of its alpha 1 subunit to the BLM.

# Blue light sterilization of Orthopaedically relevant pathogenic bacteria using IlluminOss

Franklin D. Shuler

Department of Orthopedic Surgery, Joan C. Edwards School of Medicine, Huntington WV

## Background

Blue light (405-470nm; outside of UV spectrum which is mutagenic) has broad-spectrum antimicrobial properties through the formation of reactive oxygen species and is cidal for both Gram-negative, Gram-positive bacteria, yeasts and fungi (IlluminOss implant -- FDA approved Light Fix Clinical Trial, Figure 1). 36 J/cm<sup>2</sup> is toxic to bacterial and not mammalian cells;  $E = Pt$  where E is in J/cm<sup>2</sup>, P is in mW/cm<sup>2</sup> and t is time in seconds.

## Hypothesis

Blue light used during polymerization of the IlluminOss Medical implant is bacteriocidal to Orthopaedically relevant pathogenic bacteria.

## Methods

Suspension cultures of MSSA (ATCC 29213), MRSA (ATCC 43300) and patient isolated MRSA with OD of 0.5 McFarland units ( $1.5 \times 10^8$  CFU/ml) were used in duplicate experiments using 3ml of suspension cultures (200 colonies per 100ul inoculum onto 100mm blood agar plates incubated for 24hrs at 37°C at 5.5% CO<sub>2</sub> – colony counts and % kill determined [Figure 2]). Initial experiments used “end fire” Illuminoss blue light (17.4mW/cm<sup>2</sup>; 395-415nm) at 2cm above culture with 100ul samples taken after vortexing at 0, 5, 10, 15, 20, 25 and 30 minutes; no increase in temperature noted. Can patient isolated MRSA bacteria be killed during the 400sec cure for IlluminOss 9 x 160 mm implant; custom test tube suspension culture shown with samples taken at 0sec, 400sec and 800sec using the same protocol (Figure 3).

## Results

Dose-dependent inactivation of MSSA and MRSA is noted with patient isolated MRSA 99.9% inactivated during the 400sec cure for the IlluminOss implant (US PATENT 2017/0128742 A1).

## Conclusion

This is the first report of bactericidal activity associated with an Orthopaedic Implant that is not due to the intrinsic material properties of the implant. Blue light can therefore be used as a strategy for infection prevention and eradication.

## **CARDIOTONIC STEROID RECEPTOR REGULATES NASH ASSOCIATED FIBROSIS IN THE DIET-INDUCED MURINE MODEL**

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### **Background**

Non Alcoholic Liver Disease (NAFLD) and its squal, NASH, ESLD and HCC have become the second most common cause for liver transplantation in the West.

### **Hypothesis**

The purpose of the present studies was to determine the role of Cardiotonic Steroid receptors (CTS<sub>r</sub>) on the metabolic disturbances produced by NASH, and to test the efficacy of pNaKtide to treat NASH.

### **Methods**

C57Bl6J ♀ mice were exposed to normal chow (NMC) or high fat diet (HFD). Mice on HFD was non treated or treated (pNaKtide or exercise). The proportion of cells in arrest was determined against liver apoptotic activity and collagen deposition by standard stains using morphometric techniques. Quantitative protein expression of genes involved in cell metabolism/senescence were determined by Western Blots. Metabolic profiles were measured on treated plasma by LC/MS-MS. Principal component analyses (PCA) were performed.

### **Results**

The total body weight corrected by aging increased significantly in the HFD due to an increase in the fat compartment with similar lean mass and total body water (HFD vs NMC,  $p < 0.05$ ). Livers at 24W had NASH and developed progressive fibrosis concomitant to an increase in cell senescence/apoptotic activity. Changes that correlated with disturbances of the glutathione sp., decreased mitochondrial  $\beta$ -lipid oxidation and insulin resistance with regulation of SIRT7 & FOXO1 genes expression providing metabolic prints of disease development and progression. pNaKtide and exercise reversed fibrosis with abrogation of apoptosis and paucity in senescence activity. pNaKtide increased mitochondrial  $\beta$ -lipid oxidation and insulin sensitivity by upregulation of PPR $\gamma$ -PCG1 $\alpha$  with normalization of glutathione sp. through a pSrc/GrB2 pathway.

### **Conclusion**

Disturbances of the glutathione sp. occurred concomitantly with metabolic prints and gene expression from both an uncoupled mitochondrial  $\beta$ -lipid oxidation process and an insulin resistance status. Liver cell changes that were abrogated by the blockage of the CTS<sub>r</sub> at the  $\alpha$ 1-subunit of the Na/K-ATPase.

## **Characterizing the effect tobacco flavors have on nicotine addiction**

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### **Background**

With the increased popularity of electronic nicotine delivery systems (ENDS) in the adolescent population, flavor additives have become more of a concern due to the endless options and unlimited combinations available. It is important that we understand how the various attractive flavors alter

### **Hypothesis**

We hypothesize that popular tobacco flavors increase smoking initiation and nicotine addiction.

### **Methods**

We will be investigating smoking initiation, reward-related behavior, and neuronal nicotinic receptor changes. E-vape self-administration and conditioned place preference behavioral assays will be used with mice to examine rates of acquisition between flavored and non-flavored ENDS, as well as determination of ENDS flavors' reward-related behavior with and without nicotine. Following behavioral assessments, we will use confocal microscopy to correlate any smoking-related behaviors to potential nicotine receptor changes.

### **Results**

Our previous studies have shown that menthol, the leading tobacco flavor, enhances the interaction between nicotine and nicotinic acetylcholine receptors (nAChRs) to alter addictive behavior. Similarly, we studied green apple flavor in a mouse model, and observed reward-related behavior in the presence and absence of nicotine. Additionally, our confocal assays revealed that green apple flavor by itself increased dopamine neuron firing frequency and upregulated nAChR density on dopamine neurons in the ventral tegmental area (integral in the rewarding properties of addictive drugs).

### **Conclusion**

Given these results, we hypothesize that flavoring chemicals increase smoking initiation and nicotine addiction. The proposed research is clinically relevant, due to the lack of knowledge on the effects that nicotine in combination with various flavors, as well as flavors alone, have on the brain. Revealing the impacts of these tobacco flavors on smoking-related behaviors, will be a significant factor in combating the dramatic rise in youth smoking initiation.

## **Comparison of Unicortical and Bicortical Proximal Screws and Short Plate vs Long Plate in a Distal Femur Fracture Model**

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### **Background**

Extra-articular distal femur fractures undergoing open reduction and internal fixation with distal femur plate fixation are at risk for refracture around the plate construct. There is no gold standard per say for plate length or screw arrangement that is agreed upon as being the best option for fixation.

Note - This is a follow up study adding to and completing lasts years work

### **Hypothesis**

There is no difference between unicortical and bicortical screw placement in the anatomic model

### **Methods**

Using anatomic sawbones model of the distal femur, locked plating was applied using two configurations (unicortical or bicortical) screws in the most proximal position. Axial load to failure of fractured femur models was measured. We also examined whether there was a difference for short plate vs long plate axial load to failures with the same screw variability using both normal bone and osteoporotic bone models.

### **Results**

When comparing the screw type (unicortical vs bicortical) in short plate (6-hole) osteoporotic bone model there is no statistically significant difference with average load to failure (LTF) of unicortical at 854.19N vs bicortical at 668.4N ( $P=0.062$ ). This was similar to the long plate (12-hole) osteoporotic bone model with no statistically significant difference with average LTF of unicortical at 982.18N vs bicortical at 1161.74N ( $P=0.072$ ). Thus, the null hypothesis that there is no difference in LTF between unicortical vs bicortical screw placement in the osteoporotic model of either short plate or long plate is supported by this data.

### **Conclusion**

Thus, the null hypothesis that there is no difference between unicortical and bicortical screw placement in the anatomic model is supported by this data.



# Compensating for histone acetyltransferase mutations in diffuse large B-cell lymphoma with omega-3 fatty acids

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## Background

Diffuse large B-cell lymphoma (DLBCL) is the most common type of non-Hodgkin's lymphoma (NHL). Because the majority of DLBCL patients are diagnosed at an advanced stage (i.e., invasion and/or metastasis), treatment with standard chemotherapy often leads to poor response or relapse. This has inspired a renewed effort to design rational therapeutic strategies based on the molecular pathogenesis of DLBCL. Sequencing experiments have shown that the most common mutations in DLBCL are those of the histone acetyltransferases (HATs) CREBBP and P300. These mutations result in decreased histone acetylation (e.g., H3K27Ac), the switching of enhancers from a poised to a repressed state, and decreased acetylation of important non-histone proteins such as BCL6 and p53. A recent clinical trial involving another B-cell-derived cancer, chronic lymphocytic leukemia (CLL), showed that three-month treatment with omega-3 fatty acids (w-3 FAs) led to massive increases in histone H4 acetylation when compared to baseline levels (n=1). Furthermore, levels of NF- $\kappa$ B activation remained closer to baseline three months after the cessation of treatment, possibly suggesting epigenetic reprogramming.

## Hypothesis

We hypothesize that w-3 FAs may be used to restore acetylation of both histones and non-histone proteins in DLBCL, as well a more normal gene expression profile.

## Methods

We assessed cell viability, gene expression (qPCR), and histone post-translational modifications (PTMs) in two DLBCL cell lines (Toledo and SU-DHL-5) after treatment with the w-3 FA docosahexaenoic acid (DHA) for 72 hours.

## Results

DHA causes a dose-dependent decrease in cell viability. Preliminary data from qPCR and histone PTM analyses suggest that w-3 fatty acids' mechanism of action in DLBCL cells may be more complex than expected.

## Conclusion

We are in the process of expanding our project to include more cell lines (both DLBCL and normal B-cells), more w-3 FAs, multiple doses, and longer time points.

## **Contribution of force dynamics (dF/dt) to activation of muscle synergies in insect legs**

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### **Background**

Feedback from sense organs that monitor forces in the legs of both vertebrates and invertebrates has been shown to fulfill diverse functions, including tuning motor outputs to variations in load and contributing to the activation of groups of muscles as synergists. However, the specific parameters that underlie the transform from force detection to the modification of motor output remain unclear. Previous studies in insects showed that forces applied to the legs could activate muscle synergies used in support and propulsion. However, substantial adaptation of discharges occurred when forces were applied using linear ramp-and-hold stimuli. Adaptation was significantly reduced when forces were applied using non-linear stimuli whose time profiles and magnitudes were based on joint torques calculated in freely walking animals.

### **Hypothesis**

Dynamic sensitivities to force (dF/dt) play a major role in responses of sensory and motor systems to natural, non-linear mechanical stimuli, as occur in walking. These sensitivities can be modeled, in part, using power functions.

### **Methods**

Responses of campaniform sensilla, receptors that monitor forces in the exoskeleton, were characterized to applied forces using linear ramp and hold functions. Forces were also applied using waveforms of joint torques calculated from experiments in freely moving animals.

### **Results**

Campaniform sensilla show phasicotonic discharges to forces applied using ramp-and-hold stimuli. Receptor sensitivities to force dynamics can be readily fit to power functions ( $y=ax^b$ ) but different constant and exponent values are obtained at different force magnitudes. In contrast, effects of force dynamics predominate in responses to natural, torque stimuli. Responses of larger sensory units can be effectively modeled using power functions. However, responses of smaller more tonic are not completely reproduced by these models.

### **Conclusion**

Our findings are consistent with the ideas that phasic and static characteristics do not function as separate components and that dynamic sensitivities play a major role in the generation of motor behavior.

# Dissecting the Na/K-ATPase Signaling complex in Renal Proximal Tubule: A Cysteine-Cysteine Crosslinking Approach

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## Background

The Na/K-ATPase  $\alpha 1$  subunit and c-Src have been shown to form a signaling complex, in which the  $\alpha 1$  subunit function as a signal transducer. The present study is to investigate the formation of the Na/K-ATPase signaling complex under native condition in live cells.

## Hypothesis

The Na/K-ATPase  $\alpha 1$  subunit and c-Src form a signaling complex while caveolin-1, by binding to the  $\alpha 1$  subunit, anchors the signaling complex to caveole structure.

## Methods

Crosslinking studies were performed in live cells with crosslinkers BMH (non-cleavable) and DTME (cleavable). Blue Native gel electrophoresis (BN-PAGE) was used to identify the complex size under native condition. A BN-PAGE/SDS-PAGE 2D system was used to separate and identify the components of the Na/K-ATPase complex.

## Results

(1) The BN-PAGE system showed protein bands closer to marker of 720 kDa. Western blot analysis showed co-existence of the  $\alpha 1$  subunit,  $\beta 1$  subunit, c-Src, and caveolin-1. (2) The capillary immunoblotting analysis demonstrated a clear crosslinking between the  $\alpha 1$  subunit and c-Src, by comparing the data with or without DTT/SDS cleavage. (3) In the BN-PAGE/SDS-PAGE 2D system, data showed that the complex contains the  $\alpha 1$  subunit and c-Src.

## Conclusion

In live cells, present study with a Cysteine-Cysteine crosslinking approach indicated that there were direct interactions between the  $\alpha 1$  subunit and c-Src, and between the  $\alpha 1$  subunit and cav-1, but not between c-Src and cav-1. Depletion of c-Src or cav-1 clearly reduced the involvement of the  $\alpha 1$  subunit in the crosslinking process. Furthermore, capillary immunoblotting analysis demonstrated there were multiple bands showing immune-reactivity with the  $\alpha 1$  subunit, c-Src, and cav-1, indicating the existence of different sizes of protein complexes that might contain different protein components.

# **Effects of co-injection of nicotine and morphine on 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. Nicotine is the addictive component of cigarettes. West Virginia had the highest opioid overdose deaths in 2016. About 43.4 people out of 100,000 died from opioids. Morphine is an opioid drug that is prescribed to treat pain, but is often abused. Co-use of more than one drug is very common, therefore, it is vital that we study the effects of drug combinations to understand how co-use alters the brain. In the tri-state region, >90% of heroin and opioid dependents are heavy smokers. Nicotine alone or morphine alone increase dopamine levels in the brain. Drugs that increase brain dopamine levels rapidly and to a large magnitude support addiction. The combined effects of nicotine and morphine on the brain have yet to be elucidated. We chose the opioid morphine for this research because it is the most studied prescription opioid and is regularly abused.

## **Hypothesis**

We hypothesize that co-treatment with nicotine and morphine will have a synergistic effect on upregulation of nicotinic acetylcholine receptors in the midbrain.

## **Methods**

To test the hypothesis, mice in this study were injected with saline, nicotine only, morphine only, or nicotine + morphine. Next, we used a cryostat to cut 20  $\mu\text{m}$  thick coronal brain slices and then imaged the midbrain regions using a confocal microscope. The midbrain contains dopamine neurons that are activated by drugs of abuse, which is why we focused on midbrain regions. Our mice have  $\alpha 6$ -GFP and  $\alpha 4$ -mCherry expressing nicotinic acetylcholine (nACh) receptor subunits which allows us to observe changes in fluorescence in confocal images that indicates up- or down-regulation of nACh receptors containing those particular subunits. This study will contribute knowledge of how co-use of nicotine and morphine affects receptor upregulation in the midbrain of mice.

## **Results**

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## **Conclusion**

-

## **Effects of Cytochrome P450 2B6 (CYP2B6) Single Nucleotide Polymorphisms on CYP2B6 Activity: Implications for Methadone Metabolism**

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### **Background**

Cytochrome P450 2B6 (CYP2B6) enzyme plays a significant role in the preferential stereo-selective metabolism of (S)-methadone. Concentrations of (S)-methadone above therapeutic levels have the ability to cause serious, life-threatening, and fatal cardiac side effects. This toxicity could be due in part to the pharmacogenetics of an individual, which influences the pharmacokinetic and pharmacodynamic properties of the drug and may contribute to methadone overdose and death.

### **Hypothesis**

Single nucleotide polymorphisms (SNPs) located within the CYP2B6 gene, that were genotyped in some methadone only overdose deaths, have the potential to play an important role in altering CYP2B6 activity and drug metabolism.

### **Methods**

SNP mutations for rs2279343, rs3211371, rs3745274, rs8192709, rs35773040, and rs35979566 were introduced to wild type CYP2B6 gene using Agilent QuikChange II Site-Directed Mutagenesis Kit. Sanger sequencing was performed for all genes to ensure each mutation was present. Each of the CYP2B6 genes were separately expressed in COS-1 cell lines and selectively grown. CYP2B6 microsomal protein was isolated from the COS-1 cells. The CYP2B6 activity in microsomal fractions was measured through luminescence using a Promega P450-Glo CYP2B6 Assay Kit. Inhibition studies were also conducted using clopidogrel to determine that the activity observed was from CYP2B6 and methadone was used to evaluate competition with d-luciferin at the active site.

### **Results**

Compared to wild type CYP2B6, SNPs rs2279343 and rs3745274 resulted in 123.5% and 87% increased CYP2B6 activity, respectively. In contrast, SNPs rs8192709, rs35773040 and rs35979566 yielded 57%, 78%, and 92.5% decreased CYP2B6 activity, respectively. SNP rs3211371 had comparable activity as the wild type CYP2B6.

### **Conclusion**

The presence of CYP2B6 SNPs rs8192709, rs35773040, and rs35979566 reduced the resultant CYP2B6 activity relative to wild type CYP2B6. Therefore, these SNPs may be contributing factors in decreased metabolism of (S)-methadone.

# Evaluation of Mitochondrial Energy Metabolism and Translation in Clear Cell Renal Cell Carcinoma

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## Background

Clear cell renal cell carcinoma (ccRCC) is one of the most common renal cell carcinomas, with a frequency of 70-80%. The defining morphological hallmark of ccRCC is the accumulation of glycogen and lipid droplets in the cytoplasm of the cells due to the reprogramming of glucose and fatty acid metabolism and oxidative phosphorylation (OXPHOS). Energy metabolism by OXPHOS is supported by both nuclear and mitochondrial-encoded genes. Alterations in the expression of mitochondrial genes involved in OXPHOS have been well documented in ccRCC.

## Hypothesis

We proposed that the mitochondrial translation machinery that exists solely for the synthesis of 13 mitochondrially-encoded subunits of OXPHOS complexes is also implicated in the progression of ccRCC.

## Methods

Immunoblotting analyses of 14 ccRC biopsies and their matched normal tissues were performed to investigate the role of mitochondrial translation machinery in the remodeling of OXPHOS complexes.

## Results

Along with changes in the expression of nuclear and mitochondrial encoded subunits of OXPHOS complexes, we discovered that the expression of several mitochondrial translation factors and ribosomal proteins were also significantly reduced in ccRCC biopsies.

## Conclusion

Based on the evidence provided in our preliminary studies, we propose that changes in the expression of mitochondrial translation components, specifically translation factors and mitochondrial ribosomal proteins, are part of the remodeling of mitochondrial energy metabolism and resistance to apoptosis in ccRCC.

## **Expression and activity of NaK ATPase $\alpha$ -subunit in Diet-induced murine model of Non-alcoholic steatohepatitis (NASH)**

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### **Background**

In the western world, non-alcoholic fatty liver disease (NAFLD) has been identified as the prominent cause of chronic liver disease. NaK ATPase, in particular its  $\alpha$ -subunit has been implicated in the progressive oxidative stress that is observed in the physiopathology of NASH

### **Hypothesis**

To determine the expression and activity of NaK ATPase  $\alpha$ -subunit in NASH liver. NaK ATPase, in particular its  $\alpha$ -subunit has been implicated in the progressive oxidative stress that is observed in the pathology of NASH

### **Methods**

C57Bl/6J mice (female: n=7, per each time point) were exposed to normal chow (NMC) or high fat diet + fructose (HFD). The mice on HFD was non treated or treated (p-Na/K-tide or exercise). At the end of the experiment (24weeks), animals were sacrificed and liver was collected. Protein expression was determined using RT-PCR and western blot methods while the activity of the enzyme was elucidated via ATP hydrolysis technique.

### **Results**

There was no significant difference in the NaKATPase  $\alpha$ -subunit expression among groups (NMC=1.00, HFD=0.83, HFD+pNaktide=1.19, HFD+ Exercise=0.90, mean). In contrast, there was a significant decrease in the activity of the NaK ATPase in the HFD at week 24 ( $0.85 \pm 0.03 \mu\text{moles Pi/hr/mg protein}$ ) when compared to NMC ( $1.47 \pm 0.04 \mu\text{moles Pi/hr/mg protein}$ ) but protein activity was reversed to normal values in the pNaktide group ( $1.56 \pm 0.07 \mu\text{moles Pi/hr/mg protein}$ ).

### **Conclusion**

Our findings show that at least in the mouse, NASH does not affect the expression of the NaK ATPase  $\alpha$ -subunit in the liver but reduces its activity and this phenomenon could be reversed by the administration of pNaktide.

# **Inhibition of Mitochondrial Protein Synthesis to Stimulate the Effect of 4-Hydroxy Tamoxifen in ER(+) Cell Lines**

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## **Background**

Currently available treatments- such as chemotherapy and radiation- act to suppress and terminate the growth of breast cancer cells. These therapies come with serious side effects for the patients that can affect the course of therapy. Recently a new treatment modality for breast cancer has been suggested that may ameliorate some of these negative effects. This modality uses antibiotics to interfere with energy metabolism by inhibiting mitochondrial protein synthesis to prevent cancer cell growth and proliferation in estrogen receptor positive (ER+) breast cancer cells.

## **Hypothesis**

We propose that combination of drugs that are inexpensive and well-tolerated with minimal side effects such as antibiotics and tamoxifen can reduce deleterious effects of current breast cancer treatments by inhibiting mitochondrial protein synthesis and inducing apoptosis.

## **Methods**

To investigate the induction of apoptosis MCF7 and MDA-MB-231, ER(+) and triple negative breast cancer cell lines, respectively, we exposed the cells to various concentrations of 4-hydroxy (OH) tamoxifen, chloramphenicol, and minocycline alone or in combinations. Changes in mitochondrial protein synthesis, energy metabolism, and apoptosis were determined by immunoblotting and activity assays.

## **Results**

Addition of antibiotics to 4-OH-tamoxifen treated cells stimulated the induction of apoptosis by inhibiting mitochondrial protein synthesis and energy metabolism in MCF7 cells but not in MDA-MB-231 cells.

## **Conclusion**

Our data suggest that the combination of antibiotics and 4-OH-tamoxifen effectively blocks mitochondrial protein synthesis in MCF7 cell lines, halting their growth by inducing apoptosis.



## **Is Na/K-ATPase Signaling Involved in Regulation of Blood Pressure by HO-1?**

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### **Background**

Heme oxygenase 1 (HO-1) upregulation can lower blood pressure. However, the underlying mechanism is not fully understood. Na/K-ATPase signaling mediates natriuresis and blood pressure regulation. We observe that impaired Na/K-ATPase signaling contributes to blunted natriuresis, leading to salt-sensitive hypertension in obese TALLYHO mice (TH) and Dahl salt-sensitive rats (DS). Interestingly, TH mice and DS rats had high basal HO-1 expression on a normal salt diet, which was not further stimulated by a high salt diet. Here we explore the relationship between Na/K-ATPase signaling-mediated renal sodium handling and HO-1 induction regarding blood pressure regulation.

### **Hypothesis**

Na/K-ATPase signaling contributes to the blood pressure regulation by HO-1.

### **Methods**

Male C57BL/6J (B6) mice were divided into 4 groups: (1) normal chow; (2) high salt diet (HS, 3 weeks of 8% NaCl); (3) Co (III) protoporphyrin IX chloride (CoPP, 5mg/kg BW, I.P. twice a week); (4) CoPP+HS. Systolic blood pressure was monitored by the tail-cuff method. Blood pressure, 24h-urine sample (animal in an individual metabolic cage) were collected one day before high salt intake and every week after a high salt diet. Kidneys were harvested to quantify Na/K-ATPase signaling function and HO-1 by Western Blotting.

### **Results**

Compared with the high salt diet group, CoPP reduced the blood pressure under conditions of high salt loading, characterized by a left-shifted, elevated slope in renal function curve. We also demonstrated that 24h urine output increased in both high salt and high salt + CoPP groups. Moreover, high-salt + CoPP group increased even further. Additionally, both high salt and CoPP induced HO-1 expression in the kidney cortex tissue, while the Na/K-ATPase signaling (c-Src phosphorylation) was activated in both high salt and high salt + CoPP groups.

### **Conclusion**

Na/K-ATPase signaling appeared to be involved in regulation of blood pressure by HO-1.

# **Real-time blue light environmental decontamination: intra-operative surgical instrument sterilization**

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## **Background**

Surgical site infections (SSI) kill over 8000 patients per year with an estimated 70% of contamination through surgical instruments and direct contact. Blue light (405-470nm; outside of UV spectrum which is mutagenic) has broad-spectrum antimicrobial activity and is non-toxic to mammalian cells at a dose of < 36 J/cm<sup>2</sup>. Environmental decontamination strategies can therefore be developed producing real-time cleaning of surgical instruments, surgical sites and wounds.

## **Hypothesis**

Blue light can be delivered intra-operatively to both sides of surgical instruments providing real-time sterilization.

## **Methods**

Suspension cultures of MRSA (ATCC 43300) and patient isolated MRSA with OD of 0.5 McFarland units (1.5 x 10<sup>8</sup> CFU/ml) were used in duplicate experiments with 100ul inoculum placed onto surgical scalpel blades which were treated with low intensity blue light (Figure 1). IlluminOss "end fire" was placed at 4.4cm above the scalpel blades (no discernable desiccation; T<sub>max</sub> 21.7°C) with samples taken at 15, 30, 45 and 60 minutes with total energy delivered 8.9, 17.8, 26.7 and 35.6 J/cm<sup>2</sup>, respectively. Culture samples were obtained by vortexing blades in 3ml NSS with 100ul streaked onto 100mm blood agar plates incubated for 24hrs at 37°C at 5.5% CO<sub>2</sub> – colony counts and % kill determined [Figure 2]).

## **Results**

The low-intensity blue light produced a dose-dependent reduction in colony counts (Figure 3): 62% kill (15 min); 100% kill (60 min); total energy delivered is easily obtained by LED lights. MIT collaboration has produced a working OR mayo stand prototype (patent pending/NDA). Testing revealed no differences in standard operating room procedures.

## **Conclusion**

Blue light is capable of time and dose dependent eradication of bacterial contamination from surgical instruments. Real-time environmental decontamination was demonstrated with sterilization of both sides of surgical instruments. Application of this technology to surgical wound sterilization is in progress.

## **Redox regulation of behavior changes in diet-induced “stress-less” obese mouse model**

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### **Background**

Oxidative stress plays a key role in obesity by modifying the function of important biological molecules, leading to altered biological pathways and comorbid pathology of obesity. Exercise paradoxically, increases redox stress which in-turn signals antioxidant protection. In our previous studies, we showed increased catalase expression by modulating obesogenic pathways helped protect against obesity by increasing lean mass and decreasing fat mass. Taking a deeper look into the benefits of catalase, this study examines the effects of exercise or dietary intervention and increased catalase expression on anxiety behavior shown in mice.

### **Hypothesis**

We hypothesized that transgenic mice with catalase overexpression will show decreased levels of anxiety behavior, while the control C57 mouse models will demonstrate increased anxiety behavior.

### **Methods**

To study this hypothesis, we used two mouse models with increased catalase expression; (i) catalase (Cat-tg) and (ii) a hybrid between Cat-tg and obese mice (Ob/Ob), named Bob-Cat. Each genotype, in addition to wild-type control, were either fed normal chow (NC), or high-fat (HF) diet and remained sedentary or were placed on an exercise regimen remaining on NC. Throughout the study, body weight, food intake, grip-strength, fat and lean mass (ECHO-MRI) were measured in addition to metabolic parameters (CLAMS). Hypothalamic regulating genes were evaluated using RT-PCR. Coordination and behavior were measured using an open field test and Rotarod.

### **Results**

Our results revealed there are genotypic differences in behavioral responses to diet induced obesity. The C57 mice demonstrated decreased motor coordination and strength in addition to anxiety-like behavior in comparison to the mice overexpressing antioxidant catalase. When provided a HF diet, mice over-expressing catalase also had a lower body weight and fat mass gained in comparison to the C57 fed a HF diet.

### **Conclusion**

These findings indicated that excess Catalase, can modulate anxiety behavior. The mechanism by which this occurs is under investigation.

# **Resveratrol Protection of Doxorubicin Renal Cytotoxicity, Initial Examination of Protein Modifications**

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## **Background**

Doxorubicin (DOX, Adriamycin), is a cancer chemotherapy agent used in the treatment of breast cancer, small and non-small cell lung cancer and acute myeloid leukemia. DOX induces permanent cardiomyopathy and renal impairment. The cellular mechanisms are poorly understood for doxorubicin cytotoxicity. Usage of natural products to reduce cancer chemotherapy side effects is a potential benefit to the patient especially if the natural product possesses anticancer activity. Resveratrol is a polyphenolic agent present in grapes, dark chocolate, blueberries and nuts that possesses anticancer activity.

## **Hypothesis**

Resveratrol will reduce DOX renal cytotoxicity. DOX modifies protein expression of SIRT1 (nicotinamide adenosine dinucleotide (NAD)-dependent deacetylase) and PGC1 (peroxisome proliferator-activated receptor gamma coactivator 1-alpha) which have a potential role in maintaining cell function.

## **Methods**

Human non-cancerous renal proximal tubular epithelial (HK-2) cells were incubated for 48 h. The cells were next pretreated for 1 h with 0 (DMSO), 5 or 7.5 uM resveratrol followed by a 24 h co-culture with 0-5 uM DOX. Viability was assessed using MTT and trypan blue exclusion. Cells were lysed, protein levels measured and western blots were run with equal protein loading. A minimum of 3 experiments were conducted for all parameters.

## **Results**

RES did not alter cell viability as indicated by comparable MTT values between DMSO and RES groups ( $p > 0.05$ ). DOX was cytotoxic to HK-2 cells relative to vehicle (uM) treated cells following a 24 h exposure. Resveratrol pretreatment provided protection from DOX to HK-2 cells. DOX treatment tended to lower PGC1 and SIRT1 protein expression when compared to DMSO vehicle treated cells.

## **Conclusion**

RES was protective and reduced DOX renal cytotoxicity. DOX tended to alter SIRT1 and PGC1 expression following a 24 h incubation of HK-2 cells. However, further studies are needed to explore changes in protein expression as a function of time and DOX concentration.

## **Role of endometriotic peritoneal components on ovarian cell transformation**

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### **Background**

More than 10-15% of young women suffer from endometriosis, characterized by the growth of endometrial tissue outside of the uterus. These women also have an increased presence of inflamed peritoneal fluid (PF). Statistics have shown that approximately >3% of women with endometriosis develop ovarian cancer.

### **Hypothesis**

We hypothesize that the PF components are involved in the proliferation and transformation of ovarian cells.

### **Methods**

PF from women with (endo PF) and without (control PF) endometriosis was collected after IRB approval and patient consent. The effect of control or endo PF (1 or 10%) alone, in the presence or absence of known epigenetic drugs on the proliferation of TOV-21G cells (human clear cell carcinoma cell line) were tested.

### **Results**

xCelligence Real Time Cell Analysis system that measures proliferation as an increase in cell index, showed that treating the TOV-21G cells with endo PF increased the CI slightly more than control PF when compared to the media controls (144.89% vs. 139.33% at 96 hours). Since there is evidence that EZH2/H3k27m3 pathway increases ovarian cell growth, we tested the effect of EZH2 inhibitors in preventing the PF mediated proliferation of TOV-21G. Treating the cells with PF + drug, the CI increased when compared to drug alone but decreased when compared to PF alone. PF obtained from women with peritoneal endometriosis had an increased growth effect (higher CI) on TOV-21G cells compared to PF from women with ovarian endometriosis. Human Cancer Inflammation and Immunity Crosstalk RT2 Profiler PCR array showed endo PF treatment upregulated various inflammatory genes such as CXCR4 (therapeutic target for ovarian cancer), TNF (upregulated in many cancers), and HIF1A (increases ovarian cancer invasiveness) compared to ctrl PF.

### **Conclusion**

Our results, taken together, showed that PF from women with endometriosis can both proliferate and transform ovarian cells.

## **Role of Na/K-ATPase (NKA) non-enzymatic function in proximal tubule sodium handling**

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### **Background**

Endogenous cardiotonic steroids (CTS) increase during salt loading, volume expansion and renal insufficiency, suggesting a role in the regulation of renal Na<sup>+</sup> handling. At physiological concentrations, CTS initiate Na/K-ATPase alpha1 (NKA)/Src-mediated signaling to decrease transepithelial sodium flux *in vitro*.

### **Hypothesis**

To explore the impact of this signaling on Na<sup>+</sup> and water reabsorption in the renal proximal tubule (RPT), we used RPT-specific NKAalpha1 knockout and rescue mouse models.

### **Methods**

Mice expressing a RPT-specific sodium glucose cotransporter 2 driven-Cre transgene, floxed NKAalpha1, or Cre-driven NKAalpha1 WT and mutant constructs knocked-in at the ROSA 26 locus were used to generate 3 new models. Namely, RPT-specific NKAalpha1 KO (RPTalpha1<sup>-/-</sup>), RPT-rescued with WT NKAalpha1 (RPTalpha1WT), or a Src-signaling null mutant NKAalpha1 (RPTalpha1Y260A). Basal and renal characterization was conducted using metabolic cages, lithium clearance test, and urine analysis.

### **Results**

Mice were born with the expected Mendelian ratio and RPT-specific KO and rescue of NKAalpha1 were confirmed immunologically. No change in water and food intake or body weight were noted. There was no indication of histological abnormality in kidney sections from RPTalpha1<sup>-/-</sup>, but daily urine output, absolute Na<sup>+</sup> excretion, and urinary lithium clearance were significantly decreased compared to RPTalpha1<sup>+/+</sup> littermates (0.5±0.2 vs 1.7±0.3 mL/24h, p<0.01; 0.13±0.07 vs 0.35±0.05 mmol/24h, and 1.4±0.3 vs 4.1±0.5 mL/min, p<0.05, respectively). Urinary output was rescued in the RPTalpha1WT but not in RPTalpha1Y260A.

### **Conclusion**

These results indicate increased Na<sup>+</sup> reabsorption upon NKAalpha1 ablation in the RPT. This is in striking contrast to the outcome predicted by the textbook model of NKA-driven Na<sup>+</sup> reabsorption in the RPT. This suggests that the role of NKA alpha1/Src signaling in RPT Na<sup>+</sup> reabsorption is more critical than currently recognized, and this is supported by the observed lack of phenotype rescue observed for the signaling null mutant.

## **SABR: Sonic Acoustic Biofilm Removal**

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### **Background**

Surgical site infections (SSI) account for 21.8% of healthcare associated infections, affects over 157,000 patients per annum, increases costs by over 300% and reduces patients' quality of life and function. Intra-operative use of hand-held ultrasonic debridement devices that can clean surgical sites and implants, remove biofilm in established infections while preventing damage to healthy tissues is not currently available. SABR (Sonic Acoustic Biofilm Removal) was developed in conjunction with the Massachusetts Institute of Technology (MIT) to generate a hand-held ultrasonic surgical device that is capable of debridement beyond the area of direct physical contact through the process of cavitation.

### **Hypothesis**

A novel, hand-held, reusable, sterilizable, ergonomic ultrasonic debridement tool can be developed to clean surgical wounds and implants through a combination of mechanical forces and ultrasonic waves.

### **Methods**

First-order design requirements and solutions are shown (Table 1). Low ultrasonic frequencies (20-100K) produce larger cavitation bubbles that create micro-perforations in biofilms – 40K transducer selected; cavitation maximized by having the siliconized mechanical debridement tip set at 0.12 inches from ultrasonic transducer. This device allows for continuous sterile fluid irrigation through a luer-lock mechanism.

### **Results**

SABR was successfully designed, manufactured and tested (Figure 1; patent pending). This device is ergonomic, sterilizable, and reusable. Sonoluminescence testing revealed cavitation at 100% amplitude that spread up to 1.44 inches past the debridement tip allowing for debridement of surfaces beyond direct device contact (e.g. screw holes in implants, Figure 2). In vitro biofilm removal was confirmed with mechanical 10 sec debridement removing 80% of the biofilm; 10 sec with ultrasonic debridement removed 93% of biofilm.

### **Conclusion**

SABR development was successful fulfilling all first-order medical design and functional requirements with surgeon satisfaction rated 10/10 (video presentation). In vitro and in vivo testing along with clinical outcome protocols are in progress.

# **Skeletal Muscle-Specific Na/K-ATPase Alpha One Knock Out Protects against High Fat Diet-Induced Metabolic Complications**

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## **Background**

Insulin resistance and type II diabetes have strong correlations with obesity and increase the risks of cardiovascular complications. Skeletal muscle plays a vital role in protecting against insulin resistance and glucose intolerance. Using a conditional gene knock-out approach, we have engineered a mouse lacking the alpha1 isoform of the Na/K-ATPase (NKA) in the skeletal muscle (KO), which resulted in reduced muscle mass and a switch toward more glycolytic muscle fibers.

## **Hypothesis**

To understand the role of skeletal muscle NKA alpha 1 in Western diet (WD)-induced metabolic complications, KO and wild-type littermates (WT) were subjected to a high-fat, high-fructose WD for 12 weeks.

## **Methods**

FVB/C57BL6 male KO and WT littermates were assigned to a normal chow (NC) or WD diet at 8 weeks of age. Body weights and caloric intake were recorded weekly. To assess glucose tolerance, mice were fasted for six hours prior to glucose injection (2.0 g/kg). Blood glucose was measured with a OneTouch Ultra glucometer (LifeScan, Inc) at regular intervals over the course of 120 min after injection.

## **Results**

There was no difference in basal body weight or caloric intake between WT and KO mice. WD induced a significant weight gain in WT (33.7 $\pm$ 1.7 g vs 28.8 $\pm$ 0.9 g,  $P < 0.05$ ) but not KO mice (31.7 $\pm$ 2.3 g vs. 25.3 $\pm$ 1.0 g, N.S). Similarly, WD caused glucose intolerance in the WT (area under the glucose clearance curve (AUC) 22778 $\pm$ 4226 vs. 8818 $\pm$ 2197 mg/dl\*min,  $P < 0.01$ ), but not in the KO (AUC 13153 $\pm$ 2032 vs. 12752 $\pm$ 3029 mg/dl\*min, N.S.).

## **Conclusion**

Mice lacking skeletal muscle NKA alpha1 are protected from diet-induced metabolic dysfunction, making NKA alpha1 a possible drug target for treating insulin resistance and related metabolic disorders.



# **The Adipocyte Na/K-ATPase Oxidant Amplification Loop is the Central Regulator of Western Diet-Induced Obesity and Associated Comorbidities**

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## **Background**

Obesity has become a worldwide epidemic. It is believed that cellular oxidant stress plays a key role in both the development and maintenance of obesity as well as its associated comorbidities such as diabetes, cardiovascular disease, and nonalcoholic steatohepatitis. We have previously reported that systemic administration of pNaKtide which targets the Na/K-ATPase oxidant amplification loop (NKAL) was able to decrease oxidative stress and adiposity in mice fed a high fat and fructose supplemented western diet (WD).

## **Hypothesis**

As adipocytes are believed to play a central role in the development of obesity and its related comorbidities, we examined whether lentiviral-mediated adipocyte-specific expression of NaKtide, the portion of pNaKtide derived from the  $\alpha 1$  Na/K-ATPase N domain without the TAT leaders sequence used to make pNaKtide cell permeant, could ameliorate the effects of the WD.

## **Methods**

C57BL6 mice were fed WD for 12 weeks, with body weights taken weekly. Before sacrifice glucose tolerance tests were performed, and mice were placed in metabolic cages and CLAMS cages. At sacrifice, visceral fat, subcutaneous fat, liver, heart, and brain were taken along with plasma.

## **Results**

C57BL6 mice were fed this WD, which activated adipocyte Na/K-ATPase signaling and increased adiposity, systemic oxidative stress and insulin resistance as well as induced development of NASH. We also noted the WD increased the plasma levels of leptin, IL-6 and TNF $\alpha$  along with decreased locomotor activity, expression of the D2 receptor and tyrosine hydroxylase in defined brain region as well as markers of neurodegeneration including neuronal apoptosis. Selective adipocyte expression of NaKtide in these mice fed a WD attenuated all of these changes including the brain biochemical alterations and behavioral adaptations.

## **Conclusion**

These data suggest that adipocyte derived cytokines play an essential role in the development of obesity induced by a WD and that targeting the adipocyte NKAL loop may serve as an effective therapeutic strategy.

# **The Effect of pNaKtide & Exercise on Gut-Microbiota Dynamics in a Diet-Induced NASH Murine Model.**

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## **Background**

Global incidence/prevalence of chronic liver disease and its sequela ESLD and HCC are increasing as a consequence of both viral hepatitis, and a continuous spread of the metabolic disturbances related to the obesity epidemics. NAFLD and its progression to NASH/ESLD and HCC have become the second most common cause for liver transplantation in the West.

## **Hypothesis**

We profiled the gut microbial communities in mice by diet and exercise. In addition, we explored the effects of pNaKtide, a novel 33-aminoacid peptide on NASH.

## **Methods**

Female C57Bl 6J mice were fed normal mouse chow (NMC) or high fat diet (HFD). Post sacrifice at 24-week, Terminal ileum (TI) content were collected for total microbial DNA extraction and community profiling was achieved by sequencing 16S rRNA v3-v4 hypervariable regions. HFD groups were compared to intervention groups (pNaKtide and exercise). Metabolic body compartments were determined by MRI spectroscopy. Principal component analyses (PCA) was performed on high output profiles and among groups.

## **Results**

Total body weight increased significantly in the HFD group due to an expansion of their body fat compartment (HFD vs NMC & intervention groups,  $p < 0.05$ ). A shift in the gut-microbiota communities was observed in the mice fed HFD. A significant increase in Verrucomicrobia was observed in the HFD group when compared to the NMC group ( $p < 0.05$ ). Additionally, a significant decrease in Bacteroidetes was noted in the HFD vs NMC ( $p < 0.05$ ). In contrast, the microbial communities profile from the interventions groups (pNaKtide and exercise) were comparable to the NMC group.

## **Conclusion**

Diet-induced NASH in the rodent is associated with significant changes in the gut-microbiota communities. Related microbiota changes promoted by HFD were abrogated by pNaKtide and exercise. Further studies to explore mechanisms are undergoing in view of a likely translational approach.

## **The Effects of Adolescent Binge Drinking on Astrocyte Maturation and Synaptic Colocalization**

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### **Background**

Binge drinking is highly prevalent among today's youth and is associated with increased risk of alcohol dependency later in life. While progress has been made in understanding the consequences of binge drinking on neuronal and subsequent cognitive function, little is known about the role of glial cells, which ensheath synapses and are critical in synapse formation, maturation, and transmission.

### **Hypothesis**

We hypothesize that binge-ethanol exposure during adolescence disrupts normal astrocyte maturation and appropriate synaptic ensheathment that persists into adulthood.

### **Methods**

Male Sprague Dawley rats received intracranial astrocyte-specific adeno-associated virus directly into the medial prefrontal cortex (mPFC) and dorsal hippocampus (dHipp). Brains were collected at PNDs 24, 30, 45-48, and 70 and immunohistochemistry was performed to locate synapses. Imaging was performed using confocal microscopy and 3D reconstructions were rendered using IMARIS. To investigate the effects of adolescent ethanol exposure, identical procedures were performed on animals that received ethanol exposure (5g/kg, i.g.) 10 times over 16 days beginning PND 30. Tissue was processed 24 hours after the 10th dose (PND 46) and 26 days later (PND 70).

### **Results**

Results show a significant post-adolescent increase in mPFC astrocyte volume and increased colocalization with synapses, with no such changes in the HIPP. Following intermittent ethanol exposure there was a substantial decrease in the colocalization of HIPP astrocytes and synapses following the 10th dose despite no change in astrocyte volume. In adulthood, following ethanol exposure, there was a significant decrease in HIPP astrocyte volume and a decrease in colocalization of astrocytes and synapses when compared to the age-matched controls.

### **Conclusion**

These data suggest that mPFC astrocytes undergo morphological refinement well into adulthood. While, adolescent ethanol exposure disrupts this protracted developmental trajectory and subsequent localization with synapses. How disruption of these processes contributes to the long-term changes in synaptic structure and function we have previously observed is yet to be determined.

## **A case of Embryonal Tumor with Abundant Neuropil and True Rosettes: a distinct genetic locus with an excellent outcome.**

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Department of Neurology

### **Background**

ETANTR is a rare embryonal tumor with less than 70 cases reported since 2000 with a significantly poor prognosis occurring in children under 4 years.

### **Case Presentation**

We present a case of ETANTR with rhabdoid features (WHO grade IV) and amplification of miRNA (micro RNA) locus on Chromosome 19 but with distinct locus (19q13.41) detected on FISH analysis compared to previous cases reported in literature. Previously hea

### **Discussion**

Till now, genetic hallmark reported in all previous the cases is the amplification of the miRNA cluster (C19MC) at chr19q13.42 compared to our case which has completely different locus i.e. miRNA cluster (19q13.41) on FISH analysis. We hypothesize that co

## **A case report of augmenting treatment of MDD with Methylphenidate patch**

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### **Background**

Depression can affect anyone, regardless of age, sex, and race. In the geriatric population, symptoms of depression are often overlooked and untreated when they occur concomitantly with other medical illness or life events that occur as people age, such as loss of loved ones. According to one source, more than two million of the 34 million Americans age 65 and older suffer from some form of depression. Further, the geriatric population, which comprises only 13% of the US population, accounts for 20% of all suicide deaths. The geriatric population can present treatment challenges. In addition to pharmacokinetic, pharmacodynamic changes, and the concomitant medical conditions that can accompany the geriatric population, medication non-compliance can be another challenge. One method of medication delivery is through PLO transdermal cream. While PLO cream is an effective modality for medication administration, not all medications are available in this formulation. Specifically, Methylphenidate, which is an adjunctive medication used in treatment resistant depression, is not available in a PLO transdermal cream. Previous research has shown that methylphenidate is an effective augmentation medication for depression. Methylphenidate is available in the form of a patch.

### **Case Presentation**

The methylphenidate patch was used in two geriatric patients who were diagnosed with major depressive disorder. These patients were non-compliant with oral medications. The two patients responded well to the methylphenidate patch and have shown significant

### **Discussion**

Methylphenidate is an effective medication for depression augmentation. The patch is a promising treatment modality for patients who are non-compliant with oral medications.

## **A Case Series: Review of Aggression and Psychostimulants**

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### **Background**

Attention Deficit Hyperactivity Disorder (ADHD) is the most common behavioral disorder in children, and its prevalence is increasing. In school aged children, psychostimulants are the mainstay of treatment. Commonly prescribed psychostimulant medications include methylphenidate, dexamethylphenidate, and amphetamines. Psychostimulants carry similar psychiatric adverse effects including emotional lability, anxiety, agitation, irritability, and aggressive behavior.

Aggression in childhood ADHD can be attributed to both the disorder itself and an adverse effect of psychostimulant medication use. Psychostimulant-associated aggression occurs in up to 2% of children with ADHD. ADHD-associated aggression has been reported in up to 46% of affected children. Severe ADHD symptoms and comorbid psychiatric conditions have a significant association with the development of aggression.

### **Hypothesis**

We hypothesize that the medications

### **Case Presentation**

Our case series analyzes three pediatric ADHD patients who developed new or worsening aggression while on psychostimulants. Patient one has a history of ADHD and Obsessive Compulsive Disorder, who developed aggression after beginning amphetamine-dextroamp

### **Discussion**

While psychostimulants are a well-known cause of aggression in childhood ADHD, meta-analyses and literature reviews have also demonstrated a benefit to using psychostimulants for treatment of aggression associated with ADHD. Studies suggest that methylphe

## **Abnormal Hyperpigmentation after Long Term Minocycline Use**

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### **Background**

The Tetracycline family is a widely prescribed group of antibiotic medications that are used to treat a variety of ailments due to their broad-spectrum coverage. Minocycline, a semisynthetic tetracycline, is often prescribed not only for its wide tissue distribution and high absorption rate, but also due to its broad antibacterial and anti-inflammatory abilities. These advantageous aspects result in the prescription of Minocycline for conditions such as inflammatory Acne Vulgaris and Ocular Rosacea. Minocycline, however, is known to produce a variety of common side effects, including abnormal hyperpigmentation.

### **Case Presentation**

A 77 year old white female, who had been prescribed long term use of Minocycline for the treatment of Ocular Rosacea, was noted to be increasingly tan despite minimal sun exposure. She eventually presented with blue to black hyperpigmented areas on the fo

### **Discussion**

Minocycline induced hyperpigmentation can occur in a wide variety of tissues including skin, bone and oral mucosa. Reactions can be Type 1, with a localized blue-black discoloration, Type 2, with a generalized blue-black discoloration of the shins, ankle

## **Adult Pulmonary Langerhans Cell Histiocytosis with Osseous Involvement, a Diagnostic Conundrum**

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### **Background**

Langerhans Cell Histiocytosis (LCH) is primarily a pediatric disease, but the pulmonary subset (PLCH) is more common in adults. PLCH is a smoking-related interstitial lung disease (SR-ILD) presenting in Caucasians 20 to 40 years old. The disease is rare and of unknown etiology, although environmental factors appear to be strongly linked.

Langerhans cells (LCs) are dendritic cells that reside predominately in epithelial and submucosal surfaces, and pulmonary LCs specifically inhabit the tracheobronchial tree. Derangement of these cells creates specific damage in the affected organ: lytic lesions that become fibrotic over time.

### **Case Presentation**

A 36 year old female smoker presented with right shoulder pain. Imaging revealed lytic lesions in the scapula and ribs, along with multiple pulmonary lesions. This sparked concern of a possible malignancy. Further investigation revealed Pulmonary Lange

### **Discussion**

Rapid diagnosis of LCH is a challenge for clinicians because of its incredible variability in presentation due to the multitude of locations inhabited by Langerhans cells. PLCH presents similarly to a malignancy if evaluated in early stages and imitates



# **Altered Mental Status and Catatonic features in a patient with profound thiamine deficiency secondary to bariatric surgery**

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Marshall Psychiatry

## **Background**

Wernicke encephalopathy is the most commonly recognized neurological complication of thiamine deficiency and is associated with excessive alcohol ingestion, malnutrition, and bariatric surgery. Prolonged thiamine deficiency eventually results in a chronic amnesiac syndrome known as Korsakoff Syndrome. The classic triad of Wernicke encephalopathy includes ophthalmoplegia, ataxia, and altered mental status though patients do not always present with all three elements. This can lead to under-recognition and misdiagnosis.

## **Case Presentation**

We present the case of a 65 year-old woman who presented to the hospital with acute onset of altered mental status. Her initial medical workup did not reveal an obvious etiology. There was no known history of alcohol use disorder. Her past psychiatric h

## **Discussion**

This case illustrates an unusual presentation of thiamine deficiency and highlights the need for clinicians to maintain a high index of suspicion for vitamin deficiency syndromes in at risk patients.

# **An Unforeseen Consequence of Dental Braces: Chronic Allergic Dermatitis of the Vulva.**

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## **Background**

Nickel-containing metal alloys are used in many orthodontic appliances, such as dental braces that have nickel-titanium archwires. These alloys contain a range of 8- 50% nickel by weight. The most common harmful health effect from nickel toxicity is allergic dermatitis, mediated by a type IV hypersensitivity reaction. Nickel can be absorbed into the body via inhalation, oral ingestion, or transdermally.

## **Case Presentation**

A 14-year-old nulliparous female presented to the gynecology clinic with a six month history of vulvar pain, irritation, erythema and pruritus. These symptoms interfered with the patient's life and caused extended absences from school. Her vulvar inflamm

## **Discussion**

Nickel levels in the patient were most likely supraphysiologic due to absorption of nickel released from her dental braces. Seeing that high levels of nickel in the body are excreted via the kidneys, the vulva is highly exposed. Nickel is the most common

## **An unusual case of carotid-cavernous fistula in a 78-year-old male with complex imaging diagnosis**

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### **Background**

Carotid-cavernous fistulas are rare, acquired vascular malformations. Untreated, CCFs can progress to cause vision loss due to glaucomatous damage, venous stasis retinopathy, and central retinal vein occlusion. Noninvasive studies such as magnetic resonance and computed tomography have been found to be reliable in diagnosing CCFs. However, in some cases the only radiological evidence is seen on conventional angiography, which is the diagnostic gold-standard for CCFs.

### **Case Presentation**

A 78-year-old Caucasian male presented for evaluation for a possible low-flow, dural CCF. Two months ago, he experienced left sided orbital pain, headache, and conjunctival congestion. Local physicians tried a course of Bactrim, combination topical ster

### **Discussion**

Carotid-cavernous fistulas are rare and can be difficult to confirm radiologically. Although noninvasive radiological studies have been found to be generally reliable for detecting CCFs, the sensitivities of these tests fluctuate depending on which segme

## **Anomalous Origin of Left Circumflex Artery from Right Sinus of Valsalva**

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Cardiovascular Disease, Marshall University School of Medicine

### **Background**

Coronary arteries anomalies are rare, yet significant findings in clinical practice. The majority of coronary arteries anomalies are asymptomatic and discovered during coronary angiography. Patients may have different presentations based on different types of the anomalies.

### **Case Presentation**

A 72 year old female whose PMHx was significant for hypertension, hyperlipidemia and nicotine dependence presented to our facility with complaints of acute episode of exertional chest pain. Physical examination revealed stable vital signs. Ancillary test

### **Discussion**

Congenital coronary artery anomalies are rare and may be broadly classified as abnormalities of coronary artery origin, course, destination, size, and number of vessels. The incidence is thought to be around 1% based on adult angiographic series and 0.3%

# **Bilateral Extracranial Carotid Artery Aneurysms: A Rare Complication of Marfan Syndrome**

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## **Background**

Marfan Syndrome (MFS) is an autosomal dominant hereditary connective tissue disorder due to a mutation in the FBN1 gene which encodes the connective tissue protein fibrillin-1 found in elastic tissues in multiple organ systems throughout the human body. Among the features of MFS, aortic disease is the major cause of morbidity and mortality as it leads to aneurysmal dilation, aortic regurgitation, and aortic dissection. Although an estimated 60-80% of adults with MFS have some degree of aortic disease, carotid artery aneurysms as isolated findings are rare.

## **Case Presentation**

The patient is a 70-year-old female with a history of hypertension, hyperlipidemia, hypothyroidism, type 2 diabetes mellitus, and ectopia lentis. She presented to the ED with epistaxis and anemia secondary to blood loss with a Hgb of 10.8 g/dL. The epista

## **Discussion**

Extracranial carotid artery aneurysms are rare, and limited evidence is available to guide treatment or management. While the prognosis of extracranial carotid artery aneurysms is usually favorable, few cases in MFS patients have reported TIAs and strokes

# **Chronic Inflammatory Demyelinating Neuropathy in a Patient Complicated by Diabetes Mellitus**

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## **Background**

Chronic inflammatory demyelinating polyneuropathy (CIDP) is a chronic inflammatory disease characterized by symmetrical, progressive weakness and sensory dysfunction that affects proximal and distal limbs. Multiple diagnostic criteria have been proposed but enough variability in presentation exists that uncertainty persists even after clinical symptoms, electrophysiologic testing, albumino-cytological disassociation analysis of the CSF, sural nerve plexus biopsy and MRI are analyzed. To complicate matters further is the potential of related syndromes, like Gillian Barre Syndrome, acute IDP and acute CIDP. In the presence of a diabetic polyneuropathy (DPN) comorbidity, correctly diagnosing CIDP is even more challenging.

## **Case Presentation**

A 49-year-old male with uncontrolled Type II Diabetes Mellitus and DPN presents with progressive pain, sensory loss, and weakness over a 6-week period. The patient received an immunization for influenza and was status post a spinal cord stimulator (SCS)

## **Discussion**

DPN, the most common peripheral polyneuropathy, results from axonal damage due to glycemic mediated metabolic derangement. While the pathology differs, DPN shares some symptoms with CIDP, not only making it challenging to distinguish between the two, but

# **Delirium Misdiagnosed as Lewy Body Dementia- Case Presentation and Review of Literature**

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Psychiatry

## **Background**

Delirium is one of the most commonly encountered mental disorders, but it can at times paint a confusing picture of patient presentation. Delirium might be confused with Lewy Body Dementia (LBD) as both can present with hallucinations, cognitive changes, waxing and waning features, and parkinsonian symptoms.

## **Case Presentation**

A 59 year old patient who had a long history of Bipolar I disorder experienced gradual cognitive decline that began worsening more quickly over the course of a few months. Neuropsychological evaluation diagnosed probable LBD due to prominent cognitive dys

## **Discussion**

Given the increased recognition and publicity of LBD recently, and the overlap of symptoms of both delirium and LBD, it is likely that delirium is not uncommonly mistaken as LBD. This has serious ramifications for patients, as delirium is potentially treatable.

## **Diabetic Muscle Infarction: a rare end-organ vascular complication of diabetes**

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Marshall Family Medicine

### **Background**

Diabetic muscle infarction (DMI) is a rare microvascular complication of spontaneous ischemic necrosis of skeletal muscle in patients with poorly controlled diabetes. Like other associated microvascular complications, which are often associated with DMI, damage to proximal lower extremity musculature occurs with vascular damage. This presents as sudden, severe pain associated with edema. Laboratory evaluation is largely not helpful in diagnosis, which is better identified with MRI and muscle biopsy. Management is conservative with rest, NSAIDs, and strict glycemic control. Prognosis is poor with mortality rates similar to myocardial infarction.

### **Case Presentation**

A 26 year-old woman with a history of type I diabetes and accompanying diabetic microvascular complications presented with sudden onset of swelling and sharp pain in her bilateral thighs. White blood cell count was normal but hemoglobin A1c, erythrocyte s

### **Discussion**

DMI is a rare and under-recognized pathology with relatively non-specific clinical presentation leading to frequent misdiagnosis. Physician awareness is key to facilitate early diagnosis and initiate appropriate treatment as aggressive management can resu



## **Extramedullary hematopoiesis in the sinonasal cavity, a case report and review of the literature**

Carly A. Clark, Cameron P. Worden, Brian D. Thorp, Charles S. Ebert Jr., Adam M. Zanation, Brent A. Senior, Steven Johnson, Adam J. Kimple, Wade G. McClain  
Marshall University Joan C. Edwards School of Medicine, Virginia Tech Carilion School of Medicine, University of North Carolina Department of Otolaryngology, University of North Carolina Department of Otolaryngology, University of North Carolina Department of Otolaryngology, University of North Carolina Department of Pathology and Laboratory Medicine, University of North Carolina Department of Otolaryngology, University of North Carolina Department of Otolaryngology

### **Background**

**Introduction:** Extramedullary hematopoiesis (EMH) occurs in patients with hematologic disorders, but rarely within the paranasal sinuses. We report a case of EMH in a 17-year-old male with sickle cell disease who presented with occipital pain and sinusitis. A CT scan demonstrated heterogeneous opacification of the right maxillary sinus concerning for allergic fungal sinusitis or a fungal ball with bony erosion. He was taken to the operating room for endoscopic biopsy and a limited endoscopic sinus surgery. Grossly, his maxillary sinus was filled with spiculated osseous tissue. Final pathology demonstrated active hematopoietic bone marrow filling the sinus.

### **Case Presentation**

**Methods:** We present a case report and literature review of sinonasal EMH.

**Results:** We identified fourteen articles with fifteen patients. EMH was typically associated with sickle cell disease or beta thalassemia, with an equal prevalence of each among

### **Discussion**

**Conclusions:** This case report serves as a reminder to consider the uncommon causes of sinus opacification, particularly in patients with sickle cell disease or beta thalassemia. The expansion of hematopoietic tissue may be identified as a sinus mass on CT

## **Herpes Simplex Encephalitis During Pregnancy**

Katherine Addicott, Kelly Cummings  
Obstetrics and Gynecology

### **Background**

Early detection and treatment of HSV encephalitis leads to improved outcomes. It is even more crucial during pregnancy due to concerns for both maternal and fetal wellbeing.

### **Case Presentation**

A 22-year-old primigravida at 15 weeks gestation presented to triage multiple times for migraine-type headaches, which were responsive to headache cocktails. Upon a similar repeat visit she was febrile with altered mental status and not oriented to place

### **Discussion**

HSV encephalitis has rarely been described in literature during pregnancy. More research is needed to improve earlier detection, treatment, and determine the effect on fetal wellbeing.

## **Hypersensitivity to Serotonin Syndrome in Cerebral Palsy**

Adam Schindzielorz, MD, Oluwadamilare Ajayi MD, Tamara Murphy MD, Kamal Patel MD,  
Scott Murphy MD  
Psychiatry

### **Background**

Serotonin syndrome is characterized by its primary symptoms of neuromuscular excitation, autonomic excitation and altered cognition. It is primarily drug induced with antidepressants being the main precipitants. However, antipsychotics, antiemetics, pain medications and lithium have been implicated. The syndrome is induced by the combination of two or more serotonergic agents, however there have been instances of serotonin syndrome being produced while a patient is on a monotherapy. The literature is limited in regard to the study of risk factors associated with the production of serotonin syndrome with lower doses or a single agent. One such risk factor may be underlying cerebral pathology. We present two cases that shared Cerebral Palsy as a common factor.

### **Case Presentation**

Our first case involved an 18-year-old female who developed serotonin syndrome requiring hospitalization on two separate occasions, each after a two to three-week, monotherapy trial of low dose fluoxetine and sertraline. Each instance required management

### **Discussion**

Cerebral palsy, though a well-recognized ailment, is not frequently associated with hypersensitivity to serotonin. In fact, this is the first case series to our knowledge reporting two separate cases of serotonin syndrome in patients with cerebral palsy w

## **Inferior STEMI and Systemic Emboli Presenting as a Recurrent Ewing Sarcoma in the Lung Invading the Left Atrium with Tumor Thrombi**

Jennifer Dotson, D.O., Madhulika Urella, M.D., Mina Shenouda, M.D., Yehuda Lebowicz, M.D.

Oncology/Hematology Department & Internal Medicine, Marshall University

### **Background**

Ewing sarcoma is an uncommon malignancy which usually presents as an undifferentiated primary bone tumor in children or young adults; extra-osseous Ewing sarcoma (EES) that arises in soft tissue is an unusual presentation. We present a case of recurrent EES sarcoma presenting as inferior STEMI with systemic emboli to the peripheral vasculature due to a lung mass with invasion of the left atrium.

### **Case Presentation**

A 62-year-old male presented to the ER with chest pain and shortness of breath. He had history of EES of the left posterior neck five years prior and had received chemotherapy with subsequent radiation therapy. After completion of therapy, he remained in

### **Discussion**

This is a very unusual presentation of a recurrent EES in the lung invading the left atrium with what seems to be causing systemic emboli causing STEMI and claudication symptoms. There are no cases in the literature of adults with Ewing sarcoma of the left

## **Intravenous tPA in treatment of acute stroke related to aortic dissection**

Dipali Nemade, Vikram Shivkumar  
Department of Neurology,

### **Background**

Aortic dissection (AD) is a life-threatening emergency which can present as a stroke and severe complications can occur if tPA is administered.

### **Case Presentation**

A 61-year-old woman presented to the ED within 30 minutes of onset of left facial droop and left sided weakness. Initially, BP was 180/95 mm Hg but other vitals were normal. She denied any chest pain or other symptoms. She had left homonymous hemianopia,

### **Discussion**

AD can present with neurological symptoms in 17-40% of cases. About 10-55% of patients might not experience any significant pain. If the patient meets certain criteria including absence of bleed on non-contrast head CT, tPA can be given. tPA in aortic dis

## **Kounis Syndrome: A simple MRI with contrast turned into a life threatening condition**

Ahmed Amro, MD; Kanaan Mansoor, MD; Mark Studeny, MD; Mehiar El-hamdani, MD.

Cardiology

### **Background**

Kounis syndrome [KS] is a hypersensitivity coronary disorder induced by various allergens. It is a rare condition which has been reported in every age group (2-90 years), every race and geographic location, its incidence has been reported to range from 7.9 to 19.4 per 100,000. The presentation of the detrimental effects of KS on coronary arteries ranges from vasospastic angina to allergic myocardial infarction.

Drugs are the major iatrogenic cause of KS, but virtually everything in the environment around us can cause KS. In recent years contrast mediums used in the radiologic investigation have come forth as a leading cause of anaphylaxis. Gadolinium is a rare earth metal that is used in contrast mediums for magnetic resonance imaging is generally considered to be safe.

### **Case Presentation**

This is a case of 52-year-old female who developed KS after receiving Gadobenate dimeglumine

– a Gadolinium based contrast medium (GBCM)- for MRI brain as a work up for metastatic renal cell carcinoma. Her EKG was remarkable for ST elevations in the infer

### **Discussion**

Gadolinium-based contrast medium (GCM) is generally a benign agent but in very rare cases it can lead to life threatening conditions and physicians should be aware of the detrimental side effects of this contrast medium and also should be aware of kounis sy

# **Life-threatening hemothorax following small-bore thoracocentesis for pleural effusion in patient on clopidogrel.**

AlAsmar, R., Zeid, F.

Internal Medicine, Marshall University

## **Background**

Clopidogrel is one of the most commonly used, potent antiplatelets in ACS with coronary stenting. Published data in the past ten years did not report major safety concerns regarding performing small-bore thoracocentesis on patients on clopidogrel therapy. Some published cases reported hemothoraces following thoracocentesis in patients on clopidogrel, who remained hemodynamically stable and didn't require blood transfusions.

## **Case Presentation**

We present an 85 year old male patient with past medical history of diabetes, atrial fibrillation, diastolic heart failure, CKD stage 3. Patient had NSTEMI 4 weeks before the admission, requiring DES to LAD, after which he took aspirin and clopidogrel. Patient w

## **Discussion**

Small-bore thoracocentesis is generally perceived as a very safe procedure done on medical, surgical, intensive care and IR units. Several researchers concluded that it is overall safe to perform it on patients taking clopidogrel(1),(2),(3). Our case report

## **Neonatal withdrawal following in utero exposure to kratom.**

Taylor Maddox, Emma Nellhaus, Lacey Andrews, Jessica Hass, David Miskell, Kenneth Kurek, Zachary Hansen, Todd Davies  
Family and Community Health Department, Marshall University

### **Background**

In recent years, the clinical definition of Neonatal Abstinence Syndrome (NAS) has been expanded to describe neonates experiencing withdrawal due to in utero exposure to numerous neuroactive substances, not exclusively opioids. Complex NAS cases involving exposure to multiple and unusual narcotics have become widespread. Kratom is one such substance. It is extracted from tropical tree leaves, and can be used both as a recreational drug and to mitigate opioid withdrawal. Although kratom may potentially serve as a viable opioid alternative, its activity and the consequences of controlled use are largely unstudied, particularly in the pregnant population.

### **Case Presentation**

A newborn male infant not initially identified as being at risk for withdrawal due to no maternal admission of substance use and maternal urine drug screen was negative. On the first day of life (DOL), the neonate was observed to exhibit significant signs

### **Discussion**

In this report, we present a case of NAS precipitated by in utero exposure to kratom, discuss the present body of research regarding kratom and consider potential implications of escalating kratom use on the incidence and severity of NAS. For this prenatal



## **Off Label-Low Dose Naltrexone for Post-Traumatic Stress Disorder**

Kamal Patel MD, Kelly Melvin MD

Department of Psychiatry and Behavioral Medicine

### **Background**

Naltrexone primarily approved to treat and manage opioid and alcohol dependence. However per scarce literature when used at low dose it has shown to improve and alleviate signs and symptoms of post-traumatic stress disorder

### **Case Presentation**

Here we present a 20-year-old Caucasian female who was admitted to inpatient psychiatric hospital due to worsening of depression over the months following a sexual assault. Patient endorsed symptoms of sleep disturbance, hyper-vigilance, anxiety, nightmar

### **Discussion**

In this case, following administration of low dose of naltrexone resulted in resolution of post-traumatic stress disorder symptomatology.

# **Opioid Restriction Laws for Acute Pain in West Virginia, Ohio, Kentucky, Pennsylvania, Maryland, and Virginia.**

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Department of Orthopaedic Surgery, Joan C. Edwards School of Medicine, Huntington, WV.

## **Background**

Opioid restriction legislation is put into place by states in order to limit opioid prescriptions for acute pain with the intent to reduce the development of opioid dependence. Approaches to these restrictions include supply limits, dosage limits, and required instructions for physicians to follow when prescribing opioid medications. The opioid restriction laws of West Virginia, Ohio, Kentucky, Pennsylvania, Maryland, and Virginia are summarized to ease access to this information and potentiate understanding of the opioid legislation in nearby states, especially in border counties.

## **Case Presentation**

West Virginia has requirements for physicians to follow before prescribing opioids in addition to supply limits for adults, minors, and emergency room or outpatient urgent care visits. West Virginia also implements instructions for renewals. Ohio utilizes

## **Discussion**

Comparison of these approaches involves a balance between prescriber autonomy and risk reduction. Stricter restrictions limit the capacity to prescribe at the physician's discretion, but also have greater potential to reduce the risk of opioid dependence.

# **PULMONARY VEIN THROMBOSIS SECONDARY TO TUBERCULOSIS IN A NON-HIV INFECTED PATIENT**

Yonas Raru (1), Mahmoud Abouzid (1), Fuad Zeid (2), Samson Teka (3)  
Department of Internal Medicine

## **Background**

Tuberculosis has been suggested as an independent risk factor for thromboembolism due to a hypercoagulable state induced by changes in clotting factors, protein C and vascular endothelium. Pulmonary vein thrombosis (PVT) is a rare, potentially serious and life-threatening condition that can be caused by tuberculosis. Its rare occurrence is due to a rich network of venous collateral vessels that drain the lung.

## **Case Presentation**

Our patient is a 67-year-old Caucasian male with a past medical history significant for hypertension and hyperlipidemia who came to our hospital with hemoptysis, cough and shortness of breath 1-month duration. He also noticed around 20 pounds of weight lo

## **Discussion**

Pulmonary vein thrombosis can be seen in patients with tuberculosis, lung transplantation, malignancy and post radiofrequency catheter ablation. Presentation of patients is non-specific and needs a very high index of suspicion for proper diagnosis and man

# **Purulent Pericarditis from MRSA Complicated by Cardiac Tamponade in IV Drug Users**

Zachary Curtis MD, J.R. White DO, Jason Ballengee DO, Ryan Carroll MD, Mehiar El-Hamdani MD

JCESOM, Department of Internal Medicine

## **Background**

The risk of developing purulent pericarditis secondary to disseminated MRSA infection in the absence of preceding mechanical insult is extremely low. Infective endocarditis can be complicated by perivalvular ring abscess or myocardial abscess, which can result in direct extension of infection to the pericardium. In this case series we present two cases of cardiac tamponade due to purulent pericarditis in IV drug users.

## **Case Presentation**

Patient is a 37-year-old female with a past medical history that is significant for IV drug who initially presented to the hospital with a complaint of dyspnea. Initially she was tachycardic, hypotensive, and tachypneic. Bedside echo showed a large perica

## **Discussion**

Purulent pericarditis has become a relatively uncommon condition in the modern era of antibiotic use. Cardiac tamponade from purulent pericarditis is a life threatening condition and should be recognized as a potential presentation in patients presenting

# **Pyridoxine Failure in Treatment of Tardive Dyskinesia Complicated by New Onset Depression**

Marji McCoy, Adam Schindzielorz MD, Suzanne Holroyd MD  
Psychiatry

## **Background**

Tardive Dyskinesia is an iatrogenic movement disorder often involving the mouth, trunk and extremities. It is most commonly caused by dopamine blocking medications. The typical onset is 1-2 years following continuous medication exposure with a prevalence of roughly 20%. Literature supports the use of pyridoxine for the treatment of TD with report of symptom reduction after only several weeks in some cases. Despite observed benefits, pyridoxine carries a risk of permanent peripheral neuropathy and thereby its benefits must be weighed against risk. As such, the possibility of non-response must be considered, however research is limited in addressing factors that may contribute to this outcome.

## **Case Presentation**

We present a case of a 66-year-old male who developed TD after one year of treatment with quetiapine and was trialed on B6 at a dose of 1200mg. After treatment for two months no benefit was achieved. The patient also developed acute depressive symptoms in

## **Discussion**

Though vitamin supplementation is thought to be relatively benign, it can carry risks when given above typical daily requirements. Our case demonstrates that not all populations will respond to B6 supplementation and may in fact suffer from concurrent wor

# **RASBURICASE INDUCED SEVERE HEMOLYSIS AND METHEMOGLOBINEMIA IN A CAUCASIAN PATIENT COMPLICATED BY ACUTE RENAL FAILURE AND ARDS**

Yonas Raru(1), Julia Parsons (1), Jason Ballengee (1), Fuad Zeid (2)

1. Internal medicine resident, Marshall University school of medicine, Huntington, WV 2. Pulmonary and critical care Medicine, Marshall university school of medicine, Huntington WV

## **Background**

Rasburicase is a recombinant urate-oxidase enzyme and is a very important medication for tumor lysis syndrome. Methemoglobinemia and hemolysis are known side effects of rasburicase that result from oxidative stress caused by hydrogen peroxide, a byproduct generated during the breakdown of uric acid to allantoin. Patients with G6PD deficiency have a decreased tolerance to oxidative stress and are therefore at a greater risk of hemolysis and methemoglobinemia with rasburicase.

## **Case Presentation**

Our patient is a 56-year-old Caucasian male with a recent diagnosis of grade 2-3a Non-Hodgkin's lymphoma who presented to our emergency department with shortness of breath and dark discoloration of urine. Patient was discharged 36 hours ago from our hospital.

## **Discussion**

Even if rasburicase induced methemoglobinemia and hemolysis are not very common complications, clinicians who prescribe and follow patients should detect this serious complication early and manage it accordingly. Our case can be used as a reminder that pa

## **Religious-related concerns and animal-derived medications during anesthetic care**

Hannah Datz, Ahsan Syed, Mohammad Alsuhebani, Dmitry Tumin, Joseph D. Tobias  
Anesthesiology and Pain Medicine, Nationwide Children's Hospital Columbus, OH

### **Background**

Various religions may have beliefs regarding the consumption and utilization of animal-derived products, which have the potential to affect medical care related to animal-derived medications and products. Literature regarding the use of porcine and bovine derived medications and medical devices for patients who practice Judaism, Islam, and Hinduism is limited. Consideration and knowledge of these issues is necessary to facilitate successful communication with a diverse patient population and respect religious convictions.

### **Case Presentation**

We present a 20-year-old patient of the Islamic faith who required anticoagulation following a lower extremity orthopedic procedure.

### **Discussion**

The family and patient requested no porcine-derived medications thereby precluding the use of subcutaneous low molecular weight heparin. Issues surrounding religious concerns regarding animal-derived medications and healthcare products are reviewed and op

## **Small Bowel Obstruction Secondary to Ascariasis Infection: An Alarming Finding in the Remote Territory of Eastern Honduras**

Jett MacPherson, Sandra Jackson, Wesley Wallace  
Marshall University Joan C. Edwards School of Medicine

### **Background**

Small bowel obstructions (SBO) are a common gastrointestinal condition often warranting acute surgical intervention in developed nations. It is estimated that over 300,000 laparotomies per year are performed in the United States alone for adhesion-related obstructions. In underdeveloped countries, where access to modern healthcare technologies is limited, the risks for acute intra-abdominal pathologies are shifted towards environmental exposures, such as parasitic infections.

### **Case Presentation**

We present the clinical case of a 15-year-old female patient with no known past medical history who presented to a transient medical clinic in the remote territory of La Moskitia, Honduras with a 3-month history of poor appetite, nausea, vomiting, and wor

### **Discussion**

*Ascaris lumbricoides* lives in the intestines of an infected host and transmits eggs through the feces of the host, most commonly through oral ingestion from contaminated water, or subcutaneously from stepping on the feces of a human that has been infected



## **Succenturiate Placental Lobe Abruption**

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Huntington, WV

### **Background**

During fetal growth, and following implantation, normal placental development is intended to create the essential exchange site for nutrients and waste between mother and fetus. Integrity of this exchange site is dependent on synchronicity between proliferation and atrophy of villi. A succenturiate placental lobe results from the failure of proliferating villi to atrophy; therefore, forming one or more accessory lobe attached to the main placenta only by vasculature. While complications associated with succenturiate placental lobe are commonly present in the postpartum period, placental abruption in the setting of succenturiate placental lobe can lead to maternal and fetal morbidity and mortality in the antepartum period.

### **Case Presentation**

A 21 year old G3 P2002 at 34 5/7 weeks presented to the labor and delivery triage with vaginal bleeding initially worked up as a placental abruption. Following the third stage of labor, it was discovered that the bleeding was associated with an abruption

### **Discussion**

By understanding the diagnostic modalities and management strategies associated with placental abruption and succenturiate placental lobe, conclusions can be drawn that could serve to reduce morbidity and mortality associated with patients presenting with

## **Sympathetic storm**

Mohamed Suliman, Mena Shehata, Amro Al-astal

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### **Background**

Paroxysmal sympathetic hyperactivity (PSH) is a rare syndrome formerly called sympathetic storming. This is a well-recognized complication of severe brain injury that is characterized by episodic hypertension, hyperthermia, tachycardia, tachypnea, diaphoresis and extensor posturing. The mechanism of PSS has been described as a dysfunction in autonomic centers in the diencephalon or their connections.

### **Case Presentation**

A 44 y/o man with PMH of glioblastoma multiforme that was diagnosed 7 years ago treated with right hemispherectomy. Patient presented to the emergency department with episodic seizure like activity that was described by his wife as tonic flexion of his ri

### **Discussion**

Elevated sympathetic nervous system activity is characterized by increased heart rate, respiratory rate, blood pressure, redistribution of blood to skeletal muscle and the central nervous system, diaphoresis, and hyperthermia. In normal circumstances, the

## **Thrombotic Event Following Nexplanon Placement**

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### **Background**

Nexplanon is a progesterone only birth control implant that can be used by women to prevent pregnancy for up to three years. In women with a history of DVT/PE, progesterone only contraceptives are not contraindicated. Under the CDC guidelines for risk assessment, Nexplanon ranks as 2 on a scale of 1 to 4 for women with a history of DVT/PE (1 being no restrictions, 4 being unacceptable health risk). Under a score of 2, the advantages are shown to generally outweigh the theoretical or proven risks. However, combined estrogen-progesterone oral contraceptive pills (OCPs) are known to increase the risk of thrombotic events. In women with a history of DVT/PE, the CDC ranks OCPs at 4.

### **Case Presentation**

In this case, a 37-year-old female presented to the ED with left upper extremity swelling. Two days prior, she had her Nexplanon removed and immediately replaced with a new Nexplanon. This was her third Nexplanon, with no prior issues or concerns. The pat

### **Discussion**

The risk of thrombotic events occurring with progesterone-only contraceptives is considered very low. However, this case demonstrates that even in patients with minimal risk factors, thrombotic events are still a possibility with progesterone-only contrac

# Two Ankylosing Spondylitis Patients Treated with Adalimumab Associated with Parieto-Occipital Cerebral Abscesses and Neuropsychiatric Sequelae

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## Background

Ankylosing spondylitis (AS) is a rheumatologic condition that is progressively debilitating, causing bony overgrowth and erosive osteopenia in the axial spine. It has a 0.5% predominance in the general population and predominantly affects men prior to age 40. AS is treated with disease-modifying anti-rheumatic drugs (DMARDs) and the newer biologic drugs, including anti-tumor necrosis factor alpha (TNF- $\alpha$ ) blockers like adalimumab (Humira). TNF- $\alpha$  is the master pro-inflammatory cytokine, and anti-TNF drugs have largely proven to be very effective. These drugs may not improve symptoms for up to 40% of AS patients, however, and possible side effects include GI tract bleeding, ulcers, kidney injury, and increased infection risk. One recent review article found statistically significant increases in the occurrence of serious infections with anti-TNF drug use for AS patients).

## Case Presentation

This study covers two AS patients who developed brain abscesses after adalimumab therapy. Both developed neuropsychiatric manifestations of these infections. One patient developed musical hallucinations, severe depression with suicidal ideation, visual ha

## Discussion

It is our hope that this case series will add to the literature, as it focuses on an interesting crossroads of rheumatology, infectious disease, neurology, and psychiatry. It also illustrates a very serious complication of adalimumab treatment in patients

## **Use of Atypical Antipsychotics in Postpartum OCD**

Anne DeFruscio, Adam Schindzielorz MD, Hillary Porter MD  
Psychiatry

### **Background**

Pregnancy-related psychopathology is commonplace and well described in the literature. Though, little attention is paid to the emergence and impact of anxiety disorders, despite these symptoms being comorbid with depression and conferring a worse prognosis than depression alone. OCD is one such subtype, with a 2-3% prevalence, being higher, 4-11%, in the postpartum period. Postpartum OCD is clinically distinct in its symptomatology when compared to other subtypes, with many of the intrusive thoughts being directly related to the care of the newborn. Because study of this disorder is fairly limited, treatment is also limited to those modalities more classically utilized in OCD in the baseline population.

### **Case Presentation**

We present a case of 22-year-old female who presented to the outpatient clinic for evaluation of major depression after having initiated escitalopram 5mg daily. On interview the patient was notable for new-onset, obsessive-compulsive symptoms, these inclu

### **Discussion**

The postpartum period is a time in which many women experience worsening of pre-existing or the emergence of new onset psychiatric conditions. Historically, the focus has been on depressive and psychotic illnesses. However, given the relatively high preva

## **Use of Pyridoxine (Vitamin B6) in Treatment of Neuroleptic-Induced Tardive Dyskinesia: A Case Report**

Erika Maynard, Scott Murphy, Ruthie Cooper, Tiffany White, and Mathew Lemberger  
Department of Psychiatry, Joan C. Edwards School of Medicine, Huntington, WV

### **Background**

Neuroleptic-induced tardive dyskinesia (TD) is an involuntary movement disorder and common side effect from chronic use of dopamine receptor antagonists in the treatment of psychiatric disorders. Available treatment options for TD include vesicular monoamine transporter 2 inhibitors, such as valbenazine, tetrabenazine, and deutetabenazine. However, these pharmacological agents are very expensive with a significant side effect profile. Other options include: benzodiazepines, botulinum toxin injections, and anticholinergic agents. In comparison, therapeutic use of vitamin B6 (pyridoxine) for the treatment of TD offers a lesser side effect profile and is an inexpensive alternative. Current accepted effective dose is 400 mg/day with up to 1200 mg/day considered safe with a longer lasting effect.

### **Case Presentation**

This case follows a psychiatrically hospitalized patient with longstanding schizoaffective disorder, bipolar type with neuroleptic-induced tardive dyskinesia. This patient had been treated with several antipsychotics in the past, but at this time was on R

### **Discussion**

The current state of thought regarding the efficacy of vitamin B6 in treating TD is that better evidence is needed before a compelling case can be made for widespread use. This case supports the need for well-standardized, randomized controlled trials to

## **Virchow's Node: A Case Report of An Extremely Rare Presentation of Metastasis of Adenocarcinoma with Mucinous Features from the Colon**

Monider 'Monty' Singh, Mohamed S. Suliman, Aman N. Ajmeri, David L. Stuart, Samson Teku

Internal Medicine & Joan C. Edwards School of Medicine at Marshall University, Internal Medicine & Joan C. Edwards School of Medicine at Marshall University, Internal Medicine & Joan C. Edwards School of Medicine at Marshall University, Surgery & Joan C. Edwards School of Medicine at Marshall University, Internal Medicine & Joan C. Edwards School of Medicine at Marshall University

### **Background**

Colon cancer is one of the most common causes of cancer-related mortality. Adenocarcinoma with mucinous features accounts for 10-15% of colon carcinoma. Distal nodal metastatic colorectal cancer is uncommon, and metastasis of colorectal cancer to the left supraclavicular lymph node is extremely rare without signs of metastatic organ involvement.

### **Case Presentation**

We present a case of a 54-year-old Caucasian male with colonic adenocarcinoma that presented initially as a left sided neck mass that had progressively increased in size over 9 months. On physical exam, a left supraclavicular soft tissue mass 6 cm in diam

### **Discussion**

Typically, the most common sites of colon cancer metastasis are regional lymph nodes, liver, lung, bone and brain, and ours demonstrated an extremely rare pattern of colon cancer metastasis. The presentation to metastasize to the left supraclavicular node

## **Wound healing augmented with blue light**

Franklin D Shuler

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### **Background**

Blue light (405-470nm; not UV spectrum) has broad-spectrum antimicrobial activity. Commercially available products addressing acne bacteria use both red and blue light (Neutrogena Light Therapy Mask). A single patient case series using LED blue light to successfully treat four complex and technically challenging wounds is reported.

Hypothesis: Blue light can be safely used to promote wound healing in technically challenging wounds not amendable to conventional therapies.


### **Case Presentation**

Blue light (395nm) was delivered for 15min daily using an LED flashlight. 1cm distance from wound surface was selected to minimize effects on fibroblast migration, proliferation, viability and scar formation while maximizing the energy for bacterial deco

### **Discussion**

- (1) Infected Mediport – 3 months open packing with no wound contracture or granulation tissue. Blue light for 150min total (10d) produced complete wound healing;
- (2) GIIIA anterior tibial wounds – NSS irrigation initially with 90min (6d) of treatment pr





**CLINICAL SCIENCE AND MEDICAL EDUCATION POSTER  
SESSION II • 2:30 PM – 3:15 PM**

**31ST ANNUAL  
RESEARCH DAY  
POSTER SESSION**





## **A Quality Improvement Project To Decrease Burnout and Increase Empathy in Pediatric Residents**

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### **Background**

Up to 60% of practicing physicians report symptoms of burnout, defined as emotional exhaustion, depersonalization, and low sense of accomplishment. Physician burnout has been linked to poorer quality of care, patient dissatisfaction, increased medical errors, and decreased ability to express empathy. To address this, resident wellness is becoming more widely accepted as protected time for residents across the country as a means to decompress and discuss issues that arise during oftentimes busy and sometimes emotionally exhausting rotations. Our goal was to measure and compare residents' feelings of empathy and burnout before and after implementing resident wellness time into our weekly lecture block.

### **Hypothesis**

We hypothesized that resident burnout would decrease and empathy would increase following an intervention of weekly mindfulness/wellness sessions.

### **Methods**

Pediatric residents were given two separate previously validated questionnaires, one regarding feelings of burnout, the other regarding empathy. The pre-test was given prior to the start of the intervention. The intervention involved having a 15-20 minute session during protected lecture time to discuss positive patient interactions or words of praise for fellow residents and attending physicians. After an eight week period of weekly sessions, the same questionnaires were given as a post-test to measure if there was an impact on feelings of burnout and empathy.

### **Results**

Paired t-tests comparing pre and post tests revealed significant improvement in empathy following the intervention ( $p=0.03$ ). There was also significant negative correlation using Spearman's rho between empathy and burnout pre-tests ( $p=0.02$ ) as well as empathy and burnout post-tests ( $p=0.04$ ), showing residents with higher burnout scores had lower empathy scores and vice versa.

### **Conclusion**

There was a significant improvement in residents' feelings of empathy after participating in 15-20 minute weekly sessions for eight weeks. There was also a significant negative correlation between feelings of empathy and burnout among residents.

## **A Quality Improvement Project to Improve Blood Pressure Measurement and Documentation in Pediatric Resident Clinic**

Kathryn M. Huggins, Jack R. Stines, Mark Wippel, Jeffrey K. Harris  
Marshall University, Department of Pediatrics

### **Background**

Pediatric blood pressure (BP) elevation represents an important finding as it correlates with a higher and earlier onset of hypertension. Accurate diagnosis and measurement can be influenced by patient cooperation, equipment, time constraints and accessibility to normal pediatric BP ranges. The American Academy of Pediatrics (AAP) has a BP guideline to help address these concerns.

### **Hypothesis**

Determine ways to improve pediatric BP measurement and documentation using the guidelines from the AAP.

### **Methods**

This was a retrospective study looking at a consecutive, non-randomized, sample of the first 100 patients, aged 3-17 years old, presenting for routine visits at Marshall's pediatric resident clinic, during each PDSA cycle. Only patients with an elevated BP reading were included. A series of interventions were selected using the AAP guidelines and were aimed at either nursing staff and/or residents (Table 1.) Positive outcomes included: (1) documenting elevated BP in the assessment and (2) charting repeat BP. Outcomes were measured after each cycle and compared 50 patient, randomized baseline samples, obtained from the same data range 1 year prior to each PDSA cycle.

### **Results**

Post-intervention data from each PDSA cycle were compared to the randomized samples to ensure validity of the consecutive sampling during each PDSA cycle. PDSA 3 had potentially skewed data as it was the only PDSA cycle to show decreased percent improvement. All other PDSA cycles resulted in increased percentages of improvement in both documentation rates and blood pressure conformations (Table 2).

### **Conclusion**

Overall, resident documentation for elevated BP improved. Our final intervention appears to have had the greatest impact. The outcomes for improving BP confirmatory measurements may be unreliable given the possibility that not all measurements were charted. However, this does provide us with an opportunity for further PDSA cycles. Moving forward we will use randomized samples to improve data accuracy.

## **A Quality Improvement Project to Increase Pediatric Resident Attendance at Low-Risk Deliveries**

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### **Background**

We recently received feedback from previous graduates that desired more experience with newborn deliveries since this is included in a pediatrician's job description at several smaller hospitals in rural areas.

### **Hypothesis**

Aim Statement: Our aim is that pediatric residents, during their NBN rotation month, will attend at least 10 low-risk deliveries.

### **Methods**

Key drivers were identified and include the following: 1. Need way for L&D to contact resident. 2. Need permission from obstetricians. 3. Residents need to be motivated to help make this happen. 4. L&D needs to be motivated to help make this happen.

Iterative plan-do-study-act (PDSA) cycles included: PDSA #1: obtained a Spectralink phone for nursery resident; PDSA #2: permission obtained from obstetricians; PDSA #3: spoke to residents about importance of this and encouraged them to go to L&D daily and ask to be called; PDSA #4: residents have asked to be called; PDSA #5: sign posted to remind L&D PCA to call resident in addition to the residents going over to L&D each morning; PDSA #6: resident go to L&D during free afternoons and speak to the OB residents about being called or staying around for deliveries.

### **Results**

PDSA cycles 1-4 resulted in attendance of no deliveries. PDSA cycle 5 resulted in attendance of 1 delivery and 2 calls from the L&D PCA. PDSA cycle 6 resulted in attendance of no deliveries and 4 calls from the L&D PCA.

### **Conclusion**

We improved the attendance of pediatric resident physicians at low-risk deliveries during their Newborn Nursery month.

## **Abnormal PSA results from Senior Day at Cabell Huntington Hospital**

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### **Background**

174 participants received free Prostate Specific Antigen (PSA) tests at the 2018 Cabell Huntington Hospital (CHH) SeniorFest. CHH Urology protocols were used to set abnormal results: 51 (29%) participants had either a year over year increase in PSA level by 10% or a PSA greater than 2.5ng/ml for age  $\geq$  55. Participants with abnormal results were contacted by CHH Senior Services (BE; Figure 1). For males from 55-70 years, a PSA level of  $>$  4ng/ml is present in 14% of the population.

### **Hypothesis**

Using a year over year increase of 10% and a threshold of 2.5ng/ml is useful as a screening tool for abnormal PSA in a community setting.

### **Methods**

Standard PSA testing (ng/ml) at CHH laboratories.

### **Results**

Average PSA was 1.88ng/ml (69 years average). Abnormal PSA (n=51); average PSA 3.88ng/ml (range: 0.54 [55 yo] – 9.86 [69 yo]; 68 years average). Five participants had PSA  $>$  6.5ng/ml (Figure 2; age range 64-89; mean 73 years).

Year over year comparisons: 17% of participants (29/174) had abnormal PSA screenings at both the 2017 and 2018 CHH SeniorFest; average PSA level increased 0.47 ng/ml (from 3.06 ng/ml to 3.53 ng/ml. 21% (6/29) had PSA levels that were less than the previous year's testing; 14% (4/29) had year over year changes in PSA of less than or equal to the threshold of 10%; 19 participants (65%) had PSA increases  $>$  10% (Figure 3). 26% of this subset (5/19) had year over year PSA increases  $>$  50% (highest; 3.96 ng/ml in 75 yo); 79% (15/19) with increases  $>$  20%. Compared to the group of 51, 23% (12/51) had PSA increases greater than the mean year to year change.

### **Conclusion**

51 (29%) participants at the 2018 CHH SeniorFest had abnormal PSA screenings.

## **Aggressive Behaviors among Adults with Intellectual or Developmental Disability**

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Marshall University

### **Background**

Approximately 1.2 million US adults have intellectual disability or developmental disorders (IDD). Nearly all of these patients have comorbid psychiatric illness. Patients with IDD may be prone to aggressive behaviors, which can be self-injurious or directed toward caregivers or other individuals. While these behaviors are known to be common among adult patients with IDD, the prevalence of aggression and characteristics of adults with IDD who demonstrate aggression are not well described.

### **Hypothesis**

Analyses test the null hypothesis that no difference exists in prevalence of aggressive behaviors between various demographic and clinical characteristics of the sample.

### **Methods**

Data were analyzed from a retrospective chart review of 113 patients with IDD seen in an outpatient psychiatric clinic. Two-sided Fisher's exact tests and ANOVA compare variables against aggression outcomes.

### **Results**

In this sample of patients with IDD, 60% have shown aggression, with a similar percentage across all ages and genders. Prevalence of aggression varies by IDD severity, with significant difference between mild and moderate (46% and 74%, respectively,  $p=0.021$ ). Prevalence of aggression is lower among patients with comorbid depression (41%,  $p=0.010$ ), but it does not vary significantly among other psychiatric or medical comorbidities. Atypical antipsychotics are prescribed for more than twice as many patients with aggression compared to patients without aggression (79%,  $p=0.011$ ); other psychiatric medications are prescribed to a similar percentage of patients regardless of aggression history.

### **Conclusion**

Aggression is a common adverse behavior among adults with IDD, especially those with moderate severity IDD. Patients with all-severity IDD suffer from similar medical and psychiatric comorbidities when compared to peers without aggression, except that major depressive disorder may protect against aggressive behavior. While various medications have therapeutic efficacy against aggression, atypical antipsychotics are common in this sample. Aggressive behaviors should be studied prospectively among adult patients with IDD to better understand associated factors and improve therapy.

## **Albumin level as a risk marker and predictor of Peripartum cardiomyopathy**

Ahmed Amro, Giancarlo Acosta Baez, George Koromia, Niharika Bhardwaj, Rodrigo Aguilar, Mehیار El-Hamdani, Affan Irfan  
Cardiovascular Department

### **Background**

Hypoalbuminemia is common in HF and is independently associated with increased risk of death in HF.

### **Hypothesis**

Patients with PPCMP have lower albumin level in early pregnancy, in comparison to those who do not develop ppcmp.

### **Methods**

Methods: This is a retrospective cohort study. Logistic regression analysis was used to determine significant risk factors.

### **Results**

Results: Lower albumin level was significantly associated with PPCM ( $P < 0.05$ ). Logistic regression after adjustment of age demonstrated significant association of low albumin and PPCM with  $P < 0.001$ , while after adjusting age, hematocrit, ALT, sodium and creatinine, our data still revealed significant association of albumin with PPCM ( $P = 0.033$ ). Albumin of  $< 3$  mg/dl was present in 27.93% of the patient ( $P < 0.001$ ).

### **Conclusion**

Conclusion: Screening pregnant patients with hypoalbuminemia in earlier stages of pregnancy with echocardiogram may prevent delayed diagnosis of PPCM.



## **An Intervention to Improve the Evaluation of Clerkship Students**

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### **Background**

Effective feedback is an important part of formative evaluation of clerkship students, improving student performance by increasing awareness to weaknesses and strengths. A previous study showed that changing the evaluation form can improve written comments by 7 percent.

### **Hypothesis**

The aim of this study was to attain more specific or helpful feedback through a series of interventions and in turn greatly improve the educational experience of the Internal Medicine clerkship.

### **Methods**

Methods: We changed the structure of the existing feedback form, putting written comments at the beginning of the form and asking for specific strengths and areas for improvement, educated faculty in a Grand Rounds setting, and gave them a laminated milestones card to produce more specific feedback. Three reviewers independently ranked written feedback from 1-5 according to a rubric. We compared the quantity of either helpful (3-5) or not-helpful (1-2) feedback obtained during the 2017-2018 academic year with that obtained in the first rotation of 2018-2019.

### **Results**

Results: With our intervention, helpful comments increased from 33.8% to 79.2%. A Kappa statistic revealed a lack of bias of the reviewers.

### **Conclusion**

Conclusion: A small change in the evaluation form along with an educational intervention and milestone card improved the quantity of helpful feedback given to students in the Internal Medicine clerkship.

# **Analysis of Carbon Fiber Reinforced Polyetheretherketone Orthopaedic Implants**

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## **Background**

Titanium implants have traditionally been the standard-of-care in intramedullary repair of long bone fractures. However, metal implants are radiopaque and cause artifacts on MRI, which limits their utility in the surveillance of tumors in cancer patients. Carbon-fiber reinforced polyetheretherketone (CRF-PEEK) implants have superior fatigue strength when compared to titanium implants as well as radiolucency on radiographic imaging. This radiolucency may lead to an increase in fluoroscopic times for implantation, but may lead to less metal artifact on MRI compared to titanium implants.

## **Hypothesis**

CRF-PEEK implants will produce statistically significantly less MRI artifact as compared to a titanium implant in the same leg, without statistically different fluoro times for implantation.

## **Methods**

A Carbofix tibial nail and a titanium T1 Stryker nail were implanted in a cadaver tibia and imaged each with MRI, as well as taking an MRI of the leg alone as a control. The sequences were analyzed by a blinded radiologist using a grid analysis. Additionally, a retrospective chart review of cases where titanium nails vs carbon fiber nails performed by a single surgeon was performed, comparing fluoroscopy times.

## **Results**

In an analysis of 71 femurs, the average implantation time for a metal intramedullary nail (n=57) was 142.19 seconds and the average time for a CRF-PEEK nail (n=14) was 105.38 seconds. The statistical analysis of fluoroscopy time of CRF-PEEK versus metal in tibial and humeral intramedullary nailing did not indicate a statistically significant difference in implantation time. The CRF-PEEK MRI contained less artifact than the titanium MRI.

## **Conclusion**

While limited by a relatively small sample size of CRF-PEEK nails, preliminary results indicate CRF-PEEK nails show no difference in time required for implantation in metal nailings, which would result in a lower dose of radiation exposure for patients. Furthermore, the reduced artifact on MRI of CRF-PEEK nails could have utility in cancer patients

## **Average Time-to-Conception After Hysterosalpingography Using Oil-Soluble Contrast Media**

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### **Background**

Hysterosalpingography (HSG) is an integral component in the standard diagnostic investigation of subfertility. Flushing the fallopian tubes with contrast-medium evaluates tubal patency and uterine contour. Studies have shown those having undergone HSG have had subsequent increased rates of conception, establishing a therapeutic benefit of HSG as well. Although HSG was traditionally performed with oil-soluble contrast medium (OSCM), the use of water-soluble contrast medium (WSCM) has largely become the standard practice due to cheaper cost and theorized improved safety profile. However, it is still debated which intervention yields the greatest fertility-enhancing effect. Many studies have compared the two contrast-media with no significant differences in conception rates or adverse events noted, though the studies generally followed patients just 6-12 months post-intervention.

### **Hypothesis**

The Reproductive Endocrinology and Infertility division at Marshall University solely uses HSG-OSCM for infertility evaluation. In our practice, it has been noted that the fertility-enhancing effect of HSG-OSCM may persist longer than previously hypothesized, with many pregnancies occurring 12 months or more after HSG-OSCM. The study purpose is to determine the average time-to-conception post-intervention. The hypothesis is that the therapeutic window for HSG-OSCM is actually greater than the 6-12 months accepted in prior studies comparing pregnancy rates after HSG-OSCM and HSG-WSCM.

### **Methods**

This is a retrospective chart review of more than 800 patients receiving HSG-OSCM between 2003-2016 at Cabell Huntington Hospital.

### **Results**

Chart review is currently in process. Results are still pending.

### **Conclusion**

If the therapeutic window of HSG-OSCM is greater than 6-12 months, this study could yield further studies comparing HSG-OSCM to HSG-WSCM with longer follow-up periods to determine which contrast media provides the greatest fertility-enhancing effect.

# Can Aspirin Reduce the Incidence of Persistent Wound Drainage after Total Hip and Knee Arthroplasty?

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## Background

Persistent wound drainage (PWD) after total joint arthroplasty (TJA) has been recognized as one of the major risk factors for periprosthetic joint infections (PJI). Morbid obesity, diabetes, hypothyroidism, and systemic inflammatory diseases have been identified to predispose patients to PWD. However, the role of postoperative DVT prophylaxis agent in PWD is unknown.

## Hypothesis

Patients receiving Aspirin for DVT prophylaxis after TJA will have lower rates of PWD when compared to those receiving Coumadin while having equivalent rates of thromboembolic events.

## Methods

Upon institutional review board approval we conducted a retrospective study and investigated the patients who underwent THA and TKA between years 2008-2016. 5,516 patients were identified, of which 2,183 received Aspirin. Elixhauser and Charlson comorbidity indexes were used to match the patients between the two groups. PWDs were identified as wound drainage longer than 72 hours. Furthermore, the incidence of venous thromboembolisms (VTEs) and subsequent PJIs were compared between the two groups.

## Results

The overall rate of PWD in our cohort was 6.4% (353/5,516). Patients who received Aspirin had a significantly lower incidence of PWDs (8.5% vs. 3.2%,  $p < 0.0001$ ). The rate of 30 day VTEs was comparable between the two groups (1.3% in the ASA group vs. 1.4%,  $p=0.722$ ). Patients who received Coumadin had a higher incidence of PJIs within 6 months of their surgery (1.8% vs. 1.4% in the ASA group); however, this was not statistically significant ( $p= 0.233$ ).

## Conclusion

The use of Aspirin is associated with lower incidence of PWDs after THA and TKA. In accord with previous studies, the use of Aspirin does not increase the rate of VTE events. Moreover, patients who received Aspirin had a lower likelihood for developing PJIs. Aspirin is a safe drug that can effectively prevent VTE events and is associated with lower likelihood of serious complications such as PJI and PWDs.

## **Clinical Determinants of Myocardial Injury among Hypertensive Crisis Patients**

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### **Background**

Hypertensive crisis causes myocardial injury evidenced by cardiac troponin (cTn) elevation. The 99th percentile of cTn level is unknown in this population. Risk factors predisposing patients for myocardial injury in this population are not identified.

### **Hypothesis**

99th percentile of cTn level is higher in patients with hypertensive crisis than the general population.

Risk factors for elevated cTn in hypertensive crisis are: coronary artery disease (CAD), CHF, use of aspirin, use of cardiac medications, PVD, stroke, obesity, CKD.

### **Methods**

467 patients with hypertensive crisis included. Data obtained from the electronic medical record using ICD-10-CM codes. Variables of interest were analyzed. Primary outcome was cTn level. Initial and serial levels included.

### **Results**

The 99th percentile of cTn level was 0.433 ng/ml. Risk factors associated with initial detectable cTn were elevated creatinine (OR 1.17; CI 1.02-1.34) and congestive heart failure (CHF) (OR 3.49; CI 2.06-5.9) while age > 61 (OR 0.59 CI 0.38-0.94) and BMI  $\geq$  30 kg/m<sup>2</sup> (OR 0.62 CI 0.40-0.91) had a negative correlation with detectable cTn. Risk factors associated with cTn level > 99th percentile were CHF (OR 4.28 CI 2.21-8.25) and use of aspirin (OR 1.98 CI 1.08-3.63) while BMI  $\geq$  30 kg/m<sup>2</sup> (OR 0.5 CI 0.28-0.89) showed negative correlation.

### **Conclusion**

In patients with hypertensive crisis, the 99th percentile of cTn level is higher than in the general population. Elevated creatinine, CHF, age < 61 and non-obesity are associated with detectable cTn. CHF, CAD, non-Caucasian race and non-obesity are associated with having higher serial cTn levels. Non-obesity, CHF and prior use of aspirin are associated with myocardial injury.

## **Combative Treatment for Carfentanil Epidemic - Editorial**

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### **Background**

According to CDC, opioid overdose deaths are now the leading cause of accidental death in the United States. Carfentanil is an analog of the synthetic opioid fentanyl that binds strongly to the opioid mu-receptor. The mu-receptor affinity is so firm that carfentanil is ~10,000 times more potent than morphine and ~100 times more potent than fentanyl. Keep in mind, fentanyl is 50 to 100 times more potent than heroin. Inadvertent contact with carfentanil could cause an overdose and risk the lives of first responders, border control agents, and anyone who is around the product. Usually, street consumers do not know the presence or amount of carfentanil until it is too late. Carfentanil is added to heroin as an enhancer.

### **Hypothesis**

Providing a solution to this opioid epidemic will require the combined efforts of law enforcement, legislation, research, and the healthcare system.

### **Methods**

This paper analyzes possible solutions for combatting carfentanil, as well as other opioids causing accidental overdose.

### **Results**

Solutions may include providing injection centers which have shown effectiveness in reducing overdose deaths, treating heroin addiction, and reducing the use of contaminated "street" heroin. Injection centers provide drug users with clean equipment, prescription quality pharmaceuticals, and counseling for recovery. The opioid antagonist, naloxone, has proven itself as a life-saving treatment for those who overdose on opioids. Improving naloxone access, either through designated dispensing sites or as an OTC drug, might be another solution to curb opioid deaths.

### **Conclusion**

Before carfentanil and other opioids take more lives, solutions should be analyzed and implemented to combat the growing epidemic.

## **Development of an occupational exposure platform: The NSTICK app**

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### **Background**

8 out of 10 needlestick injuries go unreported with over 800,000 injuries occurring per year. Over one-half of medical students have experienced at least one injury (needlestick, sharp or splash) at the end of the clinical period of training with over 50% not reporting the exposure. The most frequent reason for not reporting is that it “takes too much time” and there is “no utility in reporting”. John Hopkins press release stated “medical schools are not doing enough to protect their students and hospitals are not doing enough to make medical school safe”. An app and website were developed to address this issue.

### **Hypothesis**

Reporting occupational exposures can be facilitated through [www.myneedlestick.com](http://www.myneedlestick.com) and the NSTICK app.

### **Methods**

The development of an app with back support through [www.myneedlestick.com](http://www.myneedlestick.com) allows for the timely reporting of an occupational exposure. Zone V AMA medical schools are initially targeted for the distribution of this app (WV, KY, IN, MI, OH) because we are #1 in hepatitis C conversion rates (up to 5.1% conversion for our region/CDC data). Reporting of needlestick injuries is federal law: PL 106-430 2001 “The Needlestick and Prevention Act”.

### **Results**

Consumer testing through limited Apple licensure resulted in successful multi-device reporting using a personalized login with all of types occupational exposures reported in less than 2 minutes. Registered users are provided by the purchasing entity with downloads and use free for users. Unauthorized users are directed to an interface to seek immediate and appropriate medical attention. Authorized users are guided to appropriate protocols for reporting and treatment (e.g. CHH, MU Health and JCESOM has three different reporting protocols).

### **Conclusion**

This is the first and premier platform for occupational exposure reporting. The most vulnerable populations are addressed first during the product launch.

# **Does multi-generational substance abuse have a deleterious effect on outcomes of pregnant women enrolled in our MARC program**

Andrew Martin MD, Brenda Mitchell MD  
Obstetrics and Gynecology

## **Background**

Literature supports that parental substance abuse has an association with increased substance use in children. Pregnant women in our MARC program are on buprenorphine for treatment of opioid addiction and have requirements to the program. During their time in our program a detailed history is obtained including family history.

## **Hypothesis**

A family history of substance abuse will have a deleterious effect on the outcomes of the pregnant women in our MARC program.

## **Methods**

A retrospective chart review of patients enrolled in the MARC program between 2016 and 2017. 87 Patients were eligible. Patients were separated into 2 groups based on family history, 31 without a family history and 56 with a family history. The primary outcomes in the study were patient outcome in the program, length of time in the program, percentage of missed appointments, gestational age at delivery, APGARs of infants, infant weight, and length of stay of infant for NAS treatment.

## **Results**

The mean time in program was 124 days. Patients with a family history had a median time of 182 days and the patients without a median time of 108 days with a p value of 0.08. The percentage of appointments missed was not statistically significant with a p value of 0.29. Patient outcomes in the program, APGARs of infant, infant weight, length of treatment for NAS, gestational age at delivery all were not statistically significant as well.

## **Conclusion**

In conclusion according to our retrospective chart review, there was no significant relationship between family history of substance abuse and any of our primary outcomes. Substance use disorder is multi-factorial and it is important to continue to try and find ways to help treat patients including at a more individualized level.



## **Driving in the Rural Community Dwelling for the Oldest Old**

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### **Background**

The Community-Dwelling Oldest Old are the fastest growing age cohort in West Virginia. Unfortunately, we know little about this group. The oldest-old living in rural areas are surprisingly independent as only 9% of them live in long-term care facilities. The ability to drive or arrange transportation is critical to maintaining health and quality of life. Additional information on this group is essential to planning targeted intervention.

### **Hypothesis**

The working hypothesis is that there are significant differences between the community-dwelling oldest-old who are still driving and those who are not. The null hypothesis is that there are no significant differences between rural oldest-old who drive and who do not.

### **Methods**

This study was part of a larger study conducted in two adjacent census tracts in Lincoln County, West Virginia. The census tracts contain the county seat and largest city, Hamlin, and the other incorporated town within the county located 5 miles from Hamlin. The total population is estimated at 7,780 with 143 residents age 85 or older. The area defines a representative, isolated rural community for this study.

Subjects were not randomly selected but were enrolled upon referral from local health providers and other local organizations. Study criteria were as follows: age 85 or older; having lived within the boundaries of the defined community rural community for the preceding 12 months; not having lived in a residential setting within the preceding 12 months; and, legal competency.

Information obtained included driving status, demographic identifiers, living situation, degree of isolation of residence, function, frailty, sarcopenia, quality of life, nutritional status, and physical parameters. The instruments include estimates of cognitive and physical abilities.

### **Results**

Although all data has been submitted, completed results are pending and will be available by early 2019.

### **Conclusion**

Conclusions are awaiting the completion of statistical analysis. Earlier, incomplete results suggest significant conclusions.

## **Elevated Diastolic blood pressure (DBP) predicts short-term risk for Acute Coronary Syndrome (ACS) in patients without prior Cardiovascular Disease.**

Ahmed Amro, Giancarlo Acosta Baez, Kanaan Mansoor, George Koromia, Rodrigo Aguilar, Mehiar El-Hamdani, Affan Irfan  
Cardiology

### **Background**

We aimed to investigate the relation between elevated DBP and ACS. we evaluated the relation between elevated DBP at presentation to outpatient/ED for various reason and ACS events after one week of being discharged.

### **Hypothesis**

Elevated DBP is an independent risk factor for ACS in patient with no prior history of Cardiovascular disease.

### **Methods**

Methods: This is a retrospective cohort study. Logistic regression analysis and Odds Ratio (OR) was used to determine significant risk factors.

### **Results**

Results: 5 risk factors namely, Age >61 yrs ( $p<0.001$ ), history of HTN( $p<0.001$ ) and use of aspirin ( $p<0.001$ ), b-blockers ( $p=0.002$ ), diuretics ( $p=0.001$ ) were found to have significant association with developing ACS in 7 days. Furthermore, odds ratio was calculate of occurrence of ACS with elevated DBP for 3 adjusted models. In model 1 age was adjusted (OR=1.013), model 2, age and systolic blood pressure were adjusted (OR=1.019) and model 3 age, SBP, HTN, DM, ASA, Beta blockers, diuretics , ACEi and ARB use were adjusted (OR=1.019).

### **Conclusion**

Conclusion: Elevated DBP is an independent risk factor for ACS in patient with no prior history of Cardiovascular disease.

## **Exploring Surgical Value in Appendectomies**

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Department of Clinical and Translational Sciences, Joan C. Edwards School of Medicine at  
Marshall University.

### **Background**

In recent years, the Affordable Care Act has addressed value through implementation of pay for performance policies that are meant to incentivize hospitals based on performance measures such as quality and cost. Our goal is to examine risk factors that may be associated with lower quality, higher costs, and overall lower value in patients undergoing an appendectomy and develop a predictive model for these outcome measures.

### **Hypothesis**

Value can be quantitated and patient risk factors can have a significant influence on this measurement.

### **Methods**

Adult patients undergoing an appendectomy at Cabell Huntington Hospital were retrospectively analyzed through electronic medical records between August 2010 – July 2018. Risk factors were analyzed, and potential complications were graded using the Clavien-Dindo Classification System and served as a quality metric. Total hospital charges were used as our cost metric and together with our quality metric, a formula to quantitate a value unit was created. The value of each patient was then compared to risk factors using bivariate and multivariate analyses.

### **Results**

Study sample included 622 patients 18 years of age or older that had a diagnosis of acute appendicitis (326 female, 296 male) and underwent an appendectomy (573 laparoscopic, 49 open). Through bivariate analysis a history of congestive heart failure, end-stage renal failure, diabetes mellitus, hypertension, abdominal surgery, and a diagnosis of perforated appendicitis or undergoing an open appendectomy had a statistically significant decrease in value with p-values of 0.037, 0.014, 0.016, 0.003, 0.005, 0.000, 0.000 respectively. Perforation status had a statistically significant decrease in the value unit (-0.50, 95% C.I. -41 to -59) with a p-value of 0.000 after multiple regression analysis.

### **Conclusion**

Perforated appendicitis contributes a significant decrease in value for adults with appendicitis.

## **Family Physicians and Weight Loss Nutrition Counseling in the Huntington, WV Area**

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### **Background**

Obesity is a well-recognized health problem of critical importance. The 2013 prevalence of obesity in the Huntington-Ashland tristate area was 37.1%. Nutrition counseling for weight loss is effective and physician nutrition counseling is encouraged. Nevertheless, several studies have reported that physicians provide nutrition counseling infrequently.

### **Hypothesis**

In this study, we aimed to document the prevalence of physician weight loss nutrition counseling among family physicians in the greater Huntington area. We also explored barriers to this counseling.

### **Methods**

We administered an anonymous 13-question web-based survey querying physicians about how often they provided nutrition counseling to their obese patients, their nutrition education background, the resources they used in counseling and the barriers they faced to counseling. Drawing from the list of physicians in the Family Medicine section of Huntington's 2017 Health Source Directory, we excluded those without at least one practice site in either Huntington, Barboursville, or Ceredo-Kenova, those not currently practicing at the listed site and those not in ambulatory family medicine practices.

### **Results**

We invited 49 physicians to participate and had a 77.6% response rate. Over half of the respondents were aged 35-55. Fifty-three percent of our sample were men. Twenty-four physicians (63.2%) reported that they counseled at a high frequency. Only 31.6% of physicians reported having at least moderate nutrition education in medical school. Less than half of this sub-group viewed that education as clinically relevant. The most frequently-used specific patient education sources were the electronic health record system, the US Department of Agriculture's MyPlate tool, and smart phone-based apps. Time constraints and lack of patient interest in nutrition topics were the leading barriers cited.

### **Conclusion**

Huntington area family physicians tend to be high frequency obesity nutrition counselors who frequently use specific resources, who consider their education lacking and face oft-cited barriers. Larger studies are needed to further explore these findings.

## **Gender role on inpatient mortality of patients with Takotsubo Cardiomyopathy across CKD Stage 3 to ESRD: A Nationwide Analysis**

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1 Marshall University Medical Center, 2 Medstar Georgetown University Medical Center

### **Background**

The pathophysiology of takotsubo cardiomyopathy (TTC) remains poorly understood and little is known about the factors predicting mortality in these patients with underlying chronic kidney disease. Data suggest that this disease predominantly occurs in elderly females and imitates a coronary event where men and women are known to have a different clinical profile.

### **Hypothesis**

Our aim was to determine the epidemiologic and mortality difference between in patients male and female with TTC across CKD 3 to 5.

### **Methods**

Nationwide Inpatient Sample (NIS) 2005 to 2012 database, using International Classification of Diseases ninth revision (ICD-9), were queried for the study. Using propensity score matching, females with TTC were matched to males with TTC at a 1:1 ratio. All patients included in the pre match cohort had underlying chronic kidney disease stages 3 to 5, including end-stage renal disease (ICD 585.4 -585.6), were diagnosed with TTC (ICD 429.83), and underwent left heart cardiac catheterization. Those cases with stent placement or right heart catheterization were excluded. Comorbid cardiovascular, and chronic non-cardiovascular conditions were included in the analysis.

### **Results**

Among 595 hospitalized patients, 18% were males and 82% females. In-hospital crude mortality was not significant for females compared to a matched group of males at CKD stages 3 (3.03 vs 9.93% p=0.20), CKD 4 (13.33 vs 8.28% p=0.44), CKD5 (0 vs 8.94% p=0.48) and ESRD (7.69 vs 8.97% p= 0.80).

### **Conclusion**

Inpatient mortality risk of women with TTC compared to men with TTC through stages of CKD 3 to ESRD, appears to be reduced. Further studies are needed to elucidate the possible links of renal disease with mortality in patients with TTC and to assess if this holds true in outpatient settings.

## **Hospitalized Patients Experiences & Reasons for Taking Prescription Opioids**

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### **Background**

Approximately 11.5 million people have engaged in non-medical use of prescription opioids (NMUPO). With the highest rate of drug overdose deaths in the United States, West Virginia is in dire need of prevention interventions. Technology-based Prescription Opioid Safety Education (T-POSE) is a pharmacist-delivered intervention developed to educate patients on the safe use, storage and disposal of prescription opioids.

### **Hypothesis**

The purpose of this study is to summarize hospitalized patients' knowledge and experience taking prescription opioids, as well as motivations for using prescription opioids.

### **Methods**

A multisite prospective clinical trial is being conducted at two hospitals in West Virginia. Hospitalized patients being discharged with an opioid prescription, between the ages of 18-70, are eligible to participate. Patients that self-report lifetime use of heroin or illicit prescription opioid use are excluded. Patients that are eligible are randomized to receive either the T-POSE intervention or usual care. Participants were asked a series of baseline questions.

### **Results**

To date, 71 participants have been enrolled between the ages of 26 and 73. Nearly half of participants (54.9%) reported that they have never received information on safe use, storage and disposal of prescription medications in the past. However, 88.7% of participants have been prescribed an opioid in the past. All participants do not endorse NMUPO, but 20 participants provided motivation for use of prescription opioids. Of these 20 participants 100% (20) reported using prescription pain medications to relieve, 15% (3) reporting using it to relax, 50% (10) used it to be able to work, and 45% (9) used it to get through their day.

### **Conclusion**

The preliminary results suggest that patient reports of NMUPO may be contingent upon the question wording. Reasons for use of prescription opioids may yield more in-depth information; additional research is needed to confirm these findings.

## **Improving Pediatric Resident Comfort Level with ACGME Required Procedures**

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### **Background**

The ACGME requires pediatric residents to competently perform certain procedures. Studies have shown correlations between procedure comfort level, resident career goals and program size. In our program's last ACGME survey, graduating seniors felt uncomfortable performing at least 5 procedures unsupervised. This suggested that further research was needed to improve comfort levels.

### **Hypothesis**

Determine ways to improve pediatric resident comfort level with ACGME-required procedures and determine if demographics correlate with comfort level.

### **Methods**

Residents from Marshall Pediatrics and Medicine/Pediatrics were included (8 PGY1, 7 PGY2 and 9 PGY3/4). Pre-intervention, residents completed a questionnaire detailing demographics and comfort level with each procedure including indications, consent, equipment and complications using a 5-point Likert scale. The intervention included giving PGY1 residents inpatient reminder sheets for two procedures that graduating seniors felt uncomfortable performing unsupervised. Six months post-intervention PGY1 residents completed a second questionnaire, including questions regarding the usefulness of the intervention. Pre- and post-intervention data was analyzed using ordinary one-way ANOVA tests between three groups. Post-intervention data was analyzed using Whitney-Mann exact tests.

### **Results**

There were no significant differences in demographics. Pre-intervention data showed PGY1 residents were less comfortable with components in 6 procedures ( $p < 0.05$ ). All residents appeared less comfortable with 3 procedures. Post-intervention, PGY1 residents felt more comfortable with 4 procedures ( $p < 0.05$ ). Additionally, there were no significant differences in comfort level between PGY1 post-intervention and new PGY2 residents (Table 1).

### **Conclusion**

Pre-intervention comfort levels with procedures did not significantly correlate with demographics. Comfort level did improve with PGY level. Inpatient reminder sheets improved PGY1 comfort level with all procedures making them comparable to new PGY2 residents. Regardless of PGY level some procedures have low comfort levels overall. This indicates a need for future PDSA cycles to improve comfort levels in these specific areas across all levels of residency.

# INCIDENCE, PREVALENCE AND MORTALITY OF HEPATOBIILIARY & PANCREATIC MALIGNANCIES AT THE GLOBAL, REGIONAL AND COUNTRY LEVEL: 1990 TO 2016. GBD 2018 Study

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## Background

Cancer related disease is the second Global cause of mortality. As population ages, malignancies may become the most prevalent cause of morbidity and health expenditure.

## Hypothesis

The purpose of the present study is to determine incidence, prevalence and mortality trends of malignant neoplasms from the liver, gallbladder (GB) and pancreas. We also report on disability-adjusted life-years (DALYs), and Years Lost to Disability (YLD).

## Methods

The incidence, mortality, DALYs, and YLD by age, gender, year, and geography were found using datasets from the Global Burden of Disease (GBD) group. Epidemiological data obtained were modelled in DisMod-MR 2.1, a Bayesian meta-regression tool which pools data-points from different sources and adjusts for known sources of variability. GBD data was extracted from 284 country-year from 1990 to 2017.

## Results

Age-standardized global incidence rates (ASIR) per 100,000 for primary liver and pancreatic cancers rose from 12.49 to 14.55 and 6.11 to 6.37, respectively. Whereas the ASIR for GB decreased from 3.71 to 2.8. Age-standardized global mortality rates (ASMR) decreased for GB from 3.24 to 2.47, but stayed relatively constant for primary liver and pancreatic cancers at 12.54 vs 12.13 and 6.19 vs 6.20 respectively. Age-standardized global DALY decreased for all three cancers; liver (331.71 vs 295.2), GB (63.19 vs 47.82), and pancreas (122.7 vs 119.49). Age-standardized global YLD rose slightly for liver cancer from 2.69 to 3.29, stayed the same for pancreatic cancer (1.24 vs 1.30), and fell for GB cancer (0.82 vs 0.63).

## Conclusion

Global surveillance of HPB malignancies, and in particular changes in subpopulations, may provide with links to potential etiologies as well as stimulate further research.



# **Inclusion of Positive Self-Reporting by Mothers of Substance-Exposed Neonates Increases the Predictability of NAS Severity Over Toxicology Alone**

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## **Background**

The rise in opioid use among pregnant women has resulted in an increase in the incidence of neonatal abstinence syndrome (NAS). Despite the focus on opioid use, opioids are rarely used in isolation and prenatal polysubstance exposure is often associated with NAS diagnosis and severity. The trends in substance abuse are rapidly changing and largely unpredictable. Drug toxicology screens such as urine drug screens and umbilical cord toxicology are dependent upon the specific substance, timing, frequency, and dose to detect substances present and can therefore underestimate the neonatal exposure. Due to the lack of predictability and limitations of drug toxicology, maternal self-report may be an important aspect in determining neonatal exposure, NAS severity, and appropriate treatment. The aim of this study was to compare prenatal polysubstance exposure versus opioid only exposure based on toxicology and toxicology plus self-report.

## **Hypothesis**

We hypothesize that using toxicology with self-report is a better reflection of prenatal exposure than toxicology alone.

## **Methods**

Data was retrospectively extracted from medical records on neonates treated on the Neonatal Therapeutic Unit born from January-December 2017.

## **Results**

This study demonstrated that toxicology plus self-report was a better predictor of polysubstance exposure than toxicology alone. When prenatal exposure type was based on toxicology plus self-report, the prevalence of polysubstance exposure was 60% compared to 38% when based on toxicology only.

## **Conclusion**

Including self-report of substance use resulted in a statistically significant difference by prenatal exposure type with poly-exposed neonates experiencing more severe NAS and requiring a significantly greater level of pharmacological intervention than those exposed to opioids only. These results are in line with studies comparing outcomes of neonates exposed to opioids with those exposed to multiple substances.

## **Information Within Residency Monthly Evaluation Forms at Two Institutions**

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### **Background**

Monthly resident evaluation forms often attempt to capture information about residents' performance along greater and greater numbers of axes of performance. This has resulted in great complexity and length for some program evaluations.

### **Hypothesis**

We propose that large numbers of questions are associated with greater correlations between answers.

### **Methods**

Residency evaluations in core residencies during the academic year 2015-2016 were de-identified, and Likert answers were isolated. Correlations between the answers to these Likert questions were then calculated and compared between departments and schools.

### **Results**

Review of monthly evaluation forms for residents in the core ACGME programs at Marshall University and the University of Toledo demonstrated a wide spread in the number of Likert questions that faculty were asked to complete. This number ranged from a low of 7 in Surgery to a high of 65 in Psychiatry (both Marshall Programs). Correlation and network analysis were performed on these data. High degrees of correlations were noted between answers to questions on these forms at both institutions. Network analysis suggests that there were clusters of questions that produced quasi-independent answers. However, it also seemed clear that there was some duplication of information generated by these questions, especially in the residency programs with large numbers of Likert questions.

### **Conclusion**

The authors suggest that some pruning of large residency monthly evaluation forms might be prudent.

# Justification for the Classification of Kratom Herbal Supplement as a Schedule I Drug

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## Background

The indigenous plant, kratom, from Southeast Asia has been used as an herbal pain remedy and a recreational mild stimulant for decades. The alkaloids present within kratom, primarily 7-hydroxymitragynine (7-HMG) and mitragynine, bind to some of the same central nervous system receptors as opioid narcotics. By binding to these receptors, kratom can induce effects including euphoria, pain-relief, and sedation similar to opioid drugs such as heroin, oxycodone and fentanyl. Nonetheless, unlike opioid drugs, kratom is easily accessible due to its classification as an herbal supplement and lack of FDA regulation. Kratom can be purchased over-the-counter and through various online retailers.

## Hypothesis

Our goal is to evaluate the stimulatory, sedative, and euphoric effects experienced by kratom users and the abuse potential of this substance to justify reclassification of kratom as a Schedule I drug.

## Methods

There are currently no scientific studies that purport the safety and efficacy of kratom; however, after analyzing published case studies of self-medicating patients, we have found that the use of kratom, particularly at higher doses, induces similar effects as opioids and users can experience withdrawal symptoms.

## Results

After reviewing case studies of kratom and from our understanding of the pharmacology of opioids, there are remarkable similarities between the two. Opioids are highly regulated and heavily monitored through the authority of licensed healthcare providers with the legal authority to prescribe controlled substances. In addition, dispensing and prescribing of opioid medications are tracked through the use of State Prescription Drug Monitoring Programs. In contrast, kratom has very little regulation and there is no means to track its use.

## Conclusion

It is in the best interest of public safety for the DEA to classify the kratom plant as a Schedule I of the Controlled Substances Act until reliable data regarding its potential therapeutic use(s) is available.

## **Looking at Suicide and Self-Harm Behaviors in a College Psychiatric Clinic**

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### **Background**

Although there is literature regarding college mental health care, surprisingly there is a paucity of data regarding college students specifically referred for psychiatric evaluation and treatment.

### **Hypothesis**

The purpose of this research is to examine characteristics of college students referred to see the psychiatrist at an on campus clinic, located in the heart of Appalachia. In this study we specifically wanted to examine self-harm and suicidal characteristics.

### **Methods**

We conducted a retrospective chart review of 150 patients who were referred for psychiatric care, after having been evaluated by a mental health counselor at a college mental health clinic. Demographic and clinical data were collected, entered in SPSS, and analyzed.

### **Results**

Preliminary results indicate that the population was high risk with almost one-quarter (24%) having attempted suicide at least once in their life time, and over one-third (36%) had a history of non-suicidal self-harm. In addition, a high percentage of students (43.3%) had suicidal ideation in the month prior to being seen by the psychiatrist. Diagnoses associated with suicidal ideation and attempts include borderline personality disorder ( $p=0.002$ ), any substance use disorder ( $p=0.036$ ), post-traumatic stress disorder ( $p=0.021$ ), and major depressive disorder ( $p < 0.000$ ). Suicide attempts ( $p=0.048$ ) and self-harm ( $p < 0.000$ ) were both significantly related to being female.

### **Conclusion**

Our study indicates that this college patient population was quite psychiatrically ill. The suicidal ideation, suicide attempts, and non-suicidal self-harm rates were very high. The results of this study definitely speak to the need for quality psychiatric care of college students in Appalachia. Full results and a literature review will be presented.

# **Management of Bone Health in Breast Cancer Patients on Aromatase Inhibitors: A Single Institution Review**

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## **Background**

Aromatase Inhibitors (AI) block the peripheral conversion of androgens to estrogen. Treatment with AIs, therefore, result in bone loss due to estrogen deficiency. Guidelines for cancer treatment-induced bone loss include calcium and vitamin D supplementation. Per NCCN guidelines, monitoring of bone health with a bone mineral density exam at baseline and periodically thereafter should be obtained in women on AIs.

## **Hypothesis**

Better monitoring of bone health is needed for women on aromatase inhibitors.

## **Methods**

A retrospective chart review was performed analyzing 507 charts of hormone positive breast cancer patients treated at the Edwards Comprehensive Cancer Center in Huntington, WV from January 1, 2010 – December 30, 2015. 346 charts of patients who received aromatase inhibitors were further reviewed to see if they are appropriately receiving Vitamin D and Calcium and received a DEXA scan prior to starting an aromatase inhibitor.

## **Results**

Five hundred and seven patients analyzed had stage 1-4 hormone positive breast cancer. Those treated with an Aromatase Inhibitor (n=346; 68.2%) remained in the study. Of those patients who received Aromatase Inhibitors, 220 (63.5%) had vitamin D and Calcium documented on their medical reconciliation. 246 (71.1%) patients on Aromatase Inhibitors received a baseline DEXA Scan. Thirty eight (15.4%) patients did not receive follow up DEXA scans and 81 (32.9%) patients were not due for follow up at time of data collection

## **Conclusion**

Better compliance with National Comprehensive Cancer Center guidelines regarding baseline and follow-up DEXA scans is needed. Supplementation with calcium and vitamin D is also less than adequate to protect bone health and needs to be improved. Specific questioning about calcium and vitamin D and proper documentation, more detailed physician documentation and a breast navigator to confirm that baseline DEXA scans are ordered when starting a patient on an AI will improve adherence to following the current recommendations for patients on aromatase inhibitors.

## **Monitoring and Regulation of Operating Room Traffic via the MonitOR System: Revisited One Year Later**

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### **Background**

The monitoring of operating room (OR) traffic over recent years has been an area of considerable study due to the significant economic burden of surgical complications, most notably surgical site infections (SSIs) and operating room distractions (ORDs), adding to the multitude of factors that are at work during a procedure. The development of the MonitOR system - a centralized data base coupled to real time door sensors - has facilitated the collection of the number of door openings. Using this system, the information gathered could aid in the development of a cautionary system for OR personnel to be alerted to excessive and potentially critical amounts of OR traffic.

### **Hypothesis**

Using the MonitOR system, operating room traffic can be monitored to quantitatively account for the magnitude of traffic and the significance of this traffic in a clinical setting. By revisiting the results one year later, traffic can be assessed to determine if the system is an appropriate monitoring system to deter unnecessary door openings.

### **Methods**

A total of 12 ORs from the initial study were monitored for an additional year for 24 hours a day 7 days a week. Door sensors connected to a centralized data base with web server access, known as MonitOR, were attached to the front and rear doors of the ORs.

### **Results**

By comparing this study from the previous one, the results vary to show an overall increase in foot traffic in certain ORs while some illustrate an overall decrease in their traffic.

### **Conclusion**

The number and duration of door openings demonstrate the scale and significance of traffic through the OR at any given time. This large number of door openings coupled with their duration illustrate the importance of maintaining some form of OR monitoring system- both from a potential contamination aspect as well as from the inherent distractions involved with entering the room.

## **Multimorbidity among Adults with Intellectual or Developmental Disability**

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### **Background**

Medical comorbidities are common among patients with intellectual or developmental disability (IDD). While 45% of all adults in the US are estimated to have two or more chronic health conditions (i.e., multimorbidity), the prevalence of multimorbidity among adults with IDD is considerably higher. Multimorbidity compounds the burden of disease, leading to decreased quality of life, functional decline, and increased healthcare utilization. In the general population, multimorbidity worsens with age. However, the extent and characteristics of multimorbidity among US adults with IDD is not well described.

### **Hypothesis**

Analyses test the null hypothesis that no difference exists in prevalence of multimorbidity between various demographic and clinical characteristics of the sample.

### **Methods**

This is a retrospective chart review of 113 patients with IDD seen in an outpatient psychiatric clinic. Chi-square and ANOVA are used for comparison of descriptive variables and relevant medical factors between patients with and without multimorbidity.

### **Results**

In this sample of adults with IDD, the prevalence of multimorbidity is 63%, and prevalence among patients age >50 is 85%. Patients with multimorbidity are significantly older (mean 49y) compared to those without multimorbidity (mean difference 12y, confidence interval 6.2-19.9). Prevalence of multimorbidity is similar across all severities of IDD, genders, psychiatric conditions, and psychiatric medications. Patients with the following medical conditions demonstrate significantly higher prevalence of multimorbidity compared to those without the conditions: obesity (83%,  $p<0.001$ ), gastroesophageal reflux disease (85.7%,  $p=0.001$ ), and epilepsy (87.8%,  $p<0.001$ ); in this sample none of these medical conditions vary with age.

### **Conclusion**

Multimorbidity is highly prevalent among adults with IDD, and it is more common among older patients. Disorders associated with multimorbidity among adults with IDD include obesity, gastroesophageal reflux disease, and epilepsy. Future study should prospectively describe chronic health issues and evaluate relevant preventive interventions among adults with IDD.

## **Necrotizing Enterocolitis and Its Association with Neonatal Abstinence Syndrome**

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Jessica Haas.

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Hospital at Cabell Huntington Hospital, Huntington, WV.

### **Background**

NEC remains an important cause of morbidity and mortality, not only in preterm neonates, but in full term infants as well. The pathophysiology is poorly understood but is characterized by ischemic necrosis of intestinal mucosa. In full term infants there is frequently a pre-disposing co-morbidity. Neonatal abstinence syndrome is a withdrawal syndrome that typically occurs after in utero exposure to opioids, and is characterized by symptoms affecting the central and autonomic nervous system, as well as the gastrointestinal system. Due to issues related to rurality, poverty, and incidence of illicit drug and opiate use, WV has experienced sharp increases in rates of NAS. It is our goal to describe an association between NEC and prenatal opioid exposure with NAS in late preterm and full-term neonates born at our institution.

### **Hypothesis**

Identify an association between NEC and prenatal opioid exposure with NAS in late preterm and full term neonates.

### **Methods**

In this single-center retrospective cohort study, we analyzed inborn neonates with the diagnosis of NEC from 2012 through 2017. We compared infants with NEC >35 weeks gestation to those with NEC <35 weeks gestation. We compared gestational age, birth weight, age at onset of symptoms, and incidence of prenatal drug exposure between groups. Significance determined using Mann-Whitney and Fisher's exact tests.

### **Results**

23 infants were identified with NEC, 9 (39%) were babies >35 weeks at birth and 14 (61%) <35 weeks. Those >35 weeks had higher birth weights, earlier onset of symptoms, and higher percentage of prenatal exposure to opioids compared to <35 weeks gestation. Seven infants with late gestational age onset NEC associated with prenatal opioid exposure were described.

### **Conclusion**

In this cohort of infants with NEC we found higher than expected percentage of infants born at a later gestational age. We speculate that prenatal opioid exposure might be a risk factor for NEC in neonates born >35 weeks.



## **Osteomyelitis rates in Huntington and Cabell Co., WV.**

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### **Background**

Due to the profound impact of the opioid crisis in Huntington, WV, we wanted to assess the number of diagnoses of osteomyelitis in patients seen by Departments of Orthopaedic Surgery and Surgery at CHH/Marshall Health and determine if there was a correlation with the rising number of overdose drug deaths in Cabell County.

### **Hypothesis**

There is a correlation between the rising number of drug overdose deaths in Cabell County and the number reported diagnoses of osteomyelitis over time in the same geographic area.

### **Methods**

We queried the CHH/Marshall billing system for the corresponding ICD-9 and ICD-10 codes for osteomyelitis in the billing records. These records were de-identified in order to protect patient privacy. We used public overdose drug death data from WV Health Statistics Center. There were no exclusion criteria.

### **Results**

From 2014 through 2018, the monthly average of osteomyelitis diagnoses increased from 20.6 diagnoses/month to 47.2 diagnoses/month in the Departments of Orthopaedic Surgery and General Surgery at CHH/Marshall. From 2014 to 2017 the monthly average of overdose deaths increased from 5.8 overdose deaths/month to 15.3 overdose deaths/month in Cabell County. When comparing the two data series from 2014 to 2017 in a r2 correlational analysis there was a r2 value of 0.72.

### **Conclusion**

With a meaningful r2 value and a noticeable upward trend of diagnoses each year accompanying the upward trend in overdose deaths in Cabell County, we see that the impact of the opioid abuse epidemic is more broad than conventionally reported. The opioid crisis not only affects the mortality rates of the local patient population, but additionally is having a significant impact on morbidity of patients. This investigation also raises questions about whether current resource allocation and medical training is appropriate to manage the increase in osteomyelitis diagnoses.

## **Overtreatment of urinalysis in obstetric triage patients**

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### **Background**

Asymptomatic bacteriuria (ASB) is when there is significant number of bacteria in urine without signs or symptoms of a urinary tract infection (UTI). It can occur between 2% to 10% of pregnant women [1]. UTI in pregnancy is a source of morbidity for both mother and fetus. There are increased rates of preterm labor/delivery, maternal sepsis, maternal hypertension, chorioamnionitis, low birth weight and stillbirth [2]. When untreated it can lead to increased rates of pyelonephritis up to 20 to 30 times [1].

Overtreatment of asymptomatic bacteriuria can lead to adverse side effects, extra costs and antimicrobial resistance. There have been several studies showing that at least a third to half of patients are being over treated [4]. Most of these studies however were on nonpregnant patients.

### **Hypothesis**

The hypothesis of this study is to show that ASB is being over-treated as a UTI when most of the time it is normal skin flora or a contaminated specimen. A secondary goal of this study is to reduce over-treatment of ASB by educating residents on how to properly evaluate a urinalysis (UA).

### **Methods**

This is a retrospective chart review analyzing triage patients that come through CHH Ob Triage. Data will be reviewed for the years 2017 and 2018. Charts of patients who had a UA performed will be reviewed to see whether patient was treated for a UTI or not. A PowerPoint will be presented to OBGYN and family medicine residents on identification of those needing treatment for ASB based on to proper interpretation of a UA. This will be done every month for the first 6 months of 2018. The study will look at rate of treatment of ASB before the PowerPoint and rates after to see whether knowledge about proper evaluation of UA will decrease rate of treatment of contaminated urine.

### **Results**

Available in March.

### **Conclusion**

Available in March.

## **Real-World Treatment of Hepatitis C Virus (HCV): Evaluating Drug Therapy Effectiveness by Tracking Viral Load Progression in WV Medicaid Patients.**

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### **Background**

Hepatitis C Virus (HCV) is the etiological agent responsible for hepatitis C, a blood-borne disease affecting primarily the liver. With no vaccine currently available, HCV contributes to over 50% of new cases of chronic liver disease—a leading cause of death. High rates of intravenous drug use render Appalachia particularly susceptible. From 2007-2011, reported rates of acute HCV increased by 150% in West Virginia [1].

### **Hypothesis**

In 2011 the first of a series of novel HCV drug therapies became available, showing great promise in clearing infected patients of HCV viral load and thereby revolutionizing treatment. By 2014 four new drugs—Harvoni, Sovaldi, Olysio, Viekira Pak—had entered the market and were approved by the DUR Board for Medicaid coverage with strict criteria. Between May 2014 and July 2015, 100 WV Medicaid patients were approved for HCV treatment following American Association for the Study of Liver Diseases (AASLD) guidelines based on patient genotype.

### **Methods**

FDA approval for these therapies was based on testing in a relatively homogenous population lacking comorbidities. Our project therefore sought to establish a database evaluating the effectiveness of these antiviral agents in the real-world patient population. This entailed the collection of data on viral load progression for the 100 initial WV Medicaid patients treated for chronic HCV following the DUR Board's approval in 2014.

### **Results**

By consolidating and interpreting the data on viral load progression with respect to patient genotype, severity of disease, comorbidities and sources of referral, we were able to compile a robust database that serves as a baseline for future study, allowing insight into how HCV treatment can be improved in the years ahead and against which the effectiveness of rapidly-evolving individual therapies can be evaluated.

### **Conclusion**

#### References

[1] CDC. "Reported cases of acute, hepatitis C, by state — United States, 2007–2011." <https://www.cdc.gov/hepatitis/statistics/2011surveillance/table4.1.htm>. Accessed December 22, 2018.

# **Relationship Between Patient Malnutrition and Opioid Use Disorder in Rural West Virginia**

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Department of Psychology at Tug River Health Association

## **Background**

The opioid epidemic is a primary public health issue facing rural West Virginia and this issue is compounded by the medically underserved nature of the area. Opioid Use Disorders (OUD) takes root in small communities and spreads rapidly due to the intimacy of the group structure that can act to pressure individuals into trying substances and as triggers for relapse during recovery periods. OUD can increase the long-term risk of health complications including malnutrition, metabolic disorders, and poor mental health. Studies have shown that there is a considerable overlap in the biopsychological processes underlying eating habits and substance abuse as both share neurologic pathways. Malnutrition can lead to serious health issues, complicating OUD treatment further. The purpose of this observational study was to assess MAT programs in rural areas including nutritional status of participants.

## **Hypothesis**

We anticipate we will demonstrate a connection between nutrition and medication assisted treatment outcomes.

## **Methods**

The study population was recruited from Tug River Health Clinics, a Federal Qualified Health Center operating in McDowell County. A retrospective chart review was completed and group therapy sessions were also observed to gain a better understanding of the MAT population.

## **Results**

Preliminary data has revealed that the MAT patient population at Tug River Health clinic are malnourished.

## **Conclusion**

Vitamin deficiencies are commonly due to absorption issues which can be created or exacerbated with OUD. Therefore, nutrition is an important aspect of OUD treatment. Although strongly recommended, nutrition is either not considered or considered very lightly in treatment despite evidence that recovery outcomes can be improved by well-balanced nutrition. This may be confounded further in rural communities in which nutritious foods and nutrition therapy are more difficult to acquire. By identifying how nutrition effects OUD, the results of this study provides the potential for improvements in therapeutic care and positive outcomes for participants in MAT programs.

# **Severity and Type of Parental Stress in Pediatric Patients with Attention Deficit Hyperactivity Disorder (ADHD) Alone vs. ADHD with Coexisting Autism Spectrum Disorder (ASD): A Controlled Study**

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## **Background**

Parental stress levels have been found to be higher in families whose children have special health care needs, including the mental health disorders of ADHD or ASD. The percentage of children or adolescents who have both ADHD and ASD features (AF) is uncertain but may be as high as 50%.

## **Hypothesis**

Parents of children with ADHD with coexisting AF have higher levels and different types of parenting stress compared to parents of children with ADHD alone or controls.

## **Methods**

Over a 4 month period, parents of children diagnosed and treated for ADHD according to current American Academy of Pediatrics guidelines completed the Social Communication Questionnaire (SCQ) indicating the presence of AF by a score of  $\geq 15$ . The Parenting Stress Index-Short Form (PSI-4-SF) measuring total parental stress (TPS) and the 3 subdomains of parental distress (PD), parent-child dysfunctional interaction (P-CDI), and difficult child (DC) was also completed by the group along with controls without ADHD or AF.

## **Results**

The study groups were comprised of 155 ADHD patients, 131 (85%) without AF, 24 (15%) with AF, and 15 controls. Scores of TPS and the 3 subdomains of stress associated primarily with the parent, the relationship between parent and child, or the child were compared between the 3 groups using Chi square and ANOVA. Statistically significant differences were found between the ADHD, ADHD/AF and control populations in the levels of TPS, P-CDI, and DC. While PD was not statistically significantly different between these groups, high PD scores were significantly correlated with high TPS levels (Pearson correlation 0.78,  $p < 0.001$ ). The highest TPS scores were recorded in the ADHD/AF group ( $p < 0.01$ ).

## **Conclusion**

Parents of children with both ADHD and AF experience very high levels of stress related to problems specifically associated with their child and the dysfunctional relationship.

## **Sterility of Evzio® Brand Naloxone After Expiration**

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### **Background**

Naloxone is an opioid receptor antagonist used in the reversal of suspected opioid overdose. Evzio® is an easy to use naloxone auto-injector which guides users through the administration process. Previous studies have shown naloxone stays stable and effective for up to a year following expiration when stored properly.

### **Hypothesis**

Evzio® brand naloxone will also stay sterile after expiration if stored in proper conditions.

### **Methods**

Using a LAL Chromogenic Endotoxin Quantification Kit, 12 Evzio® auto-injectors and 1 Leur-Jet Leur-Lock naloxone syringe with expiration dates ranging from July 2016 to June of 2018 were tested against a USP standard of less than 500 Endotoxin Units (EU) per milligram of naloxone. Controls used included endotoxin free water and EU standard solutions of 1 EU/mL, 0.5 EU/mL, 0.25 EU/mL, and 0.1 EU/mL. All samples and controls were performed in duplicate. Absorbance of the controls were measured between 405-410 nm and a standard curve was created. Concentration of EU for the unknown samples were derived from this equation.

### **Results**

Of 36 test samples, 32 produced usable data. The four duplicate positive controls were thrown out, as three did not react and one was contaminated. The endotoxin units detected in the naloxone samples ranged from 0.013 EU/mg to 0.134 EU/mg.

### **Conclusion**

All the naloxone samples tested were under the USP standard of 500 EU/mg, indicating it has stayed sterile in the device for up to two years. With further testing, it is possible the expiration date for Evzio® auto-injectors could be extended to increase the amount of naloxone available in the National Strategic Stockpile.

# **THE IMPACT OF GENDER ON IN HOSPITAL MORTALITY OF HYPERTENSIVE PATIENTS ACROSS CKD STAGE 3 TO ESRD: A NATION WIDE ANALYSIS.**

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## **Background**

Hypertension and chronic kidney disease are two of the most important risk factors for cardiovascular disease, a major cause of death in the US population. Studies comparing the outcomes and differences in inpatient mortality between males and females with hypertension and CKD are sparse.

## **Hypothesis**

Our aim was to determine if gender in the US population and menopausal age affect the inpatient survival rate among hypertensive patients across different CKD stages and races.

## **Methods**

Data was extracted from the 2005 to 2012 Nationwide Inpatient Sample (NIS). Using propensity score matching, female hypertensive with chronic kidney disease (stage 3, 4, 5 or ESRD) patients were matched with hypertensive males at a 1:1 ratio. We compared inpatient mortality, both crude mortality and mortality per CKD stage, menopausal age, length of stay, and total hospital charges between male and females of different races.

## **Results**

Among 120,269 hospitalized hypertensive patients with CKD 3 to ESRD patients on dialysis, 58,508 (48.65%) were females and 61,761 (51.35%) males. 29.5%, 19.6%, 4.35% and 46.5% were Females with CKD 3 to ESRD respectively. Males across CKD stages 3 to ESRD were 31.7%, 18.2%, 4.1% and 46% respectively. In-hospital mortality comparing pre- menopausal and post menopausal to age matched group of males, there was a higher mortality in males, whereas females died more if they had concomitant ESRD.

## **Conclusion**

Inpatient mortality risk of women compared to men through stages of CKD 3 to ESRD, appears to be reduced in pre-menopausal women, comparable after menopause and increased when on dialysis, for all race groups except Caucasian.

# **Tweaking the Suprapubic Cystostomy Procedure: New Tricks for an Old Dog**

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## **Background**

While trocar suprapubic cystostomy remains a viable option for placing a suprapubic tube in an antegrade fashion, there remains a 2-3% incidence of bowel injury with this approach.

## **Hypothesis**

The retrograde approach for suprapubic tube placement is generally safer, although the instruments used to perform the operation are somewhat cumbersome; accordingly, we have developed 2 alternative methods for retrograde tube placement.

## **Methods**

The Trans-Urethral Supra-Pubic Tube Guide, or TUSP, is basically a hollow, curved urethral sound which may accommodate up to a 20 French catheter. It has a screw-on endpiece with a central hole, thus allowing the option of TUSP placement over a guidewire. Removal of the endpiece allows the surgeon to pass a catheter into the end of the sound once its tip has been exposed in the suprapubic region. The TUSP is then withdrawn, and the tube is pulled back into the bladder under direct vision. The second procedure is very similar, except that it involves cutting the tip off a Foley catheter, and wedging the end of the catheter very firmly onto the tip of the same size sound, which has been passed per urethra and brought out through the bladder dome. The sound/catheter assembly is then withdrawn, catheter disconnected from the sound, and cystoscope reintroduced to verify optimal catheter placement as the catheter tip is pulled back into the bladder.

## **Results**

We have performed these procedures on 20 patients, with minimal perioperative morbidity; however, there was 1 case of bowel injury. Operative time is usually under 30 minutes. Generally, an 18 French catheter is placed at the first operation, and exchanged monthly thereafter.

## **Conclusion**

We trust that the 2 alternatives described above will prove useful to urologists in the non-trauma setting, either as a primary approach, or perhaps as a back-up plan if the surgeon's preferred instrumentation is missing or compromised in some way.



# Using Patient Satisfaction Questionnaire as an Assessment and Feedback Tool for Medical Students in Third Year Clerkship

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## Background

Feedback is an important aspect of medical student education, but it is often limited to a physician's perspective. Standardized patient encounters are a routine part of third year clerkships, but there is minimal data on the benefits of involving real patient feedback.

## Hypothesis

We hypothesize that including direct patient feedback exercises into third year medical school clerkships will increase medical student satisfaction with their education.

## Methods

Medical students must complete two patient feedback encounters during their Obstetrics and Gynecology third year clerkship. After an encounter, the patient completes a form to rate the student's performance and leave comments. Faculty and residents were educated on the intervention and asked to discuss the results with the student. For this study, the students were asked to rate both if the intervention was useful, and if it encouraged faculty/resident feedback. Responses were compared from 2016 to 2018. Graduate questionnaires from 2014 to 2018 were obtained and three questions were analyzed, including "observed taking a history," "faculty provided effective teaching," and "overall quality of medical student experience."

## Results

Overall, 71% of students responded "agree" or "strongly agree" that the intervention was useful and helped improve performance, with no significant difference in responses from 2016 to 2018. There was a significant increase in the number of students who agreed that the intervention encouraged useful faculty feedback in 2018 when compared to previous years ( $p= 0.007$ ). No significant difference was noted in the responses to the graduate questionnaire over the years.

## Conclusion

Overall there was a positive response to direct patient feedback. Students reported that they found the patient comments rather than their overall score most helpful. Our study also showed that this novel approach to feedback provides a good opportunity for faculty and residents to review the students' performance and give valuable feedback.





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